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# **The Perception of Intonation in Japanese Sentence Types by Swedish Speakers**

Wh-Questions, Yes/No-Questions and Declaratives

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## ABSTRACT

This study is concerned with the topic of sentence-final intonation in wh-questions, yes/no-questions and declaratives. The aim of the study is to investigate whether native speakers of Swedish can recognize these sentence types in standard Japanese by listening to the intonation alone. In addition, whether exposure to the language affects the ability to distinguish these sentence types is investigated. Therefore, two quantitative online surveys were created for native speakers of Japanese and Swedish for further comparison.

The Swedish participants were initially asked to choose between four categories corresponding to their exposure to and proficiency in Japanese: little to no exposure, regular exposure, 1-year students at university, and 2-year students or higher at university. The participants were then asked to listen to Japanese sentences and choose the most suitable answer. The results from the Japanese speakers showed high recognition rate in all three sentence types. Similar results were produced by students of Japanese, except in declaratives. The answers indicate that declaratives were perceived as interrogative sentences instead.

**Keywords:** Wh-questions, yes/no-questions, declaratives, sentence-final intonation, Swedish, Japanese

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# CONVENTIONS AND ABBREVIATIONS

## Glossing

The system for glossing vocabulary in this thesis corresponds to the Leipzig Glossing Rules.

## Romanization

For transcribing Japanese, the modified Hepburn system of romanization has been adapted. It differs from the original system by using double letters to mark long vowels instead of macrons, except for long *e*, which is written as *ei*.

## Typographical conventions

Italics has been used to mark example words and sentences, as well as foreign words. Single quotes have been used to represent translations, and double quotes for citation. The symbol # has been used to denote an unnatural sentence, and the symbol √ to denote a natural sentence.

## Abbreviations

ACC	accusative
DECL	declarative
DAT	dative
PST	past
LOC	locative
NOM	nominative
NPST	nonpast

# 1 Introduction

This study aims to investigate whether native speakers of Swedish can distinguish the intonation of the sentence types wh-question, yes/no-question, and declarative in Japanese by listening to the intonation. Although both languages share similar patterns of sentence-final intonation<sup>1</sup> in some sentence types, will they still be recognized when listening to another language?

Intonation is an area within prosody that can serve different functions in speech. By listening to the intonation, different attitudes of the speaker can be registered, for example sarcasm, curiosity etc. The intonation can also serve as a grammatical function since it can be determined by its intonation whether a sentence is a question or a statement. For example, in a conversation, the speaker utters the phrase *Kaeru* ‘return’ with a raising sentence-final intonation. Through the intonation, the listener can register the phrase as a question (*Kaeru?* ‘Are you going home?’) and therefore give a response with a falling sentence-final intonation of the same phrase *Kaeru*, namely *I’m going home*. Without the intonation, such conversation would have been difficult to comprehend. Therefore, intonation plays an important role in communication.

Intonation has been widely studied among researchers. It has been reported that various sentence types exhibit a certain characterization in intonation (Maekawa 1991a, b; Ishihara 2017). Furthermore, it has been said that “sentence intonation for practically all languages is usually described as ‘falling’ for statements and ‘rising’ for yes/no questions” (Gårding 1979:207). Such descriptions can also be applied for statements (declaratives) and yes/no-questions (y/n-questions) in Japanese<sup>2</sup> and Swedish (Gårding 1979; Fujisaki & Hirose 1982; Abe 1998; Hultman 2003). However, in wh-questions, the description of these languages differs.

A perception study involving speakers of Russian and Japanese by Makarova & Matsui (1996), lead to them claiming that “Japanese listeners have difficulty identifying interrogatives even in their native tongue” (Makarova & Matsui 1996:1516). However, in a study by Maekawa (1991a), the participants, who were all native speakers of Japanese, identified 92.2% of the wh-questions and 95.5% of the y/n-questions. Further research has been made on wh-questions and y/n-questions in Japanese and it has been reported that these interrogative sentence types possess special attributes. (Maekawa 1991a, b; Ishihara 2017).

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<sup>1</sup> Sometimes referred as *boundary pitch movements* (Igarashi 2015).

<sup>2</sup> The Japanese mentioned in this paper refers to Standard (Tokyo) Japanese unless stated otherwise.

## **1.1 Methodology and results**

The data was gathered through a Google Forms online survey using a total of 41 sound clips. The sound clips were altered by removing a certain part in each targeted sentence, making each set of sentences segmentally identical. A survey for native speakers of Japanese and Swedish was created with the intention of later comparison. Depending on their exposure and proficiency of Japanese, the Swedish participants were asked to choose between four categories: little to no exposure (LTNE), regular exposure (RE), 1-year students at university, and 2-year students or higher at university.

The responses from Japanese participants showed high recognition rate in all three sentence types, indicating that they were able to distinguish the sentence types used in this study. The Swedish participants showed a trend of higher recognition rate of the sentence types depending on their exposure. However, the recognition rate from 1- and 2-year students differed at its highest by 1,2%. All four categories produced low results in declarative sentences compared to the other sentence types. The answer distribution indicates that the declaratives were perceived as interrogative sentences instead.

## **1.2 Organization**

An overview of the chapters will now be presented. The first chapter of the thesis gives a brief introduction to the topic and the different studies made on the sentence types of interest. What follows are the purpose of the present thesis, methodology, and the results of the experiment conducted. Lastly, the organization of this paper, which gives an overview of the subjects mentioned in each chapter is presented.

The second chapter brings up previous research to give background information relevant to intonation. The definition of accented/unaccented words is described, along with studies that are related to the attitudinal intonation of the speaker. Further, descriptions of the sentence types in terms of intonation concerning the Japanese and the Swedish languages are introduced.

The third chapter contains details on the experiment conducted. Examples of the targeted sentences used in the survey and how the sound clips were altered are described. Details of the participants regarding age, gender, and quantity are brought up, and the results from the survey are presented. The fourth chapter is where the discussion takes place, and the final Chapter 5 presents the conclusion of this study.

## 2 Previous research

This chapter provides information on previous research related to intonation. The intention is to provide the reader with general background knowledge on question intonation and studies related to this study.

