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Teaching and Learning an Endangered Austronesian Language in Taiwan

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This paper provides a case study of the process of endangered language acquisition, which has not been well studied from the viewpoint of applied linguistics. It describes the context of teaching Chinese adult learners in Taiwan an endangered indigenous language, the teachers' pedagogical approaches, the phonological and syntactic acquisition processes the learners were undergoing, and applications to other language documentation and revitalization programs. Both qualitative and quantitative methods were used to address the research questions.This study demonstrates cogently that language is a complex adaptive system. In phonological acquisition, the trill was the most difficult phoneme to learn. Systematic variations for the variables (ŋ) and (s) were found to be constrained by both markedness and interference. Furthermore, learners also tended to interpret Yami orthography based on their knowledge of English. In word order acquisition, learners performed much better than expected, partially because the present tense, coded by the SV word order, is the norm in Yami conversations. However, students still inaccurately associated word order with sentence type rather than with tense distinction. The Yami case provides an integrated model for endangered language documentation, revitalization and pedagogical research, which would be of interest to people working with other languages and the language documentation field in general.

1. INTRODUCTION[1]. There are several different approaches to the categorization of language endangerment. According to Ethnologue (Gordon 2005), the total number of languages in the world is 6,912. Of the languages listed, 516 are classified as nearly extinct, as "only a few elderly speakers are still living." A language might be considered threatened when it is used only by socially isolated old folks, a socially integrated population beyond childbearing age, and when it exists only orally, without literacy (Fishman 1991). Krauss (1992) defines three categories of endangerment: (1) moribund languages: no longer learned by children, (2) endangered languages: still learned by children but not expected to be learned by children within ten years, and (3) safe languages: supported by the state and having a large number of speakers. It is estimated that 90% of the extant oral

languages will either be moribund or will have disappeared by the end of the century (Terralingua, http://www.terralingua.org). Thus, there is a very limited window of opportunity to document and revitalize those languages.

A number of Austronesian language revitalization projects are related to language teaching and learning. One success story is the establishment of Maori immersion and bilingual schools (Maclagan et al. 2006). Maori communities were specifically built to support Maori language use at home and in social institutions for children. Another case is Hawaiian revitalization, as described by Slaughter (1997), whose success was attributed to parents' positive attitudes and well-established immersion programs.

Some efforts have been made to develop web-based interactive language learning materials for Indonesian and Tagalog (Henry and Zerwekh 2002). Software for teaching these two well-documented Austronesian languages has also been produced, such as Northern Illinois University's "Learning Indonesian on the Internet" (http://www.seasite.niu.edu/Indonesian/), Hoven's (2003) MMInteraktif, an Indonesian listening comprehension software package, and McFarland's (2006) CAI program for teaching Filipino. However, e-Learning for endangered Austronesian languages is rare.

As a result of the ELDP grant from the Hans Rausing Endangered Languages Project, Rau, Yang and Dong developed e-Learning (i.e., computer-mediated instruction) materials for Yami, an endangered Austronesian language (2007), proposed a pedagogical model for e-Learning (Rau and Yang to appear) and provided a summative assessment of the impact of their e-Learning materials (Rau and Yang this volume).

Yang (2007), in her formative needs analysis of the Yami e-Learning program, provided feedback to improve on its design. She also surveyed the attitudes of Yami teenagers toward the e-Leaning program and found that the third year junior high school students on Orchid Island had a more positive evaluation of the websites than did younger students. She reasoned that this might be due to the pressure they had to pass the Proficiency Tests of Aboriginal Languages (PTAL)[2] so that they could get the 35% bonus points on the Basic Competence Test, a High School Entrance Examination. Since there are limited resources[3] for them to prepare for the test, the Yami websites filled this gap.

Although previous studies have informed us how to build a successful Yami e-Learning program, very little research has focused on the process of teaching and learning Yami. This study investigated the context of teaching an endangered indigenous language to Chinese adult learners in Taiwan, the teachers' pedagogical approaches, the phonological and syntactic acquisition processes the learners were undergoing, and applications to language documentation and revitalization in general. We believe the research presented in this paper, bringing together two distinct but crucial areas, can make a contribution both to second language acquisition research and to language revitalization.

