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The Role of Prosody and Morphology in the Mapping of Information Structure onto Syntax

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Abstract: The mapping of information structure onto morphology or intonation varies greatly crosslinguistically. Agglutinative languages, like Inuktitut or Quechua, have a rich morphological layer onto which discourse-level features are mapped but a limited use of intonation. Instead, English or Spanish lack grammaticalized morphemes that convey discourse-level information but use intonation to a relatively large extent. We propose that the difference found in these two pairs of languages follows from a division of labor across language modules, such that two extreme values of the continuum of possible interactions across modules are available as well as combinations of morphological and intonational markers. At one extreme, in languages such as Inuktitut and Quechua, a rich set of morphemes with scope over constituents convey sentence-level and discourse-level distinctions, making the alignment of intonational patterns and information structure apparently redundant. At the other extreme, as in English and to some extent Spanish, a series of consistent alignments of PF and syntactic structure are required to distinguish sentence types and to determine the information value of a constituent. This results in a complementary distribution of morphology and intonation in these languages. In contact situations, overlap between patterns of module interaction are attested. Evidence from Quechua–Spanish and Inuktitut–English bilinguals supports a bidirectionality of crosslinguistic influence; intonational patterns emerge in non-intonational languages to distinguish sentence types, whereas morphemes or discourse particles emerge in intonational languages to mark discourse-level features.

Keywords: intonation; morphology; Quechua; Inuktitut; Spanish; English

Citation: Colantoni, Laura, and Liliana Sánchez. 2021. The Role of Prosody and Morphology in the Mapping of Information Structure onto Syntax. *Languages* 6: 207. https://doi.org/10.3390/languages6040207

Academic Editors: Ingo Feldhausen, Caroline Féry and Frank Kügler

Received: 20 February 2021
Accepted: 19 November 2021
Published: 13 December 2021

1. Introduction

When discussing the crosslinguistic variability in sentence stress patterns, Ladd (2008, pp. 251–53) asks himself whether languages can differ "without limit and in unpredictable ways" or if the variation is constrained in some principled way. Much of the research that has explored the prosodic marking of information structure has accounted for this variability by looking at the syntactic properties of a given language (Kügler and Calhoun 2020). We want to contribute to this discussion by focusing on morphology, which has been acknowledged to play a role (e.g., Büring 2010, p. 177) but has been comparatively less studied (e.g., Kügler and Calhoun 2020). We begin our exploration with the analysis of two indigenous languages of the Americas, Quechua and Inuktitut, which have been described as having a very limited use of intonation (Johns 2010; Shokeir 2009, for Inuktitut; Sánchez 2010, for Quechua). This limited use of intonation appears to characterize also the second languages (Spanish and English, respectively) spoken by L1 Quechua and Inuktitut speakers, and may be a general characteristic of the L2 spoken by speakers of indigenous languages, at least in North America (Newmark et al. 2016).

Without excluding other possible explanations[1], we hypothesize that these languages are at an extreme of a continuum of possible interactions across language modules. In

these languages information structure is mapped onto a rich morphological layer with very limited or no prosodic marking of information structure and/or sentence type. At the other extreme of the continuum, we find languages such as English and Spanish, which lack a rich set of grammaticalized morphemes that convey discourse-level information but use intonation to a relatively large extent (Ladd 2008; Vallduví 1990). However, even within this latter group of languages, the division of labor between syntax and prosody varies, with English relying more on prosody and Spanish more on syntax to mark information structure.

We propose here that this crosslinguistic difference follows from a division of labor across language modules very much inspired in previous analyses of focus (e.g., Féry 2013; Xu 2004), such that two extreme values of the continuum of possible interactions across them are available. At one of the extremes of the continuum, a rich set of morphological markers with scope over constituents convey sentence-level distinctions, as in (1), and discourse-level values such as focus and evidentiality (attested or reported information), as in (2). In languages such as Inuktitut and Quechua, the alignment of intonational patterns and information structure is apparently redundant. This, of course, does not preclude the existence of languages at the center of the continuum that allow for morphology and intonation to interact with syntax and information structure.

Inuktitut

1. a. Taku- vutit (Dorais 2010, p. 283)
   See Intr–2.S Declarative
   "You see (something)"
   b. Taku- jutit (Dorais 2010, p. 284)
   See Intr–2.S. Indicative
   "You see (something)"
   c. Taku- viit (Dorais 2010, p. 284)
   See Intr–2.S. Interrogative
   "Do you see (something)?"

Quechua

2. a. Mariya-m papa-ta mikhu-rqa-n[2]
   Mariya-EVID.ATT.FOC potato-ACC eat-PST.ATT.3.S
   "Mariya ate potatoes" (attested information)
   b. Mariya-s papa-ta mikhu-sqa-n
   Mariya-EVID.REP.FOC potato-ACC eat-PST.REP-3.S
   "Mariya ate potatoes" (reported information)

At the other extreme, a series of consistent alignments of PF and syntactic structure are required to establish major distinctions between different types of sentences, such as declaratives or yes/no questions, as in (3), as well as to determine the relevant information value of a constituent (e.g., topic or focus), as in (4) (Ladd 2008).

3. a. Poppy wrote the paper.
   b. Did Poppy write the paper?
4. I think Stella wrote the paper.
   No, POPPY wrote the paper.[3]

Given the crosslinguistic differences sketched above, our goal is to explore two research questions. First, is there a complementary distribution in the use of morphology and prosody to mark information structure and sentence type in Quechua and Inuktitut? Second, what patterns can we predict for bilingual speakers in each contact situation? In the rest of the paper, we will argue that the possible division of labor across modules may result in configurations in which syntax interacts with morphology or with intonation, resulting in the latter two being in a continuum of different levels of interface with syntax, so that in some languages intonation has a greater role, whereas in others, like Inuktitut and Quechua, morphology does (see Section 4). To support our proposal, we will summarize the main

findings of the literature on the mapping of information structure onto the morphology, syntax, or intonation (Section 2) and present evidence regarding the marking of sentence type and focus or topic in Quechua and Inuktitut (Section 3). In the final section, we will show that our proposal has consequences for the development of bilingual grammars, since in language contact situations, overlap between the two patterns of module interaction can occur, as allowed by our view that modular interaction takes place along a continuum. We will provide evidence from Quechua–Spanish and Inuktitut–English bilinguals that supports the view that there is bidirectionality of crosslinguistic influence such that intonational patterns emerge in non-intonational languages to distinguish sentence types. Conversely, morphemes or discourse particles emerge in intonational languages to mark discourse-level features such as focus and evidentiality.

2. Background: Morphology, Syntax, Information Structure, and Intonation

The current proposal stems from a generalization over a series of empirical observations and theoretical proposals regarding the mapping between information structure and different components of the grammar. First, several morphologically rich (polysynthetic and/or agglutinative) languages have been described as having very little intonational variation along the utterance, with tonal movements mostly restricted to utterances' edges. Indeed, in such languages, intonation seems to be used mostly for demarcative purposes. This is not only the case of the languages under analysis here (see Section 3), but it has also been reported for some Australian languages (Fletcher and Evans 2002; Ross et al. 2016). Moreover, if we look at the prosodic typology proposed by Jun (2014), all the languages classified as "edge-prominence languages", listed in Table 1 below, are agglutinative. Edge-prominence languages do not have any lexically or post-lexically specified head and mark prominence at the edge of the word or phrase. From a morphological point of view, all these languages have affixes to mark sentence types and/or information structure (e.g., Arnhold 2014; Fortescue 2017a for Eskimo-Aleut languages; Igarashi 2014; Kubozono 2007 for Japanese; Jeon and Nolan 2017; Song 2005 for Korean; Karlsson 2014, for Mongolian).

Table 1. Macro-rhythm of edge-prominence languages (adapted from Jun 2014: Table 17.3).

Language	Accentual Phrase/Tone Inventory	Domain Edge
West Greenlandic	Prosodic word-final: HLH, HL, LH)	≈Content word
Japanese, Kobayashi	Word-final H	≈Prosodic word
Japanese, Koriyama	LHL Accentual phrase tone melody	≥Prosodic word
Japanese, Yamagata	LHL Accentual phrase tone melody	≥Prosodic word
Korean, Seoul	Accentual phrase-initial: LH or HH; Accentual phrase-final: LH, L, H	≥Prosodic word
Mongolian, Halh	Accentual phrase initial: LH	≥Content word
Mongolian, Oirat	Accentual phrase tone melodies: H, L, LH, HH	≥Content word

This empirical observation, which highlights a possible link between morphological and prosodic typology, prompted us to explore a long-standing theoretical debate, namely the division of labor and/or the mapping between phonology (prosody in our case) and other components of the grammar. The claim that there is a division of labor between prosody and other components of the grammar is not new. Researchers have noted, for example, that languages may use morphemes to "convey the kinds of meaning that in other languages can often be signaled intonationally" (Ladd 2008, p. 5). Among those morphemes, Ladd briefly mentions question and focus particles. Discussions on the complementarity of particles and intonation are particularly prominent in Cantonese linguistics (see Wakefield 2012 for a summary), and experimental studies, such as Wakefield (2012), revealed that the Cantonese particle *lo1*, which is used to express "obviousness", is systematically translated into English by using a high-low contour. We interpret this as

further evidence of the possible complementarity between morphology and prosody in some languages at the two extremes of a continuum of modular interaction.

Since the division of labor between morphology and prosody has attracted less attention than the relation between prosody and syntax (Kügler and Calhoun 2020), we will build our current proposal taking as a point of departure the existing literature on the relations between prosody and syntax. Thus, we turn to Vallduví's (Vallduví 1990; see also Ladd 2008) idea of plasticity, which states that if a language has flexible word order, then it is less likely that prosody will be used to mark focus. When comparing focus marking in Romance (Catalan and Spanish, in particular) with Germanic languages (English), Vallduví observes that since intonational prominence is clause final in Catalan (5), focus fronting (6) is a way to give prominence to non-final constituents. Thus, if the word *ganivet* 'knife' needs to be focalized, it can be moved to clause-initial position. English, instead, can mark focus in situ by associating a pitch accent with the focalized word.