### 2.1 Accented/Unaccented words

Japanese consists of words that are either accented or unaccented. An accented word can be described as having a significant phonological fall somewhere in the word, whereas an unaccented word has no such fall. There are minimal pairs of words that are identical segmentally but can be distinguished when a *pitch accent*<sup>3</sup> is present/absent. For example, *ame* ‘candy’ has no pitch accent and is therefore an unaccented word, but when pronounced with a pitch accent it becomes *a’me* ‘rain’, an accented word (the accented vowel is post-marked with an apostrophe). In monosyllabic words like *hi* ‘fire’ and *hi* ‘day’, the pitch might be indistinguishable, but possible to distinguish when affixing a particle. Thus, the intonation contour of *hi’ ga* (fire NOM) follows high-low and low-high for *hi ga* (day NOM). The same method can be applied to distinguish bisyllabic words that have an accent on the final syllable. To sum up, an accented word is characterized by its phonological fall in tone somewhere in the word, while an unaccented word has no such fall. (Abe 1998; Kawahara 2015)

### 2.2 Attitudinal intonation

The level of pitch rise at the end of a question can indicate different standings of the speaker to the newly acquired information. According to a study by Hojo (1974), “The recurring phonetic patterns were potentially correlates of some sort of grammatical function. The four types of pitch rise were associated with their distinct grammatical meanings” (Hojo 1974:10). Starting with the sharpest pitch rise, when the speaker already has the information but double checks with the listener (e.g. *Hontoo?* ‘Really?’), the question has been named a *confirmatory question*. When the speaker is speculating, and seeks a yes/no-answer from the listener (e.g. *Konna fuu ni?* ‘Like this?’), it has been named as an *information-seeking question* and is associated with a sharp rise. If the speaker is not convinced with the information given by the listener, the speaker utters a *doubting question* with a mild raised pitch to influence further response (e.g. *E,*

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<sup>3</sup> The term pitch accent refers to the tonal events of peaks, falls, rises etc.

*soo desu ka?* ‘Oh, really?’). The mildest pitch rise was named *musings question*, and used when the speaker was soliloquizing (e.g. *Kore, moo aru ka na?* ‘Do I already have this?’). When asked, the speaker does not expect an answer from the listener since it is strictly speaking not a question. (Hojo 1974) “It cannot be denied, however, that the more rise there is, the more curious or even querulous the question is likely to become” (Abe 1998:367).

The speaker’s attitude can be portrayed in the intonation to a certain degree. In an experiment conducted by Abe (1957), 148 subjects listened to the sentence *nani o yatteru no?* ‘What are you doing?’ with varying intonations. Based on the intonation, they were to select which of the 5 given situations the intonation would correspond to. The different intonations used in the situations, followed by correct answer percentage, are: A: asked in a normal way (88), B: more politely asked than A (70), C: when curious (54), D: when angry (98), and E: when sarcastic (96). His hypothesis of a correlation “between the intonational pattern and their possible implications, tested in and applied to actual contextual backgrounds, has been proved valid as far as the experiment goes” (Abe 1957:190).

The choice of intonational pattern can change when public evidence is presented to the speaker. In a naturalness rating study by Hara & Kawahara (2011), native speakers of Japanese were to listen and rate the naturalness of stimuli after reading the context. An example of a context is presented in (1) and (2), where the negation of the predicate adjective *takai* ‘expensive’ is used, namely *takaku nai?* ‘Isn’t it expensive?’.

#### (1) Public Evidence Context

A and B just went to a Japanese supermarket and realized that Japanese vegetables are twice as expensive as local ones. A asks B:

- a. #taka’ku nai↑ (Accented)
- b. √ takaku nai↑ (Deaccented)

#### (2) No Public Evidence Context

A has just arrived Hong Kong and B told A that she can get Japanese vegetables from a Japanese supermarket. A asks B:

- a. √ taka’ku nai↑ (Accented)
- b. #takaku nai↑ (Deaccented)

(Hara & Kawahara, 2011:3)

Each sentence was presented with an accented and a deaccented predicate. The results showed a preference in accented predicates in contexts without public evidence, and unaccented predicates in contexts with public evidence. Therefore, their study confirmed the hypothesis of evidentiality affecting the speaker's choice of intonation pattern.

There are several functions with intonation (one of them being grammatically, see 2.4). The above-mentioned studies show that intonation can portray different attitudes of the speaker, along with how the context can change the intonation of the speaker.

## **2.3 Wh-questions and Y/n-questions**

A wh-question is often used when seeking specific information. It can be recognized by its interrogative words, such as *what*, *where*, *why*, and *who* in the sentence. A yes/no-question (y/n-question) can be used when seeking confirmation, often resulting in an answer of a *yes* or a *no*. The intonation of such questions has been studied by many intonation researchers (Pierrehumbert & Beckman 1988; Maekawa 1991a, b; Gårding 1998; Abe 1998; Ishihara 2003, 2017).

### **2.3.1 In Japanese**

Y/n-questions in terms of intonation can for almost all languages be described as having a raising intonation (Gårding 1979). This description can also be applied to y/n-questions and wh-questions in Japanese (Abe 1998). While interrogative sentences are generally described as having a raising sentence-final intonation, there are cases where it falls instead. For instance, when wanting to confirm the newly heard information, the speaker can respond with a sentence containing the question-particle *ka* in a falling sentence-final intonation (Ishihara, personal communication).

Studies have been made to investigate whether wh-questions and y/n-questions exhibit any special characteristics in terms of intonation. In a study by Maekawa (1991a, b), he compared the intonation of Japanese wh-questions and y/n-questions, and concluded that “their intonational difference can be expressed in terms of their focus placement” (Maekawa 1991a:202). For Y/n-questions, the focus was placed on the predicate, while the focus on wh-questions was on the wh-word (*what*, *where*, *why* and *who*). The sentences were segmentally identical after replacing the underlined part in (3) with white noise.

(3) a. Wh-question

nani ga mier-u?  
what NOM be.visible-NPST  
'What can you see?'

b. Y/n-question

nani ka mier-u?  
something be.visible-NPST  
'Can you see anything?'

The subjects in this study, who are all native speakers of Japanese, showed high identification rate of the interrogative sentences. The Japanese speakers were able to identify 92.2% of the wh-questions and 95.5% of the y/n-questions.

However, Ishihara (2017:404) states that it is necessary to compare wh-questions and y/n-questions with the contour of declaratives to find out whether they possess any special attributes. His studies found that wh-questions exhibiting a focus on the interrogative word followed by a *post-focal reduction*<sup>4</sup>. The comparison between y/n-questions and declaratives showed a difference regarding the focus on the verb. Y/n-questions exhibited a stronger focus on the verb compared to declaratives and wh-questions, which indicates a special attribute of y/n-questions.