1.1 CONTEXT. Yami is a Philippine Batanic language, spoken by less than 4,000 indigenous people on Orchid Island (*Lanyu* in Chinese). According to Rau's (1995) sociolinguistic survey, there was only one village out of six on the island where children still used

2 For a detailed discussion of the PTAL, see Huang (2007).

3 The online indigenous language textbooks for both elementary and junior high school students are available from http://www.alcd.nccu.edu.tw/index_0.html%20.

some Yami in daily interaction. Yami has been offered as an elective in elementary school since 1998, but Yami is gradually being replaced by Mandarin Chinese. Chen (1998) has compared the language proficiency, language use and language attitude among three generations of Yami and found a language shift to Mandarin and a decline of Yami language ability as age decreases. Lin (2007) re-examined language use and language ability among Yami teenagers and found that while Yami is still spoken in Iraralay, the other five villages show continuing decline in the use of Yami by teenagers with their parents. However, Yami teenagers were found to have a positive attitude toward Yami language and identity and strongly support any efforts to promote or maintain their language. Be that as it may, most of the teenagers admitted that they prefer speaking Mandarin over Yami.

Rau and Yang (2007) describe a model of biliteracy continua of majority and minority languages in Taiwan and discovered a reversal of the relationship in each of the four continua in comparison with Hornberger's model (2003). The less powerful communities in Taiwan are monolingual in a vernacular whereas the more powerful communities are bi(multi)lingual, with one of them being the official language. The addition of English literacy in the mainstream Taiwanese society tends to follow an L1 model, while the addition of Yami literacy on Orchid Island tends to follow an L2 model. In the acquisition of English in the mainstream Taiwanese society, the content is required to be "contextualized" and "authentic" for communicative needs. On the other hand, the content of online indigenous language textbooks for both elementary and junior high school students is mostly "decontextualized" with direct translation from Chinese. Finally, due to early exposure or in many cases simultaneous exposure to English, the media of biliteracy in the mainstream Taiwanese society have become increasingly similar and convergent in terms of their language structures and scripts respectively, whereas the successive exposure to Yami literacy is viewed as dissimilar and divergent from the Chinese structures and character writing to which they are exposed very early in life.

All the above-mentioned shifts of contextual factors from Yami teenagers' language attitudes, language use, and language proficiency to the disadvantaged end of power relations in the continua model have provided the context for our study.

Although revitalization of the aboriginal cultural and linguistic inheritance of Taiwan is well supported by the Taiwanese governments, central and local, the Yami language is still shifting to Mandarin in its own speech community. However the increasing interest in the indigenous languages and cultures in Taiwan has motivated Chinese students to take such courses in response to the Taiwanese government's campaign of globalization and localization.

1.2 AIMS AND RESEARCH QUESTIONS. The goal of this longitudinal study is to provide a description of the process of learning an endangered language by a group of Chinese graduate students in linguistics from 2005-2007, using both qualitative and quantitative methods to answer the following research questions.

1. What is the process of teaching and learning an endangered Austronesian language in Taiwan? What are the teachers' pedagogical approaches?
2. What are the sequences of development and interlanguage variability in Yami phonology? What phonemes are difficult to acquire and why?

3. What are the sequences of development and interlanguage variability in Yami syntax? How is word order in Yami acquired by Chinese learners?
4. How can this case study provide generalizations that would be of interest to people working with other endangered languages and the language documentation field in general?

2. METHODOLOGY. This section begins with a description of the participants in the Yami language courses, followed by the qualitative and quantitative methods used to analyze the data.

2.1 PARTICIPANTS IN THE YAMI LANGUAGE COURSES. The authors of this paper all participated in the process of teaching and learning Yami in various stages of the Yami language courses from 2005-2007. In Spring 2005, a Yami native instructor and a linguist co-taught Yami lessons to five graduate students in linguistics at Providence University in central Taiwan one hour per week as part of the two-credit Austronesian Linguistics Seminar, a graduate elective course, with the goal of introducing the structure of Austronesian languages by providing an authentic example of a language spoken in Taiwan. The same course was repeated in the spring 2006 with six students enrolled. Since half of the learners had a background in ELT, this seminar expanded its coverage from linguistic structures to language use and language teaching and increased the number of hours of Yami instruction from one to two hours per week. All the participants in this course received three graduate credits toward graduation. They were also invited to participate in the research by assessing the Yami e-Learning materials being developed at the same time.

To speed up the process of evaluating all the e-Learning materials,[4] an intensive non-credit language course was offered to four students who had acquired novice-high level of proficiency in Yami[5] to reach the intermediate level, while participating in the project as graduate assistants. The course was held at the National Museum of Natural Science, for a total of 30 hours during eight weekends in the summer of 2006.