5.	Hi	fiquem	el	ganivet	al	calaix.
	There	put	the	knife	in the	drawer
	"I put the knife in the drawer."					
6.	El	GANIVET	vaig	ficar	al calaix de dalt	
	The	knife	I	put	in the top drawer	
	"I put the knife in the drawer."					

Since Vallduví's original proposal, many experimental studies have challenged this binary classification. Face and D'Imperio (2005) have proposed to treat "plasticity" as a continuum, since there is evidence that languages within the same family (in their case, Madrid Spanish and Neapolitan Italian) differ in their use of syntactic and prosodic cues to mark focus, with Spanish being closer than Italian to the word order extreme of the continuum, since Spanish uses word order or intonation to mark focus whereas Italian uses both. More recent studies have further nuanced a rigid typological division, showing that even in Catalan multiple strategies may be used to mark focus (Feldhausen and Villalba 2020) and that varieties of the same languages differ in the extent to which they use word order or prosody to mark focus (Feldhausen and Vanrell 2014, 2015; Gabriel et al. 2009; Gabriel 2010).

The proposal that languages may either resort to syntax or to prosody to mark focus continues to be present in more recent theoretical models. In particular, the analysis of focus as prosodic alignment (Féry 2013) distinguishes the linearization of the focalized constituent (at the left or right of a prosodic domain) from the linguistic mechanisms used to signal such alignment, which may range from morpheme insertion to the use of pitch accents or deaccenting. Thus, if prosodic alignment is fulfilled by non-prosodic mechanisms in a given language, there is no need to mark focus prosodically. Crucially, this does not imply that focus cannot be marked redundantly by both prosody and morphology.

In summary, this literature reveals that languages are situated along a continuum regarding whether they resort to either syntax or prosody to mark information structure. There are clear cases at the extreme of such continuum (e.g., English resorting to intonation to mark focus) and languages that may use both (e.g., Catalan). Thus, we propose here to extend this idea regarding the weak complementarity between prosody and other components of the grammar to morphology. We suggest, then, that languages that have a rich morphology with particles or affixes that are used to mark questions, information structure or evidentiality tend to have a very limited use of intonation to mark, for example, sentence type or focus. This does not mean, though, that prosodic marking of such linguistic structures cannot be present in these languages or be introduced through language contact, as we will show later in this paper. In the next section, we will explain why this redundancy is apparently avoided in some languages by turning to Gussenhoven's analysis of tonal events as morphemes, which will allow us to articulate why in those languages either morphology or prosody interact with syntax in the marking of information structure. The languages that we are using to illustrate our point, i.e., Inuktitut and Quechua, have both a rich morphology and a limited use of intonation, as we will see in our next section.

3. Empirical Evidence Supporting the Relevance of Morphology

Inuktitut and Quechua are morphologically rich languages. Both have been considered agglutinative with words formed by a sequence of morphemes representing for the most part different grammatical categories. (Inuktitut: Fortescue 2017a; Johns 2010. Quechua: Cerrón-Palomino 1988) although in Quechua some morphemes may be syncretic.[4] Inuktitut could arguably be classified as a polysynthetic language, whereas Quechua cannot be classified as a polysynthetic language, under the assumption that polysynthetic languages are characterized by morphological marking of all the arguments on the head of the phrase as well as by exhibiting other properties such as noun incorporation (Baker 1996).[5] As has been extensively discussed in the literature (e.g., Fortescue 2017a, 2017b; Greenberg 1960), languages differ along the polysynthesis continuum, with Eskimo-Aleut languages being at the highest extreme of such continuum, since eight or more suffixes can be added to a lexical root, and arguments are marked on the head (see Fortescue 2017b; Greenberg 1960). Inuktitut also exhibits what Fortescue (2017b) terms quasi-incorporation. Of relevance to our proposal, Inuktitut and Quechua exhibit patterns of morphological regularity with a morphological template for words composed of roots and suffixes. Both have rich derivational and inflectional morphology and allow for single prosodic words with complex syntactic structure. In Inuktitut, as well as in Quechua, morphology and syntax can be recruited to convey information structure. Both languages have a limited use of pitch at the lexical and post-lexical level. Finally, Inuktitut and Quechua have been in contact for centuries with intonational languages (French and English vs. Spanish, respectively) with extended bilingualism among Inuktitut speakers (Dorais 2010; Statistics Canada 2019) and increasing levels of bilingualism among Quechua speakers. Thus, we conclude this section with a brief descriptive summary of the relevant structures in English and Spanish to be able to compare the four languages and derive our predictions in the next section.

3.1. Quechua

Quechua is a family of languages spoken in Bolivia, Perú, Ecuador, parts of Colombia, and parts of northern Argentina. Quechua varieties are agglutinative suffixal languages. Cerrón-Palomino (1988) notes that in Quechua languages the structure of a word (maximally expanded) can be schematized as having a root followed by derivative suffixes (optional), inflectional suffixes (obligatory with verbs), and independent suffixes which include suffixes that convey information structure. Rich derivational morphology in the verbal domain in Quechua allows for complex words involving causative and aspectual suffixes that in languages like English are phonologically independent words. The contrast is shown in 7a. (a single prosodic word) and b. formed of multiple prosodic words:

7.
a. Wañu-naya-chi-wa-n
Die-DES-CAUS-1.OBJ-3S
"(S/he) makes me want to die"
(Cerrón-Palomino 1988)
b. She makes me want to die.

Quechua languages have also been reported to have either initial or penultimate stress (see Hintz 2006 for a summary). The variety illustrated here, i.e., Cusco Quechua, has been described as having fixed penultimate stress (Cusihuaman 1976). Ultimate stress is exceptional (a handful of words and for emphatic purposes, particularly with the vocative suffix) and there are no words with antepenultimate stress. As concerns the acoustic correlates of stress, Cusihuaman (1976) suggests that intensity is the main correlate, although his conclusion is not drawn from systematic acoustic analysis. Indeed, one of the few available acoustic analyses of stress in Conchucos Quechua (Hintz 2006) reveals that although f0, duration and intensity are all reliable acoustic correlates of stress, f0 appears to be the most reliable.

Cusco Quechua is characterized by morphological marking of focalized and topicalized constituents, as shown in (8):

8. Pirdu-m wasi-ta-qa ruwa-rqa-n.
Pirdu-FOC/EVID house-ACC-TOP build-PAST-3.S
"It is attested that it was Pirdu who built the house" (Sánchez 2010, p. 7)

In this example the marker *-m* is syncretic and has two features: focus (new information) and evidentiality (source of information) while the suffix *-qa* marks information that is shared by speaker and hearer (topic or ground). In most varieties of Quechua, focus is not marked by stress or any special intonational pattern as in languages like English nor is it conveyed by a non-canonical word order. It can be marked by evidential suffixes such as *-m* in (8) or when it is contrastive by the suffix *-taq*. Canonical word order in Quechua is SOV when the sentence has wide focus, namely, the sentence in its entirety provides new information, as shown in (9a-b). In both cases, the first constituent is marked with an evidentiality morpheme, the attested evidentiality morpheme *-m* in (9a) and the reported evidentiality morpheme *-s* in (9b). Notice that evidentiality can also be conveyed by past tense morphemes:

9. a. Mariya-m papa-ta mikhu-rqa-n
Mariya-EVID.ATT potato-ACC eat-PST.ATT.3.S
"Maria ate potatoes" (attested)
b. Mariya-s papa-ta mikhu-sqa-n
Mariya-EVID.REP potato-ACC eat-PST.REP-3.S
"Maria ate potatoes" (reported, as in they say)

Focused or topicalized constituents may be fronted as long as they are morphologically marked as shown in (10) and (11):

10. Wasi-ta-qa Pirdu-m ruwa-rqa-n.
House-ACC-TOP Pirdu-FOC/EVID build-PAST-3.S
"The house, Pirdu built (it)"
(Sánchez 2010, p. 71)

11. T'anta-ta-m Huwan miku-rqu-n.
Bread-ACC-FOC/EVID Huwan eat-PERF-3.S
"It was bread what Juan ate."

Regarding sentence types, yes/no interrogatives are morphologically marked by the suffix *-chu* which can attach to verbs, nouns, and adverbials or adjectival words. In (12) we see it marking a verb:

12. Hamu-nki-chu
Come-2.S-INT
"Are you coming?"

Wh-questions are characterized by wh-fronting and overt morphological marking of the wh-word with an evidentiality/focus syncretic marker:

13. Ima-ta-m Mariya muna-n?
what-ACC-FOC/EVID Mariya want-3.S
"What does Mariya want?"

Declaratives may exhibit evidentiality/focus marking on the leftmost constituent:

14. Papa-ta-m muna-n
Potato-ACC-FOC/EVID want-3.S
"(He/She) wants potatoes."

Descriptions of Quechua intonation are mainly based on analyses of Cusco Quechua. O'Rourke (2009) studies the declarative intonation in the read speech of four bilingual speakers and Muntendam and Torreira (2016) explore patterns of broad and contrastive focus in NPs obtained through a dialogue task. Declaratives are characterized by a downstep pattern. Additionally, Levinsohn (1972), using auditory analyses, reports that declaratives and interrogatives have identical intonation contours. No clear prosodic correlates of focus have been reported in the literature. At least, this seems also to be the case of Tena Quechua

(O'Rourke and Swanson 2013). Thus, to confirm these descriptions, we analyzed data collected in the community of Tiracancha, Cusco, Peru.[6] Fifteen adult participants, all Cusco Quechua dominant speakers were administered among other tasks, a picture-based acceptability and elicited imitation task. From that dataset, we examine data pertaining to a yes/no question, a sentence with narrow focus on the subject and a sentence with broad focus. First, our inspection of intonational patterns of yes/no questions confirmed Levinsohn's (1972) observation that these end with a fall as declaratives do (Figure 1).