The perception of the sentence intonation can be interpreted differently when listening to a foreign language. For example, in a perception experiment by Makarova & Matsui (1996), speakers of Russian and Japanese were to listen to three different sentence types: declarative, exclamation, and interrogative in their native language and of a foreign language. The recordings were made by a standard Japanese speaker and a standard (St. Petersburg) Russian speaker. The recordings consisted of “24 two-syllable and 13 three-syllable words, each pronounced as an exclamation, interrogative and a declarative”. The results indicated a high percentage in correct recognition of declarative sentences in their native and non-native languages. The Japanese speakers correctly identified 95,1% of the declaratives in their native language and 83% of Russian declaratives. The identification rate for Russian speakers was 92,5% in Russian declaratives and 78,4% in Japanese declaratives. “While the Japanese subjects tend to misidentify both Russian exclamations and interrogatives as declaratives, the Russian subjects are apparently able to hear the differences between Japanese interrogatives and exclamations, but they ‘label’ them incorrectly, systematically perceiving Japanese interrogatives as exclamations (48,5%), and exclamations as interrogatives (62,8%).” (Makarova & Matsui 1996:1514)

Makarova & Matsui (1996) also claim that “Japanese listeners have difficulty identifying interrogatives even in their native tongue” (Makarova & Matsui 1996:1516). However, a

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<sup>4</sup> The post-focal reduction can be seen after the interrogative word *nani ga* ‘what’ in Figure 1.

contradiction to this claim can be seen in the results in Maekawa's study, where Japanese speakers identified 92.2% of the wh-questions and 95.5% for the y/n-questions.

### 2.3.2 In Swedish

Y/n-questions in Swedish share the description of having a raising sentence-final intonation, similar to Japanese and many other languages. However, compared to Japanese wh-questions, the terminal intonation in Swedish wh-questions is generally described as a falling intonation (Hultman 2003).

In a study of pitch pattern in wh-questions and yes/no-questions in German, Kohler (2004) confirmed his hypothesis that final raising and final falling occur in both syntactic structures, which also corresponds with Swedish. The usually raised intonation in y/n-questions in Swedish can fall in a situation when given a response to what already has been stated (e.g. *After Thursday? Are you?*) (Strömbergsson, Edlund & House 2012). If asking a wh-question (that is described as having a falling intonation) in the same situation, a raising intonation occurs instead (e.g. *What? What did you say?*) (Strömbergsson, Edlund & House 2012).

## 2.4 Declaratives

The similar patterns of a falling sentence-final intonation are shared between Japanese and Swedish, along with many other languages (Gårding 1979; Fujisaki & Hirose 1982; Pierrehumbert & Beckman 1988; Hultman 2003). In Japanese, an interrogative sentence can transform into a declarative by the intonation alone. For instance, if the sentence *Taroo ga kuruma o kat-ta?* (Taroo NOM car ACC buy-PST) 'Did Taroo buy a car?' is produced with a raising sentence-final intonation, it can be interpreted as a question. However, if the same sentence is produced with a falling terminal intonation, then it becomes *Taroo ga kuruma o kat-ta* (Taroo NOM car ACC buy-PST) 'Taroo bought a car', a declarative. This shows that the intonation of a sentence plays a decisive role in the interpretation of the sentence.

These studies together present the characteristics of intonation in wh-questions, y/n-questions and declarative sentences in Japanese and Swedish. The two languages have similarities regarding the falling terminal intonation in declarative sentences and raising terminal intonation in y/n-questions, but differ in wh-questions. Japanese wh-questions are described as having a raising intonation, and generally a falling intonation in Swedish.

## 3 Experiment

An experiment was conducted to investigate whether native speakers of Swedish can distinguish the three sentence types wh-questions, y/n-questions, and declaratives, in Japanese. The details and results of the experiment are presented in this chapter.

### 3.1 Purpose

The objective of this thesis is to determine whether native speakers of Swedish (henceforth “Swedish speakers”) can distinguish wh-questions, y/n-questions, and declaratives in Japanese by listening to the intonation alone. Since previous studies on respective language have shown similar intonations in declarative sentences and yes/no-questions, will they still be recognized despite being in a foreign language?

Another objective of this study is to investigate if exposure to the Japanese language affects the ability of Swedish speakers to distinguish the different sentence types. Does knowledge and proficiency of Japanese make a difference?

#### Research questions

- Can speakers of Swedish distinguish the intonation of Japanese sentence types?
- Will exposure to the Japanese language affect their ability to distinguish the sentence types?

### 3.2 Stimuli

All the targeted sentences have an adverbial in the beginning, followed by an interrogative word or an indefinite pronoun, and an accented verb. The sentences did not contain any sentence-final particles. Five sets of targeted sentences were used, where one set contained one sentence of each type (wh-question, y/n-question and declarative). A sample of a set is presented in (4) as well as their respective intonation contour in Figure 1, 2 and 3. All sound clips were recorded in standard (Tokyo) Japanese by a native speaker of Japanese.

(4) a. Wh-question

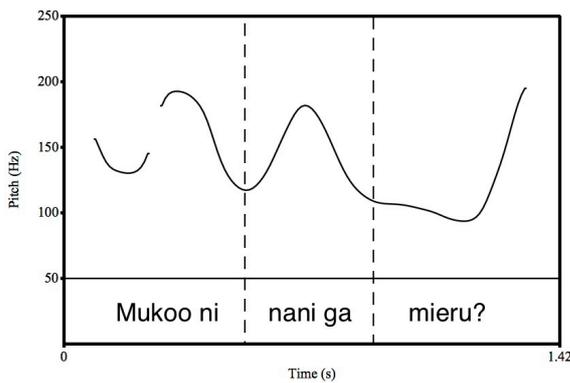
mukoo ni nani ga mier-u?  
 over.there LOC something NOM be.visible-NPST  
 ‘What can you see over there?’

b. Y/n-question

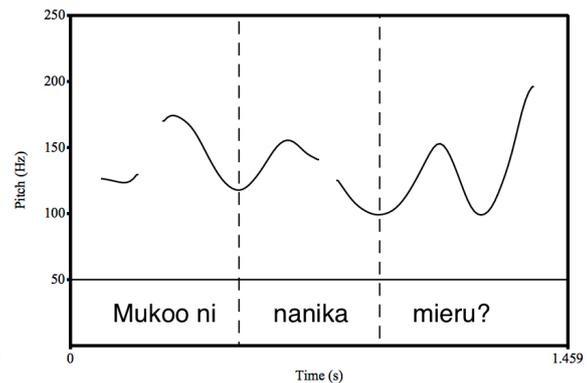
mukoo ni nani.ka mier-u?  
 over.there LOC something be.visible-NPST  
 ‘Can you see anything over there?’

c. Declarative

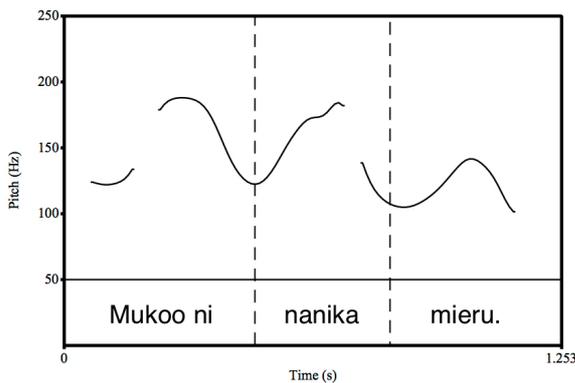
mukoo ni nani.ka mier-u.  
 over.there LOC something be.visible-NPST  
 ‘I can see something over there.’