After the Yami e-Learning program was finally completed at the end of 2006, two new graduate students signed up for the same Austronesian Linguistics Seminar with two of the three hours devoted to Yami language study in Spring 2007, while two of the graduate assistants with an intermediate level of Yami proficiency continued to participate in the Yami course as researchers and learners.

2.2. ANALYSIS OF THE QUALITATIVE DATA. The data for the qualitative studies were collected from 2005-2007, following an ethnographical approach by interviewing the participants, taking field notes, observing and videotaping classroom interactions, and examining the students' assignments and teachers' feedback. The interviews were conducted

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[4] These are the web-based interactive language learning materials for Yami, available online (http://yamiproject.cs.pu.edu.tw/elearn).

[5] See ACTFL guidelines, http://www.sil.org/LinguaLinks/languagelearning/OtherResources/ACTFLProficiencyGuidelines/contents.htm.

by one of the graduate assistants as a participant observer in this project. Themes on teaching pedagogy generalized from the interviews with the instructors and the learners will be discussed in 3.1.

2.3. ANALYSIS OF THE QUANTITATIVE DATA. The quantitative data were recorded from the five guided conversations among the four learners once every two to three weeks from March to mid-June 2007 in the Yami language class, which met for 100 minutes per week at Providence University. Each conversation session lasted for 40-50 minutes. The data were transcribed and analyzed to determine phonological and syntactic acquisition processes and variability. For the investigation of the sequences of development, markedness and interference effects were examined. For interlanguage variability, a sociolinguistic variationist approach was used to compare the performance of two groups of learners (intermediate vs. novice) to determine the factors that account for Yami interlanguage variation.

2.3.1. STATISTICAL ANALYSIS. The data were analyzed using the VARBRUL program,[6] a loglinear regression analysis suitable for natural language data that usually involves many interacting factors and unbalanced distribution in each cell.

For the study on phonological acquisition, the dependent variables are the four consonantal phonemes identified as difficult for Chinese learners: /k/, /ŋ/, /s/, /z/. The phonological system of Yami will be discussed in 3.2. The independent variables are the learners' proficiency (intermediate vs. novice) and time (five time intervals).

For the study on word order acquisition, the dependent variable is the alternation between VS and SV, while the independent variables are two proficiency levels, five time intervals, four tasks, and two sentence types, the details of which will be discussed in Section 4.

3. RESULTS AND DISCUSSION. We begin this section by addressing the first research question on the process of teaching and learning an endangered language with a focus on the teacher's pedagogy.

3.1 TEACHER'S PEDAGOGY. Following Borg's qualitative study (1998) on teachers' pedagogical systems and grammar teaching, we grouped the interview data into six major categories: (1) corrective feedback and error analysis, (2) explanation of grammar rules, (3) reference to students' background, (4) grammatical terminology, (5) practicing grammar, and (6) grammar and communicative ability. Table 1 presents the teachers' pedagogy used during the teaching process. The second column lists classroom episodes representing the identified themes[7], while the third column lists the interview data of the two teachers' com-

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[6] Paolillo (2002) has provided a comprehensive discussion of the statistical models and methods for analyzing linguistic variation. Tagliamonte (2006) has provided the most detailed step-by-step procedures for VARBRUL analysis and interpretations.

[7] The theme of explanation of grammar rules is illustrated by Episode 2. The theme of reference to students' background is illustrated by the teachers' comments in the third column.

ments on their beliefs about teaching strategies. In the following paragraphs, we combine the interview data with the students' comments to illustrate the process of teaching and learning.

TABLE 1 Teacher's pedagogical systems used during the teaching process

Teacher's pedagogy	Examples	Teacher's comments
Corrective feedback and error analysis Teachers analyzed the students' grammatical errors and provided corrective feedback.	Episode 1 S1: mo magaga, maciavang namen pa jimo an? (Hey, magaga. Can you give us a ride?) S2: kamo mangay jino? (Where are you (plural) going?) T1: There is only one person. S2: ka…(hesitated) (ka…) T1: You (singular) S2: mo mangay jino? (Where are you [singular] going?) T1: ka, ka mangay… (ka. ka mangay…) S2: ka mangay jino? (Where are you going?)	Originally, I wanted to use a communicative language teaching method, but I immediately saw that the students struggled greatly and could not keep up. I found later that even in reading a sentence, the students were unable to process it, that they could not process the sentence because we were going too quickly. You had not reached that level, so you couldn't produce those sentences on your own. However, you could understand them passively. Therefore, it was the proper time to use the grammar translation method, so we began to go back to grammar translation, or we would not have been able to continue this course. (T1, December 11, 2006)

| Explanation of grammar rules

The teachers raised the students' grammatical awareness. | Episode 2
T1: I just said that pasdepen is the main verb, right? A transitive verb. Why is it a transitive verb? You saw that affix, so you say it is a transitive verb.
Ss: (quiet)
T1: -en, -en. Ok, what about its agent, what is the agent in this sentence? | I think first of all, because of their background in English, they were sensitive to grammar, and they knew that grammar is part of the language. Therefore, in terms of grammar, in my observation, they were willing to learn it, and wanted to learn it because it was necessary. This is my observation. (T1, December 11, 2006) |
| Reference to students' background