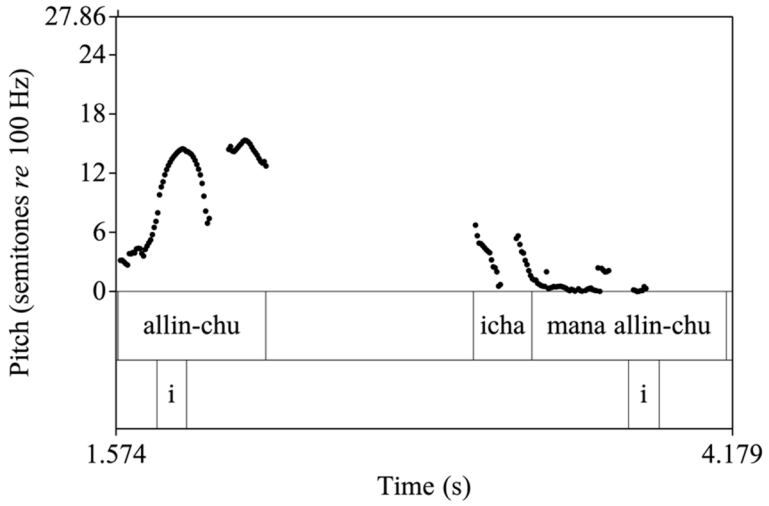

Figure 1. Final falling contour in a yes/no question "Good or not good?" as produced by a male Quechua–Spanish bilingual.

Second, we analyzed mean f0 and duration values of the vowels in sentences with narrow focus on the subject, such as (15) (see Figure 2) and compared them with other sentences with broad focus, such as (16) (see Figure 3).

15. Qhari-n llanta-ta chiqta-chka-n
man-FOC/EVID wood-ACC cut-PROG-3.S
"The man is cutting the wood"

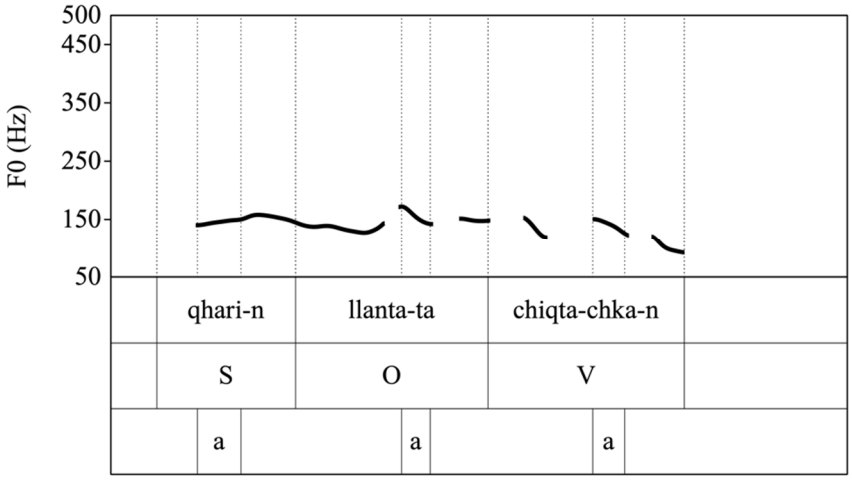

Figure 2. Intonational contour corresponding to example (15), as produced by a male speaker of Cusco Quechua.

16. Awilu-n punchu-ta awa-chka-n
Grandfather-FOC/EV poncho-ACC weave-PROG-3.S
"An old man is weaving a poncho."

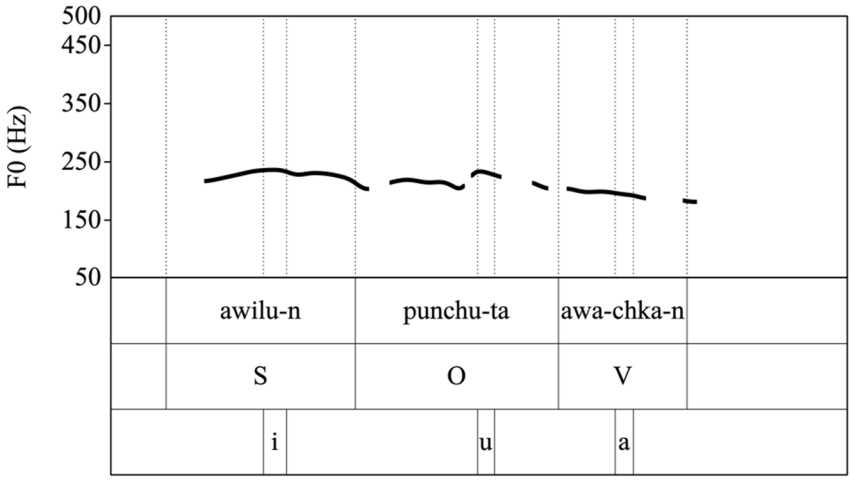

Figure 3. Intonational contour corresponding to example (16), as produced by a female speaker of Cusco Quechua.

These sentences were obtained using a contextualized elicited imitation task in which participants saw a picture and listened to a pre-recorded question and a pre-recorded answer. They were then asked to provide an acceptability judgment for the answer sentences and then say the sentence the way they would say it. To elicit acceptability judgments and elicited imitations of sentences with narrow focus on the subject, as the example in (15), participants heard the question 'Who is cutting wood?' and an answer to that question, whereas to elicit sentences with broad focus, they heard the question 'What is happening in the picture?', and an answer to that question. Since this is a relatively open task, not all participants responded with either the expected lexical item or the default (SOV) word order when providing their version of the answer. Out of the 15 participants tested (9 female), 11 produced utterances with the expected word order, whereas the remaining four (participants 2, 6, 8, and 14) answered using the OSV word order. In the broad focus context, five participants (2, 6, 7, 8 and 5) answered using different word orders (VOS or OVS) or substituted the object with an adverbial expression. Finally, one participant (#14) omitted the object. Thus, we conducted an acoustic analysis on the relevant pairs of utterances produced by nine participants. Tables 2 and 3, respectively, display the mean f0 (in semitones, ST) and duration values measured on the stressed vowel of each constituent.

Table 2. Mean f0 values (in ST) obtained from utterances with narrow focus on the subject and with broad focus displayed by participant.

Participant	S		O		V	
	Narrow	**Broad**	**Narrow**	**Broad**	**Narrow**	**Broad**
P1	6.5	7	7.5	5.2	6.2	2.6
P3	6	2.3	6.5	na[7]	2.3	na
P4	3.4	8	2.7	7.9	0.3	2
P5	3.9	5.3	3.3	4	0.8	1.6
P9	16	16.2	14.1	14.6	15	13.9
P10	14.8	14.3	13.3	14.4	13.7	13.3
P11	14.7	14.9	13.1	14.6	11.3	11.5
P12	5.1	7.8	3.5	7	2.4	1.4
P13	14.8	15.9	13.4	15.5	13.1	12.9

Table 3. Mean duration values (in ms) obtained from utterances with narrow focus on the subject and with broad focus displayed by participant.

Participant	S		O		V	
	Narrow	**Broad**	**Narrow**	**Broad**	**Narrow**	**Broad**
P1	118	101	75	53	78	68
P3	94	38	71	45	75	57
P4	120	87	41	54	66	66
P5	175	90	51	71	69	75
P9	110	81	57	39	51	45
P10	88	81	50	36	62	44
P11	125	57	54	41	65	44
P12	186	104	69	47	68	54
P13	191	58	61	39	63	57

If participants use pitch to mark narrow focus on the subject, we expect to see higher f0 values in the subject than in the other two constituents. We also expect to obtain higher values for the focalized subject than for the subject in broad focus. Values obtained suggest that, at least as concerns f0, the f0 drop between subjects and objects in narrow focus contexts is minimal or non-existent for five participants. One participant (#10) has a difference of 1.5 ST, two participants (#11, #12) have differences of 1.6 ST, and a difference of 1.9 ST was obtained for Participant 9. If we consider that research casts doubt about the perceptibility of differences below 2 ST (see Niebuhr et al. 2020 for a summary), we can conclude that there is only one participant (#9) who produced a difference that may be perceptible. If we compare the pitch patterns in narrow and wide focus, we see that there is only one participant (#3) whose values are higher in narrow than in broad focus. Finally, if we examine the f0 movement between subjects and objects in both contexts (narrow and broad focus), we see that the change is below the threshold of perceptibility. This may be indicative of an absence of declination (i.e., the successive lowering of pitch accents; see Pierrehumbert 1980; Connell 2011), a feature which has also been observed in Inuktitut (Shokeir 2009), as we will see below.

If we turn to the duration results (Table 3), clearer patterns emerge. In all cases the duration of the vowel of the constituent in narrow focus is longer than the vowels in the other two constituents. On average, the stressed vowel of the constituent in narrow focus is 75.3 ms longer than the stressed vowel of the object. Moreover, for all participants the duration difference is above the 20 ms threshold of perceptibility (Nooteboom 1999). Although this tendency is also present in broad focus contexts (the average difference between the stressed vowels of the subject and object is 30.2 ms), the magnitude of the difference is much larger in narrow focus.

Thus, these preliminary results, which are based on a small corpus (one token per condition), which was not designed for prosodic analysis (e.g., the syllable structure of the words analyzed as well as the type of vowels are not the same across constituents), suggest that f0 differences are not reliably used to mark focus in Cusco Quechua. Duration, however, may be a more systematic correlate. Other strategies, such as phrasing, are more difficult to evaluate, since participants tend to independently phrase each prosodic word.