**Figure 1.** Pitch contour of the wh-question in (4a).



**Figure 2.** Pitch contour of the y/n-question in (4b).



**Figure 3.** Pitch contour of the declarative sentence in (4c).

### 3.3 Methodology

The experiment was carried out in the form of an online survey using Google Forms with a total of 41 questions excluding background questions. In addition to the 15 targeted sentences, 26 filler questions were added to prevent skewed answers. The participants were asked to answer the survey in a quiet area since the survey is heavily based on sound. Two online surveys were created, with one each intended for native speakers of Japanese and Swedish for comparison. The only difference between the two are the background questions,<sup>5</sup> where the Swedish survey's questions were more elaborated. Swedish participants were asked to choose between four categories depending on their exposure to Japanese: little to no exposure, regular exposure, 1-year student of Japanese at a university, and 2-year student or higher of Japanese at a university. The concept behind each group will now be presented.

Starting with LTNE, the category was created for participants who have heard some or are unfamiliar with the Japanese language. An example of a participant who would have heard some Japanese could be someone who has travelled to the country for a short period of time. Someone who has never heard Japanese would be exemplified as never having heard the language at all, or perhaps only knowing a common phrase such as *konnichiwa* 'hello'. The second category RE, was created for those who *are* or *have been* regularly exposed to spoken Japanese via drama, anime, music etc. for a longer period.

The 1-year student category was created for those who are studying Japanese at university. This also includes those who *have been* studying at a university but somewhere in their first year have chosen not to continue. Therefore, 1-year students in this category include those who have not completed their first year of studying Japanese at university.

The last category, 2-year students, was created for those who are currently in their second year *or* at a higher level at university. Similar to the former category, participants that have started their second year in Japanese studies but are not currently active are also included. The reason behind including students of higher level is to compare if the beginner stage differs from students that have more proficiency. However, for the sake of convenience, the comparison will be made between the participant's choice of category and not strictly on the degree of proficiency of each individual.

The order of sound clips was arranged identically in both surveys, with the targeted sentences distributed among filler questions. The participants were able to play the sound clips

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<sup>5</sup> Differences in age groups were overlooked between the Japanese and Swedish survey and were therefore mismatched. Starting from the age group 31-35 in the Swedish survey, the Japanese survey displays 31-34, and it continues with a difference in +/- 1 year in the age groups to the end.

repeatedly. The targeted sentences: wh-questions, y/n-questions and declaratives, were segmentally identical after removing the underlined parts in (4), using the software *Praat*. They were given three alternatives for each sound clip, where only one would be a suitable answer to the specific sentence type used.<sup>6</sup> For a wh-question (e.g. *What can you see?*), the suitable answer would be in the form of a noun (e.g. *dancing people* or *Santa Claus*). For y/n-questions (e.g. *Can you see anything?*), the answer would be a yes/no or a noun (e.g. *yes, I will* or *penguins*). The suitable answer for a declarative sentence (e.g. *I can see something over there*) would be in the form of a question (e.g. *Really?* or *How?*). In other words, the alternatives presented was a yes/no answer, a noun, and a question for every sentence in the survey.

One problem concerning when answering to a y/n-questions was encountered. A yes/no answer would be the most direct/correct answer to an y/n-question. However, it does not sound unnatural when giving a noun as the answer. Despite of this, the alternative hypothesis of Swedish speakers being able to distinguish the sentence types can still be confirmed if the responses are different among the three sentence types. Therefore, yes/no answers and nouns are included in the calculation of the results. Microsoft Excel was used for sorting the results.

### **3.4 Results**

The results from the Swedish and the Japanese surveys were compared to see if Swedish speakers can distinguish Japanese sentence types through intonation only. The results are presented as the percentage of correct answers.

#### **3.4.1 Survey for Japanese participants**

By the end of the survey period, data had been collected from 25 participants. For demographic details, see Table 1. The overall result of the sentences was 93,3% correct answers. As seen in Table 2, the declarative sentence recognition was the lowest of all three types and received 84% correct answers. The highest recognition rate was y/n-question with 99,2% correct answers, while 96,8% of wh-questions was recognized. These results reconfirm that native speakers of Japanese can identify interrogative questions used in the survey.

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<sup>6</sup> To include a suitable answer (a question) for a declarative sentence in question 7 (y/n-question) was overlooked. Instead, a yes/no answer was included (see appendix). However, despite the yes/no answer, this alternative would still be an incorrect/unnatural way to answer question 7.

Japanese Survey											
Age Groups										Gender	
16-20	21-24	25-30	31-34	35-39	40-44	45-49	50-54	55-59	61+	M	F
4	4	-	-	-	3	4	5	5	-	6	19

**Table 1.** Distribution of the age groups and gender of the 25 Japanese participants.

	Wh-questions	Y/n-questions	DECL sentences	Overall results
Recognition rate	96,8%	99,2%	84,0%	93,3%

**Table 2.** Results of the correct recognition rate from the Japanese survey.

In Table 3, the answer distribution among the Japanese participants can be seen. Almost all answers in wh-questions, the noun (N) was chosen (96,8%), whereas 3,2% was yes/no answers (YN). The y/n-questions consist mainly of YNs (72%) followed by Ns (28%). Only one question (Q) was chosen as the answer for a y/n-question, which equals to 0,8%. Among the declarative sentences, the majority of the answers were Qs (84%), where the other answers consist of 7,2% YNs and 8,8% Ns. The declaratives 11 and 15 had the most wrong answers out of all the targeted questions. See the appendix for further details on the questions in the survey.

Japanese Survey															
	W1	W2	W3	W4	W5	Y6	Y7	Y8	Y9	Y10	D11	D12	D13	D14	D15
YN	-	3	-	-	1	25	23	19	11	11	7	1	-	1	-
N	25	22	25	25	24	-	2	6	13	14	2	1	3	-	5
Q	-	-	-	-	-	-	-	-	1	-	16	23	22	24	20

**Table 3.** Answer distribution among the Japanese participants. Arranged after the sentence types, wh-question (W), y/n-question (Y), and declarative (D), with the type of alternative in the survey, yes/no (YN), noun (N), and a question (Q).

### 3.4.2 Swedish survey

The Swedish survey received 69 answers. For demographic details, see Table 4. One participant's answers were not qualified for the survey due to indication of not being a native speaker of Swedish. Therefore, the participant's answers were removed from the results. The remaining 68 participants was compared to each other depending on their choice of category. Participants of the four categories have been combined into two groups: little to no exposure

(LTNE) and regular exposure (RE) will be called Group 1, and 1 year- and 2 year students of Japanese will be called Group 2.