Teachers changed their pedagogical approach to GTM, based on their perceptions of students' backgrounds and expectations. | S3: nio. (You.)
T1: Nio, You! The agent is "you". "You" is the agent doing the action. What is "you" doing? You pasdepen, so pasdepen means…?
T2: Putting something inside.
T1: The Ba-construction is used. Do you see that? It is very transitive, isn't it? That's why she used the ba-construction to put something in it. We can find that "pasdepen" is a transitive verb. Ok, what's the patient of this verb? O tatala, right? O tatala nio is the patient semantically; however, it is the grammatical subject in this sentence, because there is an "o" here. | What I want to say is that all of you have the linguistic concepts, the language concepts. Thus, you can absorb and understand grammar quickly. (T2, December 17, 2006) |

Grammatical terminology Terminology was used quite freely and students coped well with terminology.	<u>Episode 3</u> T2: apia o tatala namen ang? (What should we do about our boat?) Ss and T1: apia o tatala namen ang? (What should we do about our boat?) T1: Ok, where is the subject? S3: o tatala. (o tatala namen) T1: namen, o tatala namen means? S3: Our boat. T1: Our boat. Ok, and ang? S4: Particle. T1: Particle. Meaning…? S4: (The student gave an inaccurate answer) T1: I am asking about ang right now, what does ang mean? It is the sentence final particle. What's the possible meaning of this word? (silence) T1: Interrogative particle!	For some indigenous language teachers, they have to learn grammar rules. Although you won't teach students these rules, you have to be equipped with the concept of grammar. For example, ma- would appear in front of all adjectives (stative verbs). For example, very tall and very short, etc. It may spark a students' interest in learning the Yami language. (T2, December 17, 2006)
Practicing grammar Teachers always led the course by practicing activities.	<u>Episode 4</u> Practicing activity: "mangay tamo do_____. T1 provided photos of small boats (one and two-man boats) and big boats (six-man boat, eight-man boat, and ten-man boat) to illustrate the differences. Students asked what ships other people would like to take. T2: mi tamo do mibekbek an, no mangay tamo do atlo so avat? (Should we take the motor boat or the six-man boat?) S4: mangay tamo do pikavangan. (Let's take the two-man boat.)	"I like Audio-lingual because it has strict drills which are stimulating. I like it very much because I think I like this kind of practice. I think it is necessary to have this kind of practice because we can internalize some grammar rules through them. (T1, December 11, 2006)

Grammar and communicative ability	Episode 5	"I think the grammar
	Insturction: Pretend that you were one of the five tourists. Write down a list of things that you are going to complain about to the hotel owner.	translation method is the fastest way to know one language in a short time.
Teachers believed grammar is the basis for communicative ability.	Example 1. ya masazówsaw no mahep, am ya mánnget no maraw. (It is cold at night and hot in the morning.)	It is the fastest, because you don't need to be actively manipulating the language, but can learn
	2. ya abo o wanglu. (There is no internet access.)	the language passively. (T1, December 11, 2006)

3.1.1. CORRECTIVE FEEDBACK AND ERROR ANALYSIS. This course was originally designed for communicative language teaching (CLT); however, the teacher T1[8] became aware of students' difficulties during oral activities and was also concerned about the short timeframe of the course, so she shifted to grammar translation (GTM) and audio-lingual methods beginning with Lesson Two at the beginning stage of her instruction during the 2005-2006 school year. As Maslovaty (2000) suggests, teachers may change their pedagogies based on the dilemma they face, the teachers' personal belief systems as well as teaching context and, to a lesser extent, personal background characteristics. The tensions between GTM and CLT were resolved by an eclectic combination of methods and activities, as described in Fotos (2005: 668).

In a change of her teaching strategy, T1's focus was drawn to corrective feedback and error analysis. Episode 1 in Table 1 provides an example: as soon as a student made a mistake, T1 jumped in to help correct it.