3.2. Inuktitut

Inuktitut is an Eskimo-Aleut language which has been in contact with English and French since the 16th century (Dorais 2010). Like other languages in the family, Inuktitut is a highly polysynthetic language, with a rare type of polysynthesis, which Fortescue (2017b), following Mattissen (2003), defines as "affixal + scope". This means that successive affixes that are added to the word-base or radical are cumulative as regards semantic scope. Thus, changing the order of morphemes changes the meaning of the word. All words begin with a lexical stem and finish with inflections. The stem or radical expresses the basic meaning of the word and may be followed by lexical and grammatical affixes, in

that order (Dorais 2010; Fortescue 2017a). Thus, the word-internal syntax is, according to Dorais (2010), more important than word-external syntax.

In the variety under analysis, there are four types of words: nouns, verbs, localizers/demonstratives, and small words (Dorais 2010). Nouns inflect for number (singular, dual, plural) and case (see Dorais 2010, pp. 70–76). Nouns may end up with a grammatical suffix indicating the possessor. Verbal lexemes, which, as opposed to nouns can constitute sentences by themselves, begin with a verbal radical (or with a noun radical + a verbalizing suffix) and may contain morphemes indicating person of the subject and object, modalities and aspect and definiteness of the object (Dorais 2010, p. 76). Inuktitut has 10 verbal moods. Among those, there is a declarative mood, which "shows that what one is telling actually occurred" (Dorais 2010, p. 78), an indicative mood, which expresses a generic event, and an interrogative mood (see 1a–c above).

The default word order is SOV (17a), but word order is reported to be flexible in declaratives and yes/no questions, as opposed to wh-questions (Sherkina-Lieber 2004). Studies on West Greenlandic (e.g., Fortescue 1984, 2017a) reveal that variation in word order depends on the information structure, as in other languages with flexible word order. In declarative sentences, the SVO order is used when the object is focalized (17b), whereas the VOS is used when the subject is focalized. An OSV order, instead, is used when the object is a topic (Fortescue 1984). Berge (2011), who studies topic and discourse structure in West Greenlandic, explains that focus constructions (right dislocations as exemplified in 17b) are used when the speaker has not clearly identified the topic in an ambiguous text.

17. a. Broad focus word order

Piniartu- p	puisi	pisar- a- a.
hunter ERG	seal.ABS	catch IND.TR 3SG.3SG

"The hunter caught the seal."

b. Focalized object

Piniartu-p	pisar-a-a	puisi.	(Fortescue 1984, p. 181)
hunter ERG	catch IND.TR 3SG.3SG	seal.ABS	

"The hunter caught the seal."

18. Context: At a potluck party, you see a delicious fish and you wonder who brought it; you ask and you get the following reply:

iqalu-mit Miali naksaq-tuq
fish-ACC Mary brought 3sg IND
"As for the fish, it was Mary who brought it" (Sherkina-Lieber 2004, p. 127)

Relatively little is known about Eskimo Aleut languages' prosody. The few existing studies on Inuktitut lexical prosody consistently show that the language has no stress. This has been tentatively concluded by Fortescue (1983), through the acoustic analysis of a small set of utterances, and later confirmed both through the acoustic analysis of narrative data (Shokeir 2009), and in a recent study involving words uttered in isolation and short dialogues (Arnhold et al. Forthcoming). Both studies revealed that differences in f0, intensity, or duration were not marking stress but were rather consistent with phrasal patterns, such as the f0 declination that is expected in a declarative sentence in final position. Additionally, Shokeir (2009) reports no differences in vowel quality.

As concerns the intonation of sentence types, two studies (Massenet 1980; Fortescue 1983) provide initial acoustic evidence of the final intonation contours of declaratives and interrogative utterances in different varieties of the language. Massenet (1980), who studies the variety spoken in Resolute Bay, suggests that declaratives have a rise associated with the penultimate syllable followed by a fall. The final contours associated with interrogative utterances depend on the type of question. For example, yes/no questions are signaled by a rise, associated with the antepenultimate syllable followed by a low tone and subsequent rise (HLH). In this type of questions, there is also vowel lengthening (the vowel doubles in duration, according to Massenet). In echo questions, instead, the author observed the same f0 contour, but the vowel triples its duration. Fortescue (1983) describes the intonation contours of two short declaratives and the corresponding interrogatives in twelve Eskimo varieties. He concludes that dialects differ in their rhythmic patterns (syllabic vs. mora

time); in the syllable to which the tonal movement is associated, and finally regarding whether interrogatives end with a rise or fall. Of the varieties surveyed in the study, the two that are closer to the one under analysis here are reported to have falling intonation contours in declaratives and either a sustained pitch or a sharp rise (associated with the penultimate syllable) plus vowel lengthening in interrogatives.

More recent work (Shokeir 2009), based on the analysis of multiple narratives produced by speakers of Inuktitut and couched within the Autosegmental metrical framework (e.g., Ladd 2008; Pierrehumbert 1980), concludes that: (i) tonal movement is mostly restricted to the end of the utterance/turn and tonal movements are strictly aligned with the final two syllables of the utterance; (ii) rising contours (LH) have the basic meaning of continuation, and can be used in intonation lists, in utterance-initial locatives or to hold a turn (Figure 4)[8]; (iii) falling contours (HL) have the basic crosslinguistic meaning of finality and, thus, usually signal the end of a turn (Figure 5); (iv) rising contours are also found in interrogatives but the main phonetic correlate of questions seems to be the lengthening of the vowels in final position. Varieties show slight differences in the timing of the fall. For example, Shokeir (2009) shows that in Nain, there is a fall from the penultimate to the ultimate, whereas in the variety spoken in Iqaluit, there is a slight rise in the penultimate and a fall associated with the ultimate. An additional interesting conclusion is that this variety does not show the declination patterns that are characteristic of most of the world languages, i.e., the tone remains levelled until the end of the utterance.

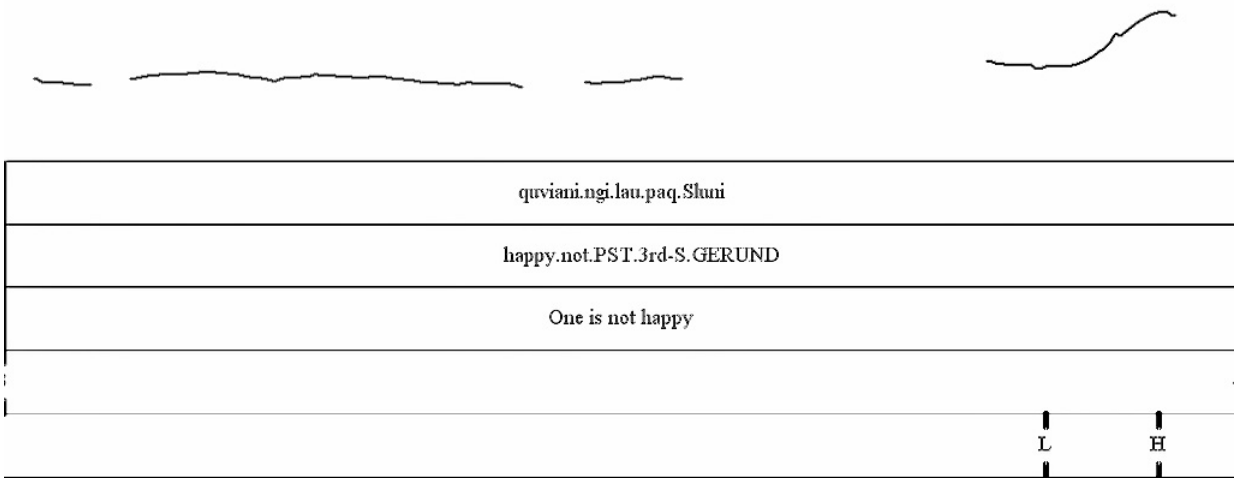

Figure 4. Rising intonation contour produced by a female speaker from Baker Lake (Shokeir 2009, p. 21).

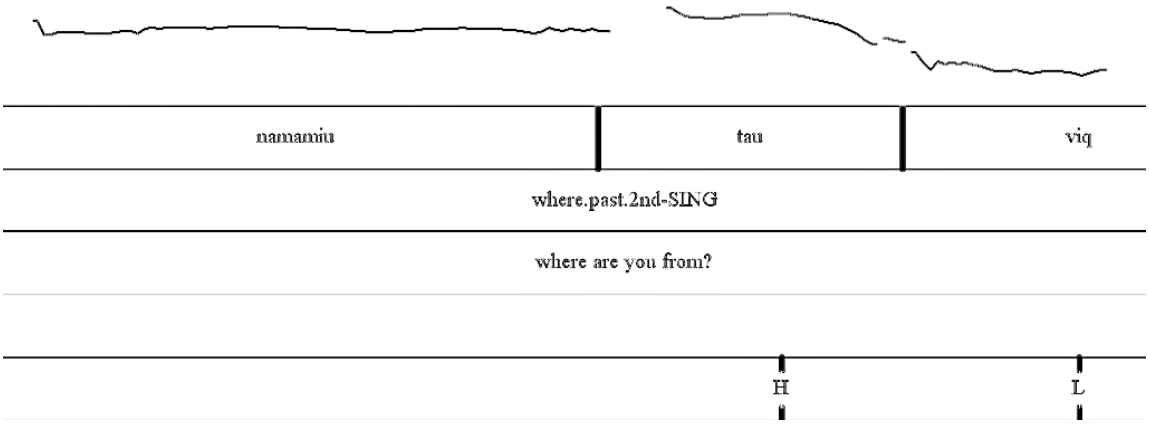

Figure 5. Falling intonation contour produced by a female speaker from Iqaluit (Shokeir 2009, p. 24).