Swedish Survey											
Age Groups										Gender	
16-20	21-24	25-30	31-35	36-40	41-45	46-50	51-55	56-59	60+	M	F
8	46	9	4	-	-	-	1	-	-	33	35

**Table 4.** Distribution of the age groups and gender of the 68 Swedish participants.

	Number of participants	Wh-questions	Y/n-questions	DECLs	Overall results
LTNE	20	27%	54%	41%	40,7%
RE	20	50%	70%	43%	50,7%
1-year students	15	92%	98,7%	56%	82,2%
2-year students	13	90,8%	98,5%	55,4%	81,5%

**Table 5.** Results of the recognition rate from the Swedish survey, along with the number of participants in each category.

Starting with Group 1, LTNE and RE had 20 participants each. The overall recognition rate was 40,7% (LTNE) and 50,7% (RE). Although the overall result differed by 10%, RE had 23% higher recognition in wh-questions and 16% higher in y/n-questions. The results in declarative sentences differed only by 2%. Participants of RE ranged in numbers of correct answers, from 3 to 14 out of 15 sentences. Further details on the correct percentage number in each category are presented in Table 5.

Group 2 had a total of 28 participants, where 15 participants were 1-year students and 13 participants were 2-year students. 1-year students correctly answered 82,2% of the sentences, which is the highest of all four groups. They also had the highest recognition rate in all three sentence types. 2-year students were not far from the 1-year students as their recognition rate was 81,5%. The results between the categories differed only by 1,2-0,2% in all three sentence types.

A comparison of the two groups shows that Group 2 had a distinct higher recognition rate in the interrogative sentences compared to Group 1. The wh-questions had 38,5% correct answers in Group 1 and 91,4% in Group 2. As for y/n-questions, Group 1 answered 62%

correctly, and 98,6% for Group 2. The declarative sentence recognition ranged within 41–56% from all four categories.

	Wh-questions	Y/n-questions	Declaratives
Male	71%	81%	54%
Female	50%	73%	42%

**Table 6.** The correct recognition rate between males and females.

In a comparison between the genders, the male respondents had a higher recognition rate than female respondents in all the three sentence types. As seen in Table 6, the sentence type with the most differential percentage is wh-question.

Little to no Exposure															
	W1	W2	W3	W4	W5	Y6	Y7	Y8	Y9	Y10	D11	D12	D13	D14	D15
YN	5	4	8	11	1	13	7	2	1	5	4	8	5	8	2
N	4	6	8	3	6	1	6	7	7	5	6	8	8	5	5
Q	11	10	4	6	13	6	7	11	12	10	10	4	7	7	13

**Table 7.** Answer distribution among LTNE. Ordered by the sentence types wh-question (W), y/n-question (Y), and declarative (D), with the alternatives in the survey yes/no (YN), noun (N), and a question (Q).

As seen in Table 5, LTNE had the lowest recognition rate of 27% in wh-questions. The preference of answering a wh-question with a Q can be seen in Table 7, which equals to 44% out of the answers in wh-questions. The correct answer (N) represents 27% of the answers chosen, and 29% for the YNs. The answer distribution in y/n-questions was similar to wh-questions, namely, a preference in choosing Q as the answer, as it represents 46% of the answers compared to 44%. The correct answers in y/n-questions consist of 28% YNs and 26% Ns (in total 54%). Even in the declarative sentences, the Q as the answer was preferred over the other alternatives (41% of the answers). YNs consist of 27% of the answers, and 32% for Ns.

Compared to LTNE, RE does not show a preference in choosing Q as the answer in the three sentence types. The answers in wh-questions, consist mainly of Ns (50%), followed by Qs (28%) and YNs (22%). In y/n-questions, the N was preferred as the answer (43%), compared to YNs (27%) and Qs (30%). In the declarative sentences, the correct answer (Q) consisted of 43%, followed by 34% Ns and 23%YNs. See Table 8 for further details.

Regular Exposure															
	W1	W2	W3	W4	W5	Y6	Y7	Y8	Y9	Y10	D11	D12	D13	D14	D15
YN	2	3	11	5	1	18	7	1	-	1	2	5	7	7	2
N	12	11	5	10	12	1	6	12	12	12	6	9	7	5	7
Q	6	6	4	5	7	1	7	7	8	7	12	6	6	8	11

**Table 8.** Answer distribution among RE. Ordered by the sentence types wh-question (W), y/n-question (Y), and declarative (D), with the alternatives in the survey yes/no (YN), noun (N), and a question (Q).

1-year students at university															
	W1	W2	W3	W4	W5	Y6	Y7	Y8	Y9	Y10	D11	D12	D13	D14	D15
YN	2	1	2	-	1	9	3	5	4	3	3	-	-	4	-
N	13	14	13	15	14	6	12	10	10	12	4	5	8	4	5
Q	-	-	-	-	-	-	-	-	1	-	8	10	7	7	10

**Table 9.** Answer distribution among 1-year students. Ordered by the sentence types wh-question (W), y/n-question (Y), and declarative (D), with the alternatives in the survey yes/no (YN), noun (N), and a question (Q).

2-year students or higher at university															
	W1	W2	W3	W4	W5	Y6	Y7	Y8	Y9	Y10	D11	D12	D13	D14	D15
YN	-	1	2	2	1	9	8	7	4	7	-	-	-	3	-
N	13	12	11	11	12	4	5	6	8	6	8	6	4	3	5
Q	-	-	-	-	-	-	-	-	1	-	5	7	9	7	8

**Table 10.** Answer distribution among 2-year students. Ordered by the sentence types wh-question (W), y/n-question (Y), and declarative (D), with the alternatives in the survey yes/no (YN), noun (N), and a question (Q).

In a comparison of the overall results between 1- and 2-year students, a slight difference can be noticed. However, when looking closer at the choice of answer, the two categories differ the most in y/n-questions and declaratives. The answers to wh-questions besides the correct answer, consist of 8% (1-year students) and 9,2% (2-year students) YNs. The 1-year students had a preference in answering a y/n-question with a N (66,7%), followed by YN (32%) and Q (1,3%). For the 2-year students, a YN was the most preferred (53,8%), followed by N (44,6%) and Q (1,5%). When answering a declarative sentence, besides the correct answer, 2-year students had

a stronger preference compared to 1-year students in choosing N as the answer (40% compared to 34,7%) than YN (4,6% compared to 9,3%).

When observing the overall answer distribution between Group 1 and 2, a difference can be seen. From the targeted sentences, Group 1 chose from all three alternatives presented in the sentence types (see Table 7 and 8). However, Group 2 excluded one alternative in 12/15 sentences when responding (see Table 9 and 10). Both 1- and 2-year students chose from all three alternatives in one y/n-question (Y9) and one declarative (D14). Furthermore, the 1-year students chose from all three alternatives in an additional declarative (D11) where the 2-year students excluded one answer.