At first, T1 only offered S2 a cue in Chinese "you (singular)," because she wanted to elicit the rule through an interactive discussion rather than simply supplying the rule herself. In fact, S2 offered the correct nominative form "ka" 'you (singular)' in her attempt, but after T1's prompt, she changed to an incorrect answer. After that, T1 gave S2 the correct answer.

T1 mentioned in (1) she liked to offer "incidental corrections" during oral activities, an idea adopted from Ellis' "incidental focus on form" (2001) as cited in Williams (2005: 671).

(1) What I like is not a shotgun approach, but incidental corrections. I can generalize some common problems emerging from our activities; after that, we can discuss them all together. This is what I like to do. (T1, December 11, 2006)

This preference is drawn from her own experience in learning English inductively in junior high school, as shown in (2).

(2) When I was a junior high school student, my teacher also liked the inductive method. Some teachers prefer to use the deductive method, which is to offer a rule first, and then allow students to put that rule into practice. For me, I don't like

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[8] Throughout this paper, the two teachers are identified as T1 and T2, and the students are identified by the letter S and a number (e.g. S1, S2, etc.).

people to tell me the rules directly since I can find out the rules by myself. For this reason, I prefer to use the inductive method rather than the deductive method. (T1, December 11, 2006)

Sometimes the teacher provided compressed grammar rules rather than asking students to explore the rules themselves, especially when the rules involved transitive and intransitive affixes. As Bauer and Nation (1993) suggest, the majority of affixes are regular and predictable, and therefore should be taught directly. S4 expressed how she felt about this technique in (3).

(3) Maybe she was afraid that we couldn't understand or couldn't answer it, so she told us the rules before asking us. Is that right? If she threw some grammatical questions at you suddenly, you probably would not be able to answer, right? (S4, December 21, 2006)

Although the students felt embarrassed when they were corrected, they still expected corrective feedback, as illustrated in (4).

(4) I felt that the teacher's correction was ok, although I felt embarrassed at that moment. However, if there was no correction, I would not have known my errors when I read out loud. (S1, December 11, 2006)

3.1.2 EXPLANATION OF GRAMMAR RULES. During each class, students repeated after T2, modeling the native speaker's input. This was followed by T1's explanation of grammar. This was a recurrent pattern in their team teaching. According to Brown (1994), a very limited portion of classroom speaking time may legitimately be spent in human "tape recorder" speech. Moreover, he also suggests that drills can offer students an opportunity to listen and orally repeat certain strings of language that may pose some linguistic difficulty, either phonological or grammatical. Particularly, these exercises could help to establish certain psychomotor patterns (to "loosen the tongue") and to associate selected grammatical forms with their appropriate contexts.

In Episode 2, Table 1, T1 posed a grammatical question. After several tries, with T2's help, S3 provided correct short answers on case markers. This interaction style is a typical "monologue in disguise", as described in Peled-Elhanan and Blum-Kulka (2006).

A student commented in (5) that teaching grammar before they even learn to pronounce words properly would discourage them from speaking. However, repeating after the teacher encouraged them to speak.

(5) If you teach grammar first before we know how to read (Yami words), and we seem to know everything when we actually do not, then I would be afraid of speaking. If we begin by repeating after the teacher out aloud, then it is a good teaching method. This way, we would be less hesitant to speak when we answer questions or join in activities later. (S2, December 17, 2006)

3.1.3 REFERENCE TO STUDENTS' BACKGROUNDS. T1 believed her focus on grammar was related to the students' backgrounds. When the interviewer asked her about her choice of teaching strategy, she mentioned her perceived needs of the participating learners, as in (6).

(6) Most of the students here wanted to finish their MA theses. Take ER[9] for example. He must clearly understand Yami grammar before he can write about word order, right? In addition, you worked on Yami reduplication and KR worked on Yami intonation. JM worked on E-learning and AN worked on Yami dictionary. All of them need to master Yami structures before they can make significant contributions. Especially people like JM - in order to create e-Learning games, she has to pressure cook, cook quickly; she needs to learn the language in a short time. This is why I applied the techniques that I did. (T1, December 11, 2006)

Many adult learners expect grammar in the L2 curriculum and treat grammar as the central component of language (Hinkel and Fotos 2002). Since this was the instructor's assessment of the students' needs, she adopted what she called "pressure cooker" method by focusing on grammar.