Although there are no studies, to our knowledge, that have looked at the acoustic correlates of focus in Inuktitut, focus realization has been studied for languages of the same family, such as West Greenlandic (Arnhold 2014) and Unangan (Taff 1999). Both studies coincide in that there is not one single strategy to mark focus in each of these languages. In particular, Taff (1999), looked at focalization in color terms (stimulus: *the house isn't red; it's black*). The analysis was complicated by the fact that there are no adjectives in the language, so color terms can be designated by a variety of morphosyntactic choices, as in (19) and (20). Taff (1999) found that 4/20 participants did not mark focus at all; other speakers (4/20) chose lexical items (e.g., "only" to mark focus), whereas the remaining participants either lengthened the penultimate syllable or used a small pitch movement associated with the verb rather than the adjective (in her study the contrastive focus was on the adjective).

19. Negative particle:

Ula-χ	qaχtʃiqlu-ku-χ	ulu:da-laka-χ
House-3abs	black-prs-3abs	red-neg-3abs

"The house is black; it isn't red"

20. Use of 'only':

Ula-χ	ulu:da-laka-χ	qaχtʃiqlu-ku-χ	aɣatʃ
House-3abs	red-neg- 3abs	black-prs-3abs	only

Although there is no direct evidence on the prosodic marking of focus in Inuktitut, indirect evidence obtained from a series of studies on the English spoken by Inuktitut–English bilinguals and Canadian English controls suggests that bilinguals do not mark corrective focus (Féry 2013, p. 689) in English using prosody (Colantoni et al. 2014). This research included two perception and two production tasks. In the first perception task, participants listened to an utterance that had corrective focus on the Subject, Verb, or Object, followed by a low-pass filtered stimulus[9], and they had to indicate whether the latter was similar to the former. This task was designed to determine whether bilinguals and monolingual controls were able to perceive difference in prominence between the stimuli in the absence of segmental information. In the second perception task (contextualized task), participants heard a story followed by a series of questions based on such a story. For each question, they heard three possible answers with the focus on the Subject, Verb, or Object, and had to indicate which answer was the most appropriate. The goal of this task was to determine whether participants could use tonal variations in a linguistically meaningful way, i.e., to determine the focalized constituent. Figure 6 displays the results of both tasks. If we compare the behavior of bilingual speakers in both tasks, we see that mean accuracy was higher in the first (Figure 6, top panel) than in the second task. This suggests that bilinguals can perceive differences in prominence in the absence of linguistic information (i.e., in the task with low-pass filtered stimuli) but they cannot reliably use prosody to determine whether the Subject, Verb, or Object was focalized (they were consistently below chance).

Differences in perception appear to be matched with differences in production. L1 Inuktitut–L2 English speakers successfully imitated f0 differences in sentences with corrective foci in different positions (Figure 7, left) but they did not produce those same differences when they had to answer questions that prompted for a corrective focus (e.g., *Is Bobby the dog's name? No, Toby is the dog's name*) in those same positions (Figure 7, right).[10] This is particularly revealing, since corrective focus is the strongest type of focus, and thus is more likely to be marked prosodically or syntactically (e.g., Féry 2013, p. 689).

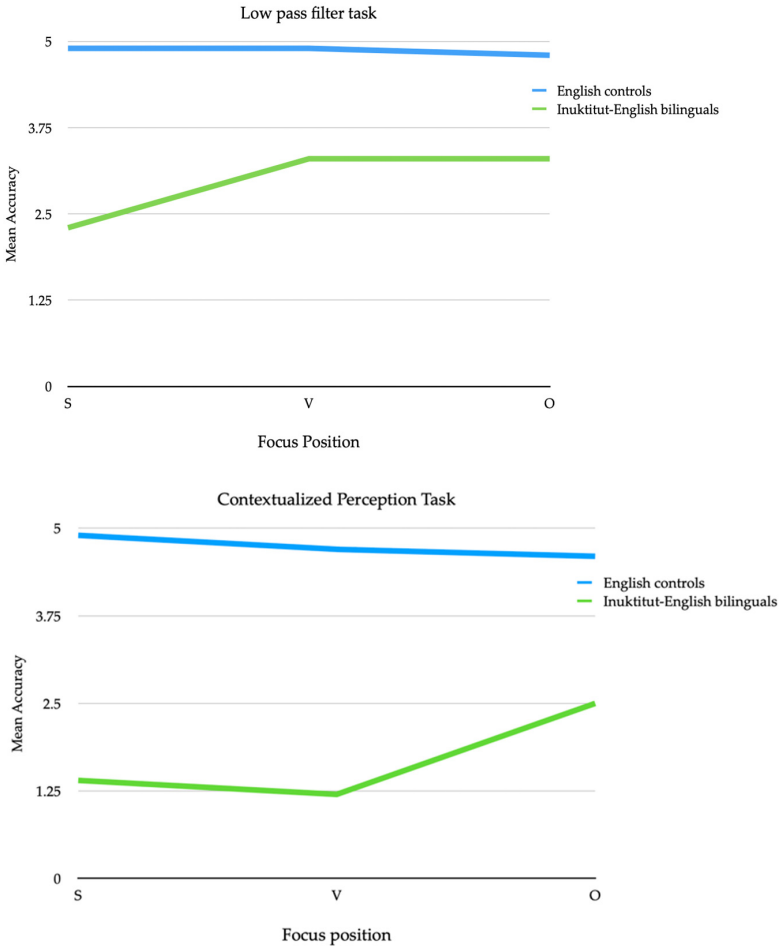

Figure 6. Mean correct responses (over five different stimuli) obtained from an auditory task (**top**) and a contextualized perception task (**bottom**)—from Colantoni et al. (2014).

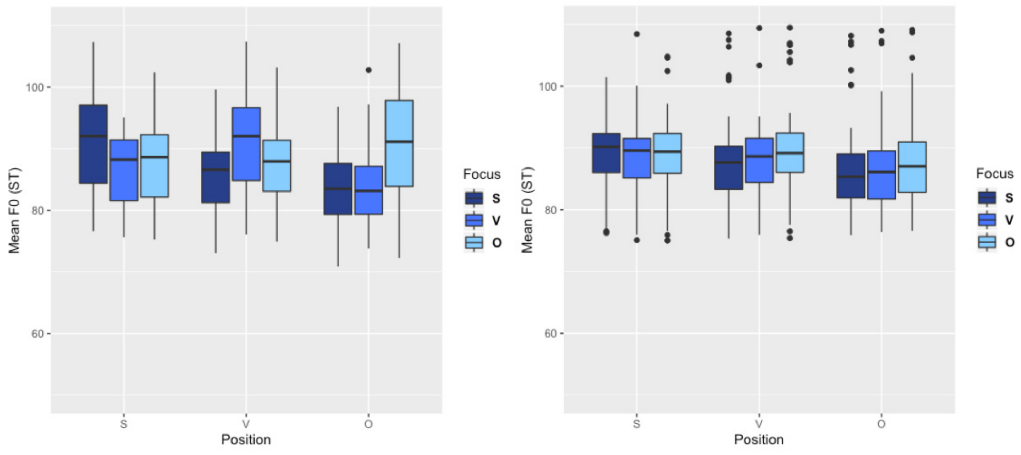

Figure 7. (**Left**) Mean f0 values (in ST) for vowels in sentences with contrastive focus on the subject (navy blue), verb (bright blue), and object (light blue) as produced in the sentence imitation task. (**Right**) Mean f0 values (in ST) for vowels in sentences with contrastive focus on the subject (navy blue), verb (bright blue), and object (light blue) as produced in the contextualized production task.

3.3. English and Spanish

In this subsection we briefly summarize the main syntactic and prosodic characteristics of focus-marking and sentence type in the two intonational languages with which Quechua and Inuktitut are in contact.

As concerns the prosodic and syntactic marking of focus, we have mentioned that English is consistently classified as being towards the extreme of the [-plastic] continuum, in the sense that focus can be marked in situ using only prosody. The focalized constituent can be made prominent by two strategies: namely, expanding the pitch range in the accented word and deaccenting the post-focus constituent (e.g., Bolinger 1989; Cruttenden 1997; Gussenhoven 2004; Ladd 2008). The fact that focus can be marked prosodically does not preclude the use of syntactic means. For example, the cleft sentence *No, it was Poppy who wrote the paper* is a possible paraphrasis to sentence (4) above.

As per the sentence types analyzed here, English uses both syntax and prosody. Declaratives and absolute yes/no questions differ in their word order, with the latter involving either subject-auxiliary inversion (e.g., *Is she coming?*) or *do* support (e.g., *does she come today?*) (Hill and Bradford 2000). In North American English, interrogatives differ from declaratives in the realization of the nuclear contour with questions ending with L* H-H% contours (Bartels 1997, 1999). Although the final contour is the main cue to mark sentence types in English, recent studies have suggested that a higher initial pitch accent distinguishes questions from statements (Saindon et al. 2017; Patience et al. 2018).

The prosodic and syntactic encoding of focus in Spanish has been the object of much debate. It has been proposed that Spanish marks focus either syntactically or prosodically (see Face and D'Imperio 2005; Kügler and Calhoun 2020; Feldhausen and Vanrell 2014, 2015). Although it has been claimed that syntax (word order, in particular) is the preferred mean to signal narrow and contrastive focus (e.g., Zubizarreta 1998), experimental studies have found that some Spanish varieties do not use word order to mark focus (e.g., Muntendam 2009, 2013 for Andean Spanish; Gabriel 2010 for Argentine Spanish; Hoot 2012 for Mexican Spanish), whereas others do (e.g., Madrid Spanish; see Feldhausen and Vanrell 2014, p. 15). As concerns prosodic cues, there is no consensus either. For example, Face (2001) reported that contrastive focus is marked by a different pitch accent in Madrid Spanish, whereas Toledo (1989) did not find any consistent use of prosodic cues (including f0, duration and intensity) in Buenos Aires Spanish. Results of a study on L1 Spanish–L2 English speakers' perception and production of corrective focus (Ortega-Llebaria and Colantoni 2014) cast doubts about Spanish speakers' ability to perceive contrastive focus on subjects or verbs or to produce f0 differences in those same positions. In summary, although syntax and prosody are available, varieties seem to differ in terms of the component of the grammar chosen to mark focus, as suggested by Feldhausen and Vanrell (2014, 2015).