The results in this section indicate that a difference between the categories can be seen, and will be discussed in the following chapter.

## 4 Discussion

### 4.1 Japanese survey

The result from the previous study by Maekawa (1991a) received high identification rate on interrogative sentences by Japanese speakers. However, in contrast to Maekawa's study, this experiment used several variations of wh- and y/n-questions. Since Maekawa's results only apply to the questions in (3), a survey was created to reconfirm the ability to distinguish the interrogatives used in this study by native speakers of Japanese. As expected, the results of this experiment indicate that the interrogatives used in this study can be distinguished by Japanese speakers. Despite the similar results, the methods in altering the sound clips between these studies differs. The sound clips in this experiment were altered by solely removing a certain segment (see (4)) in various sentences. Maekawa replaced different segments in various degrees of the sentence with white noise making the distinguishing more complicated. Since the interrogatives can be identified by Japanese speakers, the discussion will now continue to the results from Swedish speakers.

The lowest recognition rate out of the sentence types was the declaratives (84%). When observing the results from Makarova & Matsui (1996), the Japanese speakers identified 95,1% of the declaratives in their native language. The lower recognition rate (84%) in this experiment, could be due to the difference in methodology. Compared to their study, this experiment used sentences longer than 3 syllables, and the sound clips were altered by removing a certain part.

The participants were not notified of what the survey was based on, namely the intonation. They were simply asked to listen to the sound clips and choose the most appropriate answer, whereas in Makarova & Matsui's study, they were asked to identify the sentence type. The awareness can make one more alert on what to focus on, which could possibly lead to better results.

Being an online survey, there are risks that follows with it. Since the survey was heavily based on sound, the surrounding environment when participating is of great importance. Therefore, the environment might have affected the participants in overlooking decisive parts in intonation.

The sentence length, awareness and environment are possible factors that may have affected the participants when answering the survey.

## 4.2 Swedish survey

This experiment was constructed as a quantitative study. Due to the time limit, the number of participants did not meet the expectations. A majority of responses from the Swedish survey came from the younger age group and therefore lacked answers from various age groups, which can be seen in Table 3. Responses from 4 age groups were collected out of 10 age groups. A comparison between age groups could not be executed due to insufficiency of responses.

It has been reported that the northern people of Sweden have difficulties understanding the intonation of southern people's interrogative sentences in the right way because of the differences in sentence intonation at various places (Hultman, 2003). A possibility of deviation from the northern participants could have been detected, although due to inadequacy of responses a proper analysis could not be conducted. Therefore, any correlation of perception of Japanese sentence intonation between northern and southern participants could not be found.

One of the background questions asked in the survey was if they were fluent in other languages than Swedish. The responses received indicated a wide range of bilingual and trilingual speakers. The thought behind this background question was to see if multilingualism would affect the ability to distinguish the sentence types. However, due to insufficient responses among the groups, no further analysis could be conducted.

The participants' choice of category of different levels of exposure and proficiency seem to have affected their perception of these sentence types the heaviest. The 1- and 2-year students had similar high recognition rate in interrogative sentences despite their various backgrounds, e.g. dialects and multilingualism. There is a possibility that such backgrounds might have affected the rate of declaratives, since the background question of exposure and proficiency did not reveal any significant difference among the participants.

In Table 4, the correct recognition rate between the genders can be seen, where the males' recognition rate was higher in each sentence type. A possible reason to this lies not on the gender, but in distribution. The male distribution is higher than the females in Group 2, whereas the female distribution is higher in Group 1. This could be the possible explanation, since exposure and proficiency has shown to be the heaviest factor when distinguishing the sentence types. On the other hand, there are many factors that can affect the perception. For instance, age, dialect, multilingualism, history of residence in different regions etc. are some of the influential factors. However, the responses received were either insufficient, or unevenly

distributed. Therefore, any conclusion regarding if these factors plays a role in the perception could not be drawn.

#### **4.2.1 The sentence types**

In the Swedish survey, LTNE had the lowest recognition rate in all three sentence types out of all categories. The sentence type with lowest recognition was the wh-question where only 27% was recognized. A possible explanation to this might be due to the difference in sentence-final intonation between the two languages, as the sentence-final intonation has been described as having a raising in Japanese and a falling in Swedish. LTNE were able to recognize 54% of the y/n-questions, despite the higher possibility of answering correctly, since both YNs and Ns were acceptable answers. Despite the problem of two possible answers in y/n-questions, the results still show a distinct difference between the groups.

RE's results of wh-questions were 23% higher recognized than LTNE, and 16% higher in y/n-questions. This could be an indication of an increase comprehension of the intonation in Japanese interrogative sentences among those regularly exposed to the language compared to those with little to no exposure. The variation in total correct answers for individual subjects was wide, ranging from 3 to 14 among the sentences. One participant in this category correctly recognized 14/15 sentences, which is comparable to the participants in Group 2. The wide range of correct answers could be due to the frequency of exposure, or due to the capability of the participants. However, the survey was not designed to answer such questions.

The results produced by the 1- and 2-year students differed at its highest by 1,2%. With an average of 91,4% (wh-questions) and 98,6% (y/n-questions), Group 2 produced similar results to the Japanese participants (wh-questions: 96,8% and y/n-questions: 99,2%). This indicates that the ability to distinguish interrogative sentences can be acquired in early studies at university.

The answer pattern between the two groups showed a difference where Group 2 was more selective in their choice of answer. This suggests a higher recognition of different intonation in sentence types and they were therefore able to exclude alternatives they knew were wrong. However, when observing the answer distribution in y/n-questions further, the 2-year students were closer to the Japanese participants. Both 2-year students and Japanese participants preferred to answer a y/n-question with a YN, whereas both 1-year students and RE preferred a N. In other words, the higher-level students had an answer distribution closer to the Japanese participants in y/n-questions, but still with a distinct difference.

In the perception study by Makarova & Matsui (1996),<sup>7</sup> the informants were able to identify over 78% of the declaratives when listening to a foreign language. However, the Swedish speakers' recognition rate of Japanese declaratives varied from 41-56%. Despite the different results, all the three languages, Russian, Japanese, and Swedish, share the description of having the sentence-final intonation falling in a declarative sentence (Fujisaki & Hirose 1982; Svetozarova 1998; Hultman 2003). In the answer distribution, one can see that the participants often chose a N as the answer to a declarative sentence. A possible reason for the choice could be due to the participants perceiving the declaratives as a wh-question. Which is possible since the sentence-final intonation in wh-questions and declaratives is described as falling in Swedish.