3.1.4 GRAMMATICAL TERMINOLOGY. Episode 3 in Table 1 shows that the teacher employed a translation strategy and often used grammatical terminology to explain the usage of affixes and case markers in Yami. S3 reflected in (7) the need for translating the Yami sentences into Chinese, especially when the language is written in the Roman alphabet:

(7) Yami is written in Romanization, so when I read the text, I want to know the meanings of the words. (S3, December 9, 2006)

To teach students grammatical terms, T1 employed the above-mentioned "monologue in disguise" or self-questioning and answering technique. In Episode 2, Table 1, she tried to explain the transitive verbal affix "-en" to students. S1 commented that the use of grammatical terminology helped her remember how to use –en, as in (8).

(8) After I learned the meaning of some affixes, it became easier for me to remember them. For example, it is easier to remember the transitive affix –en. (S1, December 11, 2006)

3.1.5 PRACTICING GRAMMAR. Another teaching method the teachers used frequently in their course was language activities. In Episode 4, Table 1, T1 provided photos of small boats (one and two-man boats) and big boats (six-man boat, eight-man boat, and ten-man boat) to illustrate the differences. Students asked what ships other people would like to take. After the students learned the topic "*mangahahap*, go fishing," and finished an oral activity and grammar patterns, T1 provided a sentence pattern "*mangay tamo do*_____." (We will go by __) and asked each student to fill in the blank.

Celce-Murcia and Hilles (1988) mention that classroom activities can enable students to perform spontaneously with the language, as well as experience increased empathy, heightened self-esteem and motivation, and lowered sensitivity to rejection, thus facilitating second-language acquisition. S4 expressed positive feelings toward these activities in (9).

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[9] All names are pseudonyms.

(9) I think it is effective. As a novice, you will be afraid to make a sentence. This way, we can follow the sentence pattern. It is easier to fill in the blank. (S4, December 21, 2006)

T1 also used rhythm and mnemonic devices to increase students' long-term memory. She believed Yami songs could reinforce one's memory of Yami language, so she taught a few songs. A student reflected on the usefulness of songs for language learning in (10).

(10) You will still remember them in the future, for example, I took Japanese in college, and in class we would sing *zo san, zo san* (the elephant song). I still remember it now, so I still know elephant. Thus, it can give you a strong memory, and I think it can stay in my mind for much longer. (S4, December 21, 2006)

She also taught students some effective tricks to remember Yami words such as matching Yami syllables with Chinese characters (see Table 2).

TABLE 2: Yami-Mandarin Chinese phonetic and phonological similarities words

Yami	Mandarin Chinese	English gloss
rangirang	rang-i-rang	rainbow
kasingasíngat na	ga-xing-a-xing-a-te-na	It's too expensive

3.1.6 GRAMMAR AND COMMUNICATIVE ABILITY. Although T1 said she changed her pedagogical approach to a combination of grammar translation and audio-lingual methods, during classroom observations, many communicative activities were still employed, such as role-plays.

In Episode 5, Table 1, T1 asked the students to pretend that they were one of five tourists and asked them to write down a list of things to complain about to the hotel owners. T1 believed that grammar translation is a short cut to grasp the knowledge of a language. Afterwards, the students can spend the rest of their lives developing communicative ability and improving their accent, as illustrated in (11).

(11) I think that the grammar translation method is the fastest way to know a language in a short time. It is the fastest, because you don't need to be actively manipulating the language, you don't have to speak the language, but can learn the language passively. If you know the grammar rules of that language, you can learn the language passively. (T1, December 11, 2006)

This teacher's practice corresponds with the finding of a study by Lee and Wang (2002) that grammar instruction can make a difference for L2 acquisition and speed up the learning process for adult learners, although communicative approaches have been greatly promoted in language teaching.

3.1.7 INDIGENOUS LANGUAGE TEACHING IS NO DIFFERENT FROM FOREIGN LANGUAGE TEACHING. The instructor's teaching practices and the learner's expectations of learning a Taiwanese indigenous language is similar to teaching and learning a foreign language in Taiwan. This may not be an overstating of a minor result. Perhaps

from a psycholinguistic perspective, the process of second language acquisition would be the same regardless of the social status of the language. However, from a sociolinguistic perspective, this finding has many implications and might eventually have an impact on language revitalization.

It might sound ridiculous and politically incorrect to treat indigenous languages as "foreign" in their own land.[10] However, the strategy of teaching an endangered indigenous language to the majority of the society and to position it as a "foreign" language, which carries its own prestige and desirability, is designed to increase the visibility and status of the endangered language.

The language learning effort made by the Chinese students, in fact, has made an impression on the Yami local activists whose children do not speak Yami. In addition, the learners also chat online in Yami, arousing curiosity from their peers to encourage them to sign up for this language course. Therefore, these endeavors to promote Yami by teaching it as a "foreign" language in a graduate program will undoubtedly raise the prestige of the language.