There is much less debate about the syntactic and prosodic differences in sentence types. Although inversion is possible in questions (e.g., ¿Escribió Juana el trabajo? 'Did Juana write the paper?', Zagona 2002), the default type of question does not require inversion (Escandell-Vidal 1998; Armstrong 2010). Word order is variable both in statements and questions depending on the type of verb (e.g., Hertel 2003), and as we mentioned, on the information structure of the sentence. Finally, given that Spanish is a pro-drop language, questions can consist of only a verb (e.g., *¿vino?* 'Did s/he come?'). As such, prosodic cues play a crucial role in distinguishing both sentence types. Independently of the specific choice of final contour (see Prieto and Roseano 2010), questions are marked by a final rise. Additionally, Spanish questions are characterized by having a higher initial pitch (Navarro Tomás 1944; Sosa 1999), a higher initial pitch accent (e.g., Face 2007), and a higher overall pitch (Armstrong 2010; Willis 2010) than statements.

3.4. Language Comparison

Table 4 summarizes the differences among the languages analyzed here in the marking of sentence types (broad focus statements vs. yes/no questions) and different types of foci. Inuktitut, which has a rich morphological layer with radicals that can be followed by eight or more suffixes (i.e., the word is equivalent to a sentence; Fortescue 2017a), has no marking of stress and a restricted use of intonation at the phrase level, with tonal variations mostly confined to the last two syllables of the utterance. As Johns (2010) suggests, morphology

may be encoding differences expressed intonationally in English. Quechua also has a rich morphological layer, with a complex system of focus and evidential markers (Cerrón-Palomino 1988). It has a fixed accent in the penultimate syllable and the use of prosody to encode sentence types and/or focus seems to be very limited. As we showed, statements and questions have similar overall contours and pitch does not seem to be used to mark focus, at least in our dataset. Both languages use syntax, in addition to morphology, to mark focus. Although both languages differ in their lexical prosody, in the availability of specific markers for focus (Quechua has a wider range of morphemes than Inuktitut to encode focus/evidentiality) and sentence type (more complex set of morphemes that attach to the verb in Inuktitut than in Quechua) and in the total number of suffixes that can be attached to a root (larger in Inuktitut than in Quechua; Fortescue 2017a). Spanish and English, instead, are both intonational languages that use, to a different extent, prosody to signal sentence type and focus.

Table 4. Summary of the language components interactions for the marking of sentence types (statements vs. absolute yes/no questions) and focus (narrow and contrastive).

Language	Function	Intonation	Morphology	Syntax
Quechua	Sentence type	✘	✓	✘
Inuktitut		✘	✓	✘
English		✓	✘	✓
Spanish		✓	✘	Possible but not required
Quechua	Focus	✘	✓	✓
Inuktitut		✘	✓	✓
English		✓	✘	Possible but not required
Spanish		Varies across dialects	✘	✓

4. Our Proposal

We propose, then, that the crosslinguistic differences discussed above follow from differences in the division of labor across language modules at the interface between syntax, information structure, and PF or morphology along a continuum of possible modular interactions. One possible arrangement is that at the interface between syntax and information structure a series of consistent alignments of PF and syntactic structure are required to establish major distinctions between different types of sentences (declarative, interrogative, exclamative sentences) as well as to determine the relevant information value of a constituent (for instance, topic and focus values). At the sentential level, these alignments do not exclude, in principle, the possibility of multiple syntactic operations such as merge to interface with the information structure component. For instance, interrogative sentences in English may have, in addition to specific intonational patterns, *do*-support and wh-movement. Another possibility is that a rich set of morphological markers with scope over constituents convey sentence-level distinction and focus with a highly restricted alignment of intonational patterns and information structure, as languages such as Inuktitut and Quechua illustrate. In this proposal, we aim to account for why it is the case that some languages fall within one extreme of the continuum of possibilities for interaction across modules.

Inuktitut and Quechua raise the question of why there is such a division of labor between phonology and morphology at the intersection with information structure in them. A potential explanation can be articulated if we adapt Gussenhoven's proposal (Gussenhoven 2004, p. 22) that intonational contours have a morphological structure, which defines the meaning of the contour, and a phonological structure, which specifies its tones. If, in a given language, the meaning of the contour is encoded in the morphology (thus, segmentally marked), as is the case in Quechua or Inuktitut, then, such language would be less likely to encode information structure in the phonology or would encode

it minimally. Conversely, a language that does not encode information structure in the morphology (e.g., focus in Germanic languages) would be more likely to encode it in the phonology. We would like to make it explicit that our proposal does not preclude the possibility of redundancy such that both intonation and morphology can be recruited to encode the same value of information structure. Rather, we propose that modularity and interaction across modules offers, in addition to redundancy, a choice between phonology and morphology. Languages such as Inuktitut and Quechua represent the morphology option.[11]

A complementary explanation, couched in the focus as prosodic alignment proposal (Féry 2013) would be that since the information structure is already marked in the morphology, it would be less likely for it to be marked prosodically. We further argue that this is because morphemes (at least in these languages) are transparent, unambiguous markers of the structures under study. Intonation, instead, always has multiple layers of meaning, ranging from linguistic to paralinguistic meanings (e.g., Ladd 2008); or in Bolinger's words (Bolinger 1986, p. 13): "since no human utterance can be totally without emotion, one can never be certain where the 'grammar' of an utterance ends and its 'emotion' begins." In both Quechua and Inuktitut prosodic variation is kept to a minimum and it is mainly deployed for demarcative purposes (for this reason, it can be classified as an edge-prominence language; Jun 2014), to signal the end of a prosodic domain (word or utterance). The prosodic marking of the edge rather than of the head, as is the case in English, may be related to the fact that the word is the domain of syntactic recursion. If, as Fortescue (2017a) puts it, words in Inuktitut are holophrastic (i.e., there is no clear distinction between morphology and syntax), the marking of the head/root (as opposed to the prosodic word) may make it difficult to interpret the meaning of the word, since suffixes are cumulative as concerns semantic scope.[12] The fact that the domain of recursion is the prosodic word may have an additional consequence for the prosodic structure of the utterance, namely the absence of prosodic recursion. As explained in Sections 3.1 and 3.2, the absence of declination seems to characterize the prosody of both Quechua and Inuktitut. Indeed, peak height was relatively constant across the utterance. Although these are preliminary results based on relatively short sentences (particularly our Quechua data), we interpret this absence of declination as indicative of an absence of prosodic embedding (see Féry 2017, pp. 78–85, for a discussion).

Figure 8 schematizes the inverse relationship between morphology and prosody in the languages under study:

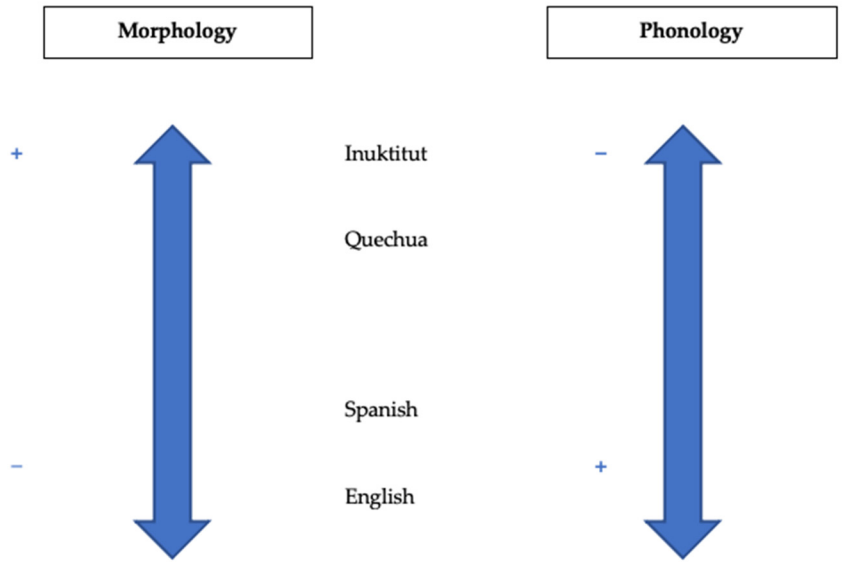

Figure 8. Schematization of the relationship between morphology, phonology, and information structure with examples from the languages mentioned in this paper.

Both options (relying on syntax and intonational patterns or on morphemes) are compatible with assigning information value to the dislocated material at the left and right peripheries as well as contrastive focus. There is, however, a significant distinction between both options: while intonational patterns do not necessarily show scope effects on the surface, morphological patterns do. In a sentence such as (21) below, contrastive focus on the constituent as well as the yes/no nature of the question are marked by the suffix *-chu*, and no final rising intonation is required (the sentence meaning is closer to English "Was the load what the men tied?"):

21. Runa-kuna qipi-ta-chu wata-sa-nku?
man-PL load-ACC-INTR/FOC tie-PROG-3.PL
"Do the men tie the load?" (Muntendam 2015)

If a negative yes/no question is asked, then *-chu* must appear on negation as in (21):

22. Mana-chu runa-kuna qipi-ta wata-sa-nku?
NEG-FOC/INT man-PL load-ACC tie-PROG-3.PL
"Don't the men tie the load?"

In contrast with the declarative negative in (22):

23. Mana runa-kuna qipi-ta-chu wata-sa-nku
NEG-FOC/INT man-PL load-ACC tie-PROG-3.PL
"The men don't tie the load"

5. Implications

The languages that we described in Section 3 have been in contact for centuries with Romance and Germanic languages. According to the 2007 Census conducted by the Peruvian National Institute of Statistics (Instituto Nacional de Estadística e Informática 2007), 51.4% of respondents in the Cusco region aged 3 and older declared Quechua to be their mother tongue, but in the more urbanized province of Cusco only 18.22% of residents declared it their mother tongue. In rural provinces such as Calca, the percentage is higher, 69.91%. This indicates a process of language shift in urban areas that is usually preceded by extended bilingualism. As for Inuktitut, there is a large percentage of speakers (65.3%) who claim it as their first language and this percentage is higher than any other aboriginal language in Canada (Allen 2007), but most of the population is bilingual (Allen 2007; Dorais 2010; Statistics Canada 2019). As such, we can expect bi-directional influences affecting the morpho-syntax and/or the prosody of these languages, especially given the vast literature in bilingual studies that has shown that phenomena at the interface of language components are likely to exhibit crosslinguistic influence (see Sorace 2011 and White 2011a, 2011b; for general overviews). Of particular relevance to our proposal is Sorace's *Interface Hypothesis* according to which bilingual grammars are more susceptible to crosslinguistic influence at the interface of core components of the grammar such as syntax and external components such as information structure. We also draw on Slabakova and colleagues' (Slabakova 2009; Cho and Slabakova 2014) proposal regarding the acquisition of overt and covert features in adult second language speakers. Thus, in this section, we spell out the predictions that would derive from our proposal regarding the interactions between morphology, syntax, and prosody (Figure 8), and we test such predictions against different findings coming from recent experimental studies.