Depending on their exposure to the language, the recognition rate of wh-questions varied from 27% to 92%, which is a notable difference. This indicates a development in understanding of the intonation in wh-questions despite the intonational difference between the languages. The recognition rate of y/n-questions varied from 54% to 98,7%, increasing with their exposure. Similar to wh-questions, a distinct difference between the categories can be seen. Despite similar description in sentence-final intonation between the languages, y/n-questions were more difficult to comprehend for Group 1 compared to Group 2. The latter group was able to distinguish the interrogative sentences, whether the description of intonation was similar (y/n-questions) or not (wh-questions) between the languages. However, all the categories recognized only 46-56% of the declaratives even though Group 2 has shown the capability of distinguishing the interrogative sentences that is similar and dissimilar to Swedish. Instead they chose to answer the declaratives as an wh-question in Swedish.

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<sup>7</sup> Previously explored in 2.3.1

## 5 Conclusion

This experiment has investigated Swedish and Japanese speakers' capabilities of distinguishing wh-questions, y/n-questions and declaratives by listening to the intonation. A trend of increased recognition rate in Swedish participants with higher Japanese exposure levels can be seen in the results to a certain degree. This indicates that exposure to Japanese affects the ability to distinguish the sentence types in Japanese. The similarity in recognition rate between 1- and 2-year students suggests that a higher degree of proficiency in the language has no significant meaning when distinguishing the sentence types. Although, the 2-year students' answer distribution was closer to the Japanese participants' in y/n-questions compared to the 1-year students'.

LTNE had a low recognition rate in wh-questions compared to other groups. The difference in intonation between Japanese and Swedish wh-questions might have affected their perception. In other words, some or no exposure to Japanese suggests a difficulty in distinguishing wh-questions in a language that does not share the same intonation to one's own. However, even when sharing the intonation patterns, in this case declaratives, the recognition rate was rather low. Despite the results showing the capability of Group 2 in distinguishing sentence types similar and dissimilar to Swedish, the recognition rate did not exceed 56%. However, the answer distribution indicates that the Swedish participants perceived the Japanese declaratives as a wh-question, as both sentence types share intonation description in Swedish. Therefore, the participants chose the N as the answer.

To sum up, the results indicate that the level of exposure to Japanese has a contributing factor in distinguishing between sentence types in Japanese. However, the degree of proficiency does not reveal any distinction in the ability of distinguishing them. In the case of declaratives, the results indicate that it was perceived as a wh-question instead. This leads to the conclusion that the native speakers of Swedish have difficulties in distinguishing the Japanese wh-questions and declaratives due to both sentence types being similar in sentence-final intonation in Swedish.

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## **Resources**

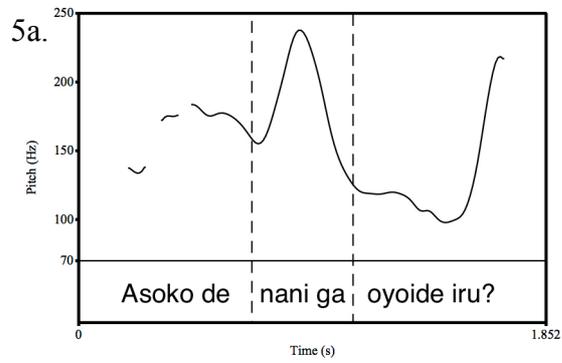
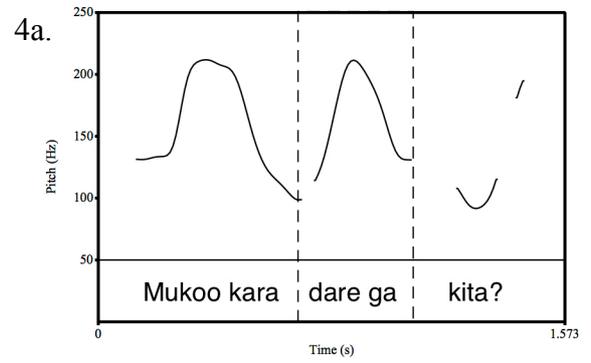
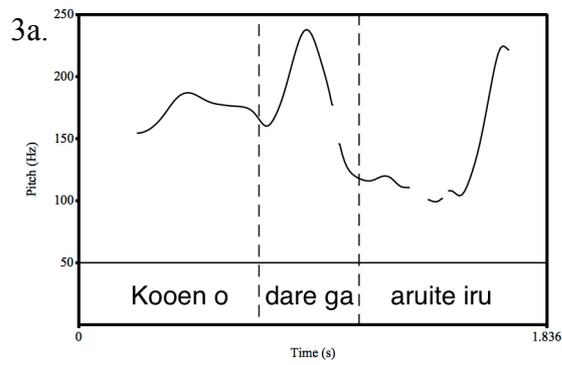
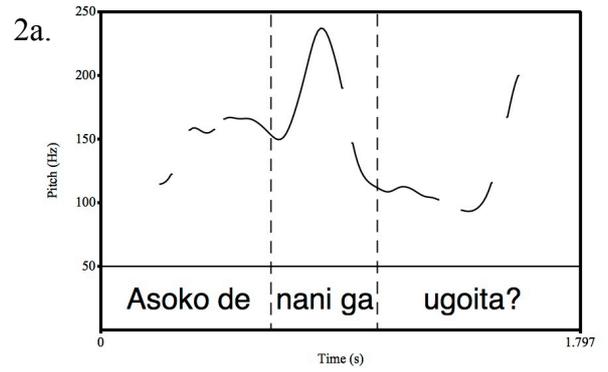
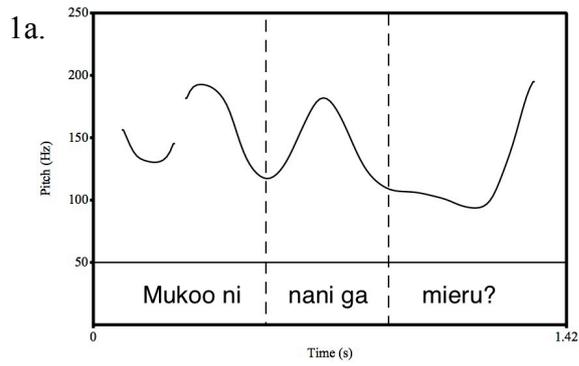
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## Appendix

This appendix contains the targeted sentences used in the survey and their respective intonation contour. The transcription of the sound clips used in the survey is provided. The original writing of the alternatives is in Swedish and Japanese. The presentation of the alternatives is in the order: Swedish, Japanese, and English. The questions are arranged by sentence type and the number of the sentence does not represent the order in the survey.