3.2. PHONOLOGICAL ACQUISITION. In this and the following sections, we focus on the developmental sequences and interlanguage variability in phonology and syntax.

There are twenty consonants, four vowels, and four diphthongs in Yami (Rau and Dong 2006). Among all the segments, four consonants, /k, s, ŋ, z/, were identified as difficult for Chinese learners. Table 3 lists Yami consonants, where all the symbols represent standard Yami orthography.

TABLE 3: Classification of Yami consonants

		Place of articulation						
		Labial	Alveolar	Retroflex	Palatal	Velar	Uvular	Glottal
	Stop	p, b	t	d		**k**, g		ʔ
Manner	Fricative	v		**s**			h	
	Nasal	m	n			ŋ		
	Liquid		l	r				
	Affricate				č, ǰ			
	Trill		**z**					
	Glide	w			y			

The four phonemes are explained as follows.

/k/: a voiceless stop.

/ŋ/: a velar nasal.

/s/: a voiceless retroflex fricative. It is palatalized before the front vowel /i/, e.g., *siko* 'elbow', *sinsi* 'teacher, loan word'. The /s/ occurring before any vowel other than a high front vowel /i/ in a loan word is pronounced as a voiceless alveolar fricative [s], e.g., *saki* 'liquor'.

/z/: an alveolar trill.

Some of the most commonly found variants for the four phonemes are listed in Table 4, with the first row representing the target form.

TABLE 4: Variants for the four phonemes

/k/ → [k]	/ŋ/ → [ŋ]	/s/ → retroflex /s/	/z/ →trill
/k/ → [kʰ]	/ŋ/ → [n]	/s/ → [s]	/z/ → [l]
	/ŋ/ → [g]		/z/ → [z]
	/ŋ/ → [ʔ]		

The percentages of correct production of the target forms are shown in Table 5.

TABLE 5: Description of the realization of the four sounds

Phoneme	Input Probability Production/ Total tokens	%
/k/	**0.98**	
[k]	830/882	94.1
[kʰ]	52/882	5.9
/ŋ/	**0.88**	
[ŋ]	397/466	85.2
[n]	7/466	1.5
[g]	49/466	10.5
[ʔ]	13/466	2.8
/s/	**0.59**	
[retroflex s]	122/207	**58.9**
[s]	85/207	41.1
/z/	**0.04**	
[trill]	13/282	**4.6**
[l]	257/282	91.1
[z]	12/282	4.3

Among the four problematic phonemes, the trill /z/ is the most challenging (accuracy rate = 4.6%), followed by the retroflex /s/ (accuracy rate = 58.9%). The velar nasal in non-coda position has a wide variety of variants, whereas the problem of the velar stop /k/ lies mostly in aspiration, which might be interference from the English alphabet k.

Among the four phonemes, /z/ is the most challenging sound to acquire. The corrected mean of accurate production or the input probability of /z/ from the VARBRUL analysis is only 0.04, as shown in Table 5. The corrected means of accurate production for /s/, /ŋ/, and /k/, on the other hand, are 0.59, 0.88 and 0.98, respectively.

The alveolar trill /z/ is extremely marked because it is infrequent in languages of the world; besides, neither the learners' L1 (Mandarin Chinese) nor their major foreign L2 (English) have the trill sound in their inventories. Thus according to Eckman's (1996) Markedness Differential Hypothesis (MDH), trill is a difficult sound for the learners to pronounce. The two variants for trill are lateral [l] and retroflex [r], such as *pivazayan* [pivalayan] "work, transitive verb" and *mivazay* [mivaray] "work, intransitive verb". Accurate production of the target trill did not occur at all during the first year of instruction and thus will not be further discussed in this study.

In our following analysis of sequence of development and variability, we only concentrate on the two variables with the most variants, i.e., /ŋ/ and /s/. A log-linear regression analysis, VARBRUL, was used to test how proficiency and time account for sequence of development and variability.

3.2.1 INVESTIGATION OF /ŋ/. The most correct pronunciations of [ŋ] occurred in coda position, for example, *ikong* 'what,' *Maoyong* 'person's name,' *manazang* 'buy.' The learners tended to resyllabify the syllable structure with /ŋ/ by changing it from the onset to the coda[11] and inserting a [g] to create a new onset. For instance, they would pronounce ma-*nga*-mi-zing 'obedient' as ma*ng-ga*-mi-zing; ka-te-*ngan* 'know' as ka-te*ng-gan*.