Based on general principles established in crosslinguistic influence research (Sorace 2011) and on our view that there is a tendency in languages at the two extremes of the continuum of modular interaction to favor a division of labor between prosody and morphology at the interface with syntax and information structure, we make the general prediction that when Quechua or Inuktitut come into contact with Spanish and English, it is possible for the morphologically rich languages to be affected by the languages with rich prosodic patterns. It is also possible for the latter to be affected by the patterns of morpheme encoding of information structure found in Inuktitut and Quechua. Thus, a bidirectional influence is

possible but there is an ordering in which the stages of influence work. In terms of the influence of prosody-oriented languages on morphology-oriented languages, we propose that the prosodic marking of sentence type will be transferred to these languages before the prosodic marking of focus (see Table 4). This is because sentence type is encoded only in the morphology of the substratum languages, whereas focus is encoded both in the morphology and the syntax making sentence type encoding an easier target than focus for a switch from morphology to prosody. In fact, one could argue that prosody can be perceived as a more reliable cue for sentence type than focus at earlier stages of acquisition (Mac Whinney 2012). As a reliable cue, it can be successful in competing with morphology among bilinguals who are dominant in Spanish or English. Moreover, we may need to keep in mind that there are differences in the relative complexity of each structure too. For example, choosing a sentence type—at least as concerns declaratives vs. yes/no questions—involves a binary option with a relatively unambiguous meaning, accompanied either by syntactic and prosodic marking (English) and redundant prosodic marking (Spanish). Focus, however, is more complex as it requires contextual information. Furthermore, and depending on the language, focus marking can have scope over the whole sentence or over a constituent.[13] Finally, although focus constituents are enhanced by redundant prosodic cues, it is less clear how focus is marked prosodically in different Spanish varieties. These differences between sentence-type and focus properties make sentence type in Quechua and Inuktitut more likely to be subject to crosslinguistic influence from the socially dominant languages and, at the same time, more likely to be acquired earlier than constituent focus in Spanish and English in contact situations.

The literature on language contact and intonation supports this general prediction, since it has been found that sentence type and focus appear to be at different levels. There is evidence that prosodic marking of sentence type can be acquired by different types of bilinguals (Colantoni et al. 2018; Marasco 2020; Zárate-Sández 2015) but prosodic marking of focus is rarely acquired (e.g., Ortega-Llebaria and Colantoni 2014; Nava and Zubizarreta 2010) or exhibits a protracted and gradual acquisition (Leal et al. 2019). There is also the issue of which prosodic markers you are "choosing". For example, Inuktitut speakers are good at using final rises and falls but they do not use pitch at the beginning of the utterance to mark sentence types.

Furthermore, in recent studies that explore the realization of sentence types there is evidence of influence of Spanish sentence type prosody among Quechua–Spanish bilinguals. Indeed, there is unpublished research by Antje Muntendam on Quechua speakers in contact with Spanish that exhibit rising intonation patterns in yes/no questions rather than the morphological marker. On the other hand, and to the best of our knowledge, there is no current evidence of the emergence of a yes/no morpheme (whether bound or independent) in Spanish in contact with Quechua.

While influence of sentence type prosody from Spanish into Quechua has been attested and no evidence of Quechua sentence type morphology in Spanish is available, studies concentrating on the prosodic realization of focus by Quechua–Spanish bilinguals have consistently observed that prosodic contours are not transferred from Spanish into Quechua but rather the other way around. This has been reported for Cusco Quechua–Spanish bilinguals both in read (O'Rourke 2009, 2012) and semi-spontaneous speech (Muntendam and Torreira 2016; van Rijswijk and Muntendam 2014). O'Rourke studied declarative sentences with broad focus and contrastive focus on the subjects in the read speech of Quechua–Spanish bilinguals from Cusco, and Spanish monolinguals from Cusco and Lima. She found that Quechua–Spanish bilinguals and some Spanish monolinguals from Cusco did not use peak alignment to mark focus, as opposed to monolinguals from Lima, and suggested that these differences may be attributed to contact with Quechua. Muntendam and colleagues (Muntendam and Torreira 2016; van Rijswijk and Muntendam 2014) also reported influence from Quechua in the Spanish realization of noun phrases that had either broad focus or contrastive focus on the noun or the adjective. In summary, studies

show that, as concerns the marking of focus, prosodic realizations found in Quechua are transferred into Spanish.

The influence of Spanish on Quechua regarding constituent focus seems to start not by affecting Quechua prosody but by affecting Quechua morphology first. Studies on some varieties of Quechua have reported evidence of influence from Spanish into Quechua in the dropping of the morphological marking of focus. Indeed, Muntendam's (2015) work on Bolivian Quechua (from Tarata) shows that Quechua speakers in contact situations exhibit lack of morphological markers of contrastive focus. A range of possibilities was found. First, some participants in the study showed morphological marking of the subject topic when the object was contrastive with canonical SOV word order, as in (24).

24.

Mana. Runa-s-qa	yunta	wata-sa-nku
No. Man-PL-TOP	yoke	tie-PROG-3.PL

"No. The men are tying the yoke" (Muntendam 2015, Speaker 1)

A mixed pattern was found in the production of SOV in a sentence with contrastive focus on the object with a conspicuous lack of a morphological marker on the subject topic or the object, as in (25):

25.

Runa	chukchuka	apa-sa-n
Man	pick	bring-PROG-3.S

"The man is bringing the pick" (Muntendam 2015, Speaker 5)

Finally, there are patterns that are even 'closer' to Spanish in examples such as (26), where there is evidence of SVO word order with broad focus and, as in the previous case, there is no morphological marking of evidentiality/focus on any constituent at the sentence level, as shown by the lack of any type of evidentiality/focus suffixes:

26.

Misi	qawa-sa-n	huk'ucha-ta
cat	watch-PROG-3.S	mouse-ACC

"The cat is watching the mouse" (Muntendam 2015, Speaker 2)

These data suggest that there is an intermediate stage before Spanish focus prosody can directly influence Quechua that involves the dropping of morphological markers.

Turning to the influence of Quechua morphological marking on Spanish prosody marking of information structure, research on Quechua–Spanish bilinguals shows that speakers who are dominant in Quechua tend to generate discourse markers in Spanish that have equivalent or similar information structure properties to those of existing in Quechua (Manley 2007; Zavala 2001). In example (27) the speaker conveys along with the sentence meaning the source of the information, which in this case is 'hearsay' as indicated by the word "dice" at the beginning of the sentence. In other varieties of Spanish, the equivalent sentence would be *estaban caminando, dicen* '(they) were walking, they say' where *dicen* does not refer to people actually saying something but conveys the notion that the information is hearsay.

27.

Dic-e	camin-ando	est-aban.
Say-3.S	walk-GER	be.ASP-PST.IMP. 3.PL

"Then (they) were walking" (reportative) (Cusco) (Sánchez 2015)

In summary, regarding sentence type, there is a directionality such that Spanish prosody affects Quechua prosody, but Quechua sentence type morphology does not influence Spanish by generating sentence-type morphemes. Regarding constituent focalization, in contact varieties where Quechua is the dominant language, we see no transfer of intonational patterns from Spanish and conservation of morphological markers. Varieties that are heavily influenced by Spanish show a lack of morphological marking on focalized constituents but no clear evidence of transfer of intonational patterns. Conversely, Spanish varieties in contact with Quechua develop discourse-related morphological markers. This is shown in Table 5:

Table 5. Summary of the between-language influence in prosody and morphology for sentence type and focus (Quechua and Spanish contact).

Structure	Prosody: Spanish > Quechua	Morphology: Quechua > Spanish
Sentence type	√	×
Focus	×	√

We take these data to suggest some form of complementarity of prosody and morphology in Quechua–Spanish bilinguals as well as an ordering in which crosslinguistic influence takes place. Of course, further research is needed to support this possibility.

Much less is known about the consequences of language contact as concerns the realization of focus and sentence types in the case of Inuktitut–English bilinguals. As mentioned in Section 3, research shows that, as it was the case with Cusco Quechua, bilinguals transfer prosodic patterns from Inuktitut to English, since differences were found in the perception and production of corrective focus (Colantoni et al. 2014) when bilinguals were compared to monolinguals. Evidence of crosslinguistic influence in the realization of English statements, absolute yes/no questions, and declarative questions has also been reported recently (Colantoni et al. 2018). This study, which included imitation of isolated sentences as well as production of the same sentence types in context, showed that Inuktitut–English bilinguals matched English monolinguals more closely in the realization of final contours than in the amount of pitch change observed in initial pitch accents. This is consistent with what was reported for their L1, since previous studies on Inuktitut and other Eskimo-Aleut languages observed that tonal movements were restricted to the last two syllables of an utterance. Finally, evidence that the Interrogative mood in Eskimo-Aleut languages may be substituted by rising contours comes from Fortescue (1983), who indicates that in Central Alaskan Yupik the interrogative mood morpheme is replaced by a rising contour in yes/no questions.