### Wh-questions

1. 向こうに何が見える？  
‘What can you see over there?’
  - Ja/はい/Yes
  - Dansande människor/踊っている人達 /Dancing people
  - Jaså? /そう? /Really?
2. あそこで何が動いた？  
‘What was moving over there?’
  - Nej/ううん/ No
  - En döende fisk/死にそうな魚/A dying fish
  - Hur då? /どうやって? /How?
3. 公園を誰が歩いている？  
‘Who is walking in the park?’
  - Nej/いいえ、誰もいなかった/ No
  - En gubbe i området/近所のおじいさん/ An old man in the neighborhood
  - Vem då? /え、誰? /Who?
4. 向こうから誰が来た？  
‘Who came from over there?’
  - Nej, inte än/いいえ、まだ/ No, not yet
  - Tomten/サンタさん/ Santa Claus
  - Hur då? /どうやって? /How?
5. あそこで何が泳いでいる？  
‘What is swimming over there?’
  - Nej/ううん/ No
  - Det är delfiner/カバだよ/ It is dolphins
  - Var det kul? /楽しかった? /Was it fun?



## Y/n-questions

6. 向こうに何か見える？

‘Can you see anything over there?’

- Nej, jag ser inget / ううん、何も見えない / No, I don't see anything
- En elefant som äter / 草を食べている象 / An elephant that is eating
- Vadå för något? / え、何が? / What do you mean?

7. あそこで何か動いた？

‘Was something moving over there?’

- Nej, inget / ううん、何も / No, I don't see anything
- En levande råtta / 生きているネズミ / A living rat
- Jo, det kan jag / はい、いいよ / Yes, I can

8. 公園を誰か歩いている？

‘Is someone walking in the park?’

- Ja / はい / Yes
- Grannens hund / お隣さんの犬 / The neighbor's dog
- Gick du vilse? / 迷った? / Were you lost?

9. 向こうから誰か来た？

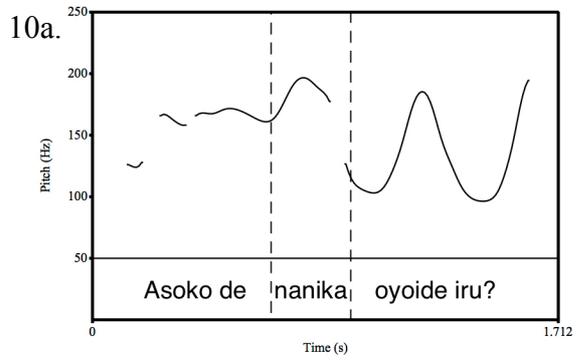
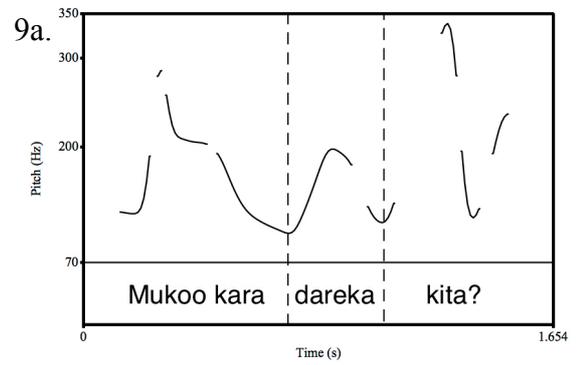
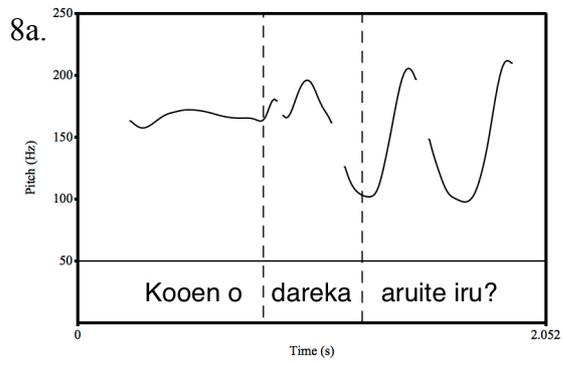
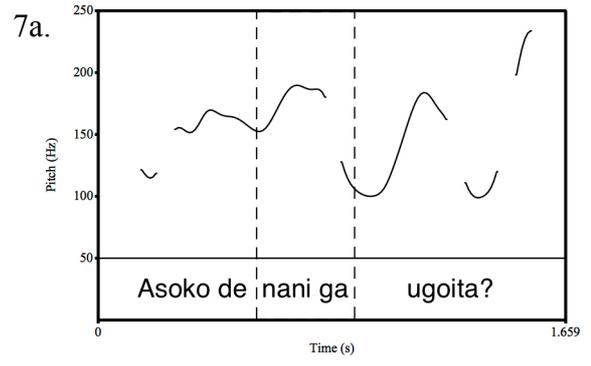
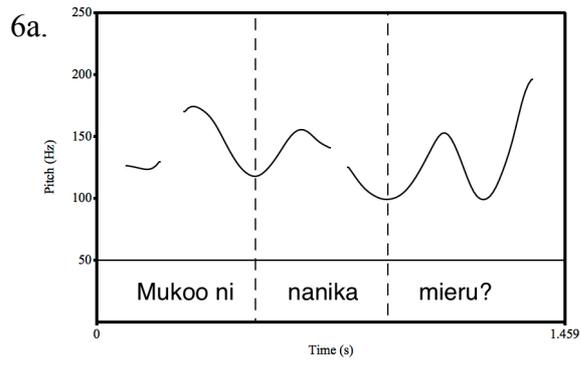
‘Did someone come from over there?’

- Ja / はい / Yes
- Pappa och lillasyster / 父と妹 / Father and my little sister
- Jaså? / そう? / Oh, really?

10. あそこで何か泳いでいる？

‘Is something swimming over there?’

- Ja / はい / Yes
- Fiskar / 魚だよ / Fishes
- När då? / いつ? / When?



## Declaratives

11. 向こうに何か見える。

‘I can see something over there.’

- Ja/うん/ Yes
- Eiffeltornet/エッフェル塔/ The Eiffeltower
- Vadå för något? / え、何が? / What?

12. あそこで何か動いた。

‘Something was moving over there.’

- Ja, jag ska/はい/ Yes, I will
- En flygande fågel/飛んでいる鳥/ A flying bird
- Vadå för nåt? /えっ、何? / What kind of stuff?

13. 公園を誰か歩いている。

‘Someone is walking in the park.’

- Ja, det blir bra/はい、いいです/ Yes, it will be fine
- En lågstadielev /小学生です/ An elementary school student
- Jaså? Trots att det regnar? /本当? 雨なのに? / Really? Even though it's raining?

14. 向こうから誰か来た。

‘Someone came from over there.’

- Ja, någon kom/はい、来ました/ Yes, somebody came
- En person som sålde kakor/ クッキーを売っている人だった/ A person selling cookies
- Vem kan det vara? /一体誰だろう? / Who could that be?

15. あそこで何か泳いでいる。

‘Something is swimming over there.’

- Nej /いいえ/ No
- Pingviner/ペンギンだよ/ Penguins
- Var då? /え、どこ? / Where?