The general patterns reported in the literature for Quechua–Spanish and English–Inuktitut bilinguals, as well as some individual patterns described in Muntendam's (2015) work, seem to correspond to different levels of realignment of the interface between information structure and syntax and morphology or phonology. This preliminary evidence supports our proposal of a complementary distribution of morphology and prosody at the interfaces in contact situations between the Quechua and Spanish and Inuktitut and English. Furthermore, it also seems to support our view, based on the higher reliability of prosody as a cue for sentence type, that transfer of sentence-type prosody is more likely to occur than transfer of constituent focus prosody. Conversely, given the lower levels of reliability of prosody as unequivocal encoding of constituent focus, and the fact that focus interpretation heavily relies on computing contextual information, one would expect that morphological or word-level marking of constituent focus would be more likely to occur among speakers who are dominant in Quechua or Inuktitut and have Spanish or English, respectively, as their non-dominant language. As such, our proposal is very much in line with Slabakova and colleagues' (Slabakova 2009; Cho and Slabakova 2014) analysis of feature reassembly in second language acquisition.[14] According to their view (see Slabakova 2009, p. 321), the easiest learning scenario is when no feature reassembly is required, i.e., when, in their framework, an inflectional morpheme in the L1 is mapped into an inflectional morpheme in the L2. Albeit not referring to inflectional morphemes, we could argue that this is a similar scenario as the one reported here when discussing sentence types. For example, questions are marked by a suffix in Quechua and are consistently prosodically marked by a higher initial pitch accent and a rising contour in Spanish. Thus, we would expect that a Quechua–Spanish bilingual would map the Quechua morphology into the Spanish prosody to signal questions. The most difficult learning situation, according to Slabakova and colleagues, is the one in which feature reassembly is required. In their view, this is represented by instances in which a feature encoded in the context in the L1 maps into a morpheme in the

L2. We could argue that focalization in the languages under study here represents a similar, although not identical, scenario. That is, we saw, for example, that in Spanish focus could be signaled by syntactic and/or prosodic means, depending on the dialect. In English, if we exclude cleft constructions, focus is only marked by prosody. However, the features that are used to mark focus in both languages (e.g., higher f0 or larger f0 excursion) can also be used to express paralinguistic meanings. As such, the use of prosody may result in ambiguity. In Quechua, instead, focus is consistently marked by a suffix and possibly by syntactic movement. Thus, a bilingual would have to map a morpheme from Quechua into either syntax or prosody, taking into account contextual information. This would require some type of reassembly from morphology–syntax interaction to phonology–syntax interaction with context. We may expect, then, that Quechua–Spanish bilinguals resort to inserting a morpheme in Spanish. As we saw (see Table 5), they tend not to use prosody to mark focus in Spanish and may insert lexical items to mark the focalized constituent and/or the source of information.

Finally, Muntendam's data suggest that contact between morphologically rich languages, such as Quechua and Inuktitut, and intonational languages (Spanish, in particular) may also involve changes affecting aspects of the syntax such as word order. The extent to which syntax is affected needs to be explored. This is, of course, a preliminary proposal that needs to be tested by studies on bilingual acquisition of languages in the two extremes of the continuum of interfaces between information structure, syntax, and phonology, in one extreme and morphology in the other extreme.

6. Conclusions

This paper was written with the overarching goal of deepening our understanding of the role of prosody and morphology in the marking of focus and sentence types. We set out to answer two specific questions. The first one was whether there is a complementary distribution in the use of morphology and prosody to mark information structure and sentence type in Quechua and Inuktitut. The second question was which patterns could be predicted for bilingual speakers in each of the languages involved in a contact situation. As concerns the first question, we began our journey with an empirical observation driven from our previous research on Quechua–Spanish and Inuktitut–English bilinguals, namely that there seems to be a correlation in Inuktitut and Quechua between rich morphology that allows for complex sentences to be single prosodic words and a limited use of intonation. We have shown that indeed lexical and post-lexical uses of pitch are limited in such languages and that many of the functions covered by intonation in other languages are encoded in the morphology. This led us to conclude that morphology encodes segmentally in these languages what pitch encodes suprasegmentally in languages such as Spanish or English, and thus, to postulate a division of labor between morphology and prosody in them. We also suggested that the purely demarcative uses of intonation and the relatively flat prosodic structure of the utterance (i.e., lack of prosodic recursion) may be linked to the fact that the word rather than the sentence is the domain of syntactic recursion. Our proposal does not preclude the use of prosody in such languages but just predicts the relative weight of morphology and prosody will vary, very much in line with previous proposals regarding the role of prosody in focus marking (e.g., Féry 2013). As per our second question, we have seen that transfer of prosodic patterns from intonational languages to Quechua or Inuktitut is modulated by the type of structure; namely, it is more frequent in the marking of sentence types than in the encoding of focus, which is consistent with previous L2 studies, and which speaks to the nature of redundant cues in the contact languages. Conversely, transfer of morphological encoding into intonational languages seems to affect focalized constituents but not sentence type. Following Slabakova (2009), we suggest these patterns could be accounted for by the fact that bilingual acquisition of focus marking may involve feature reassembly and attendance to discourse context.

We are cognizant, however, of our limited knowledge of the degree of variability in the languages under study. We have encountered descriptive gaps both as concerns the

individual languages and the realization of focus and sentence types in monolinguals and bilinguals. Thus, this paper intends to inspire more research on language contact and intonation in languages with complex morphological systems.

Author Contributions: Conceptualization, both authors; data analysis: Quechua (L.S.); Inuktitut (L.C.). All authors have read and agreed to the published version of the manuscript.

Funding: Collection of Inuktitut data was supported by a Social Sciences and Humanities Research Council grant, Canada (890-2011-0049).

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by The University of Toronto Research Ethics board (protocol code 00025928; original approval 19 January 2016) and the Rutgers The State University of New Jersey protocol 16-331 (original approval 4 May 2016) and University of Illinois Chicago protocol 2020-0236 (original approval 29 September 2020).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Acknowledgments: For their support in obtaining the Quechua data the authors would like to thank Bersi Macedo, Hipolito Peralta Ccama, Siwar Peralta, Oscar Hilares, the community of Tiracancha, and all the participants in the study.

Conflicts of Interest: The authors declare no conflict of interest.

Notes

1 Newmark et al. (2016) attribute the English prosodic patterns of North American First Nations and Native Americans to sociolinguistic factors, such as the expression of ethnic identity, mainly developed in the residential school system.

2 We use the official alphabet for Cusco Quechua approved by the Ministry of Education in Peru.

3 The focalized constituent (contrastive corrective focus) is capitalized.

4 An anonymous reviewer points out that in agglutinative languages there is a strong tendency to have one-to-one correspondence between morphemes and meanings. In that respect, despite the existence of some syncretic morphemes, most Quechua languages tend to have morphemes that correspond to a single "meaning".

5 Sherkina-Lieber (2004) for Sánchez (2010) for Quechua argue that these languages do not pass all the tests proposed by Baker (1996) to characterize polysynthetic languages. In both cases, the languages do not show regular patterns of noun incorporation. See, however, Fortescue (2017a) for a detailed discussion of why Inuktitut should be considered a polysynthetic language.

6 Data were collected in 2016 in Tiracancha, district of San Salvador-Calca, Peru by a research team directed by Liliana Sánchez that included Bersi Macedo and Hipólito Peralta Ccama, both native speakers of Cusco Quechua. Both authors are very thankful to the research team as well as to the Tiracancha communities, the school and Fundación HOPE Holanda Perú, a Netherlands-based international cooperation NGO.

7 Values were not defined since this participant used creaky voice.

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8 This figure comes from Shokeir's (2009) work. As noted by an anonymous reviewer, it is not segmented by syllables.

9 Low-pass filtering is a technique that allows to remove information above a certain frequency. In this study, all acoustic information above the maximum f0 value of each stimulus was removed. As a result, participants heard stimuli that sounded like mumbling (i.e., no segmental information).

10 This is an indication that while able to perceive the auditory difference and to produce it in isolation, participants were not able to identify the focalized constituent in the second perception and production tasks. It is important to highlight that this is a specific case of corrective focus in which the answer to the question explicitly negates the antecedent. An anonymous reviewer suggests that the fact that (a) this sentence is an answer to a yes/no question and (b) it is a negative answer might mitigate the need for corrective focus intonation in production. Although we acknowledge that possibility, the fact that participants were able to imitate the contours (Figure 7, left) but did not produce any tonal changes when they had to produce the same sentence as a response to a question (Figure 7, right) still needs to be explained. At the same time, it is also possible, as noted by López (2009), that negation may interact with focus by introducing an alternative to the negated referent making the production task more complex than the perception task, and therefore making the use of corrective focus intonation more difficult for the participants. Furthermore, as proposed by Bianchi and Bocci (2012) corrective focus is a root phenomenon that is discourse-related which may also generate complications for the participants.

[11] As suggested by an anonymous reviewer the extent to which redundancy is (in)frequent across world languages could be further researched from a typological perspective.

[12] Fortescue (2017b) highlights the fact that these "word-sentences" are a unit since they fall "under a unitary prosodic contour" (Fortescue 2017b, p. 221). In the case of Quechua, as illustrated above in sentence 7, word-sentences also exist.

[13] Focus may also interact with sentence type. For example, in Cusco Quechua, it is possible for the yes/no marker to have scope over a constituent as in:

(i)	Papa-ta-chu	muna-nki
	Potato-INT	want-2.SG
	"Do you want POTATOES?"	

[14] We thank an anonymous reviewer for pointing out the relevance of Slabakova's proposal to our paper.

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