Four separate VARBRUL runs were conducted on the four variants of (ŋ) with a total number of tokens of 466 and found that proficiency determined accurate production of the target form of (ŋ). As shown in Table 6, students of intermediate proficiency used the target form more frequently (.65), whereas those of low proficiency tended to use the three variants (.78 for [n], .64 for [g] and .78 for glottal stop). Overall, the most frequent variant for the target form (ŋ) is [g] with a total frequency of 10.5% as opposed to a little under 3% for either of the other two variants [n] and glottal stop, as shown in Table 6.

TABLE 6: Proficiency on accurate production of (ŋ)

Factor Group	[ŋ]		[n]		[g]		[ʔ]	
VARBRUL Weight (%)								
Proficiency								
Novice	.32	(76)	**.78**	(3.4)	**.64**	(15.9)	**.78**	(5.1)
Intermediate	**.65**	(92)	.27	(0.4)	.39	(6.2)	.22	(0.4)
Range	34		51		25		56	
Total Percentage %	85.2 % (397/466)		1.7 % (8/466)		10.5 % (49/466)		2.8 % (13/466)	

[11] The only two consonants permissible in coda position in Mandarin Chinese is /n/ and /ŋ/.

As shown in Table 7, time was also a significant factor group accounting for accurate production of (ŋ). The ratio of correct pronunciation increased gradually; the third and fifth times were better than the first, second, and the fourth times, as the VARBRUL weights above .50 (.60 and .57 respectively) indicate promotion of accurate production. The fact that both proficiency and time determine accurate production of (ŋ) indicates that the development of (ŋ) follows a linear pattern.

TABLE 7: Time on accurate production of (ŋ)

Factor Group	VARBRUL Weight (Pi)	Correct tokens / Total tokens	%
Time			
First	0.26	36/51	70.6%
Second	0.44	80/97	82.5%
Third	**0.60**	108/120	90%
Fourth	0.48	65/76	85.5%
Fifth	**0.57**	108/122	88.5%
Range	**34**		
Total		397/466	85.2%

3.2.2 INVESTIGATION OF /s/. The acquisition of (s), on the other hand, demonstrates a different trajectory. Contrary to the linear pattern for (ŋ), there seems to be a curvilinear pattern for (s). Two separate VARBRUL analyses were conducted on the 207 tokens with /s/. All loan words and palatalized variants were excluded from coding, thus the target form is the retroflex /s/. As shown in Table 8. The only significant factor group is time. Beginning with the third time, the learners showed accurate production of the target form with the weights of .55, .66. and .61 respectively. However, the intermediate learners did not favor the target form and the difference between them and the novice learners was not significant[12].

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12 By convention, the VARBRUL weights for non-significant factors are listed in square bracket.

TABLE 8: Significant factors accounting for accurate production of (s)

Factor Group	VARBRUL Weight (Pi)	Correct tokens / Total tokens	%
Proficiency			
Novice	NS [0.52]	62/102	60.8%
Intermediate	NS [0.48]	60/105	57.1%
Time			
First	0.35	6/15	40%
Second	0.35	18/45	40%
Third	**0.55**	9/15	60%
Fourth	**0.66**	45/65	69.2%
Fifth	**0.61**	44/67	65.7%
Total		122/**207**	58.9%

Students of novice level actually produced the target form of retroflex /ʂ/ slightly more frequently than did those of intermediate proficiency, who preferred to use [s]. This is probably because there is a phonological variation and sound change in progress between /s/ and the retroflex /ʂ/ in Mandarin Chinese (Rau and Li 1994, Rau 1996). There is a tendency for Taiwan Mandarin speakers to merge the two phonemes to /s/. For the novice-level students, the retroflex feature was more salient to them because their attention was recently drawn to this in Yami. On the other hand, intermediate learners tended to fall back on their L1 habit when they joined the course again.

Previous studies have shown that phonological variation in L1 might affect interlanguage variation in L2. Chen (2001) provided evidence to show that Chinese learners of English who used a stigmatized variant of (r), such as [l], in their L1 also used the same variant for their English (r), e.g., [lwak] and [low] for *rock and roll*. In addition to the variant of [s] for the retroflex target in our data, we also found the variant of Chinese [l] for Yami (r), e.g., aṟaw 'day' [al̠aw] by an intermediate learner who used a stigmatized variant of (r) in Mandarin Chinese.

3.2.3 SUMMARY. We have learned that the four phonemes which tended to be pronounced inaccurately actually have different degrees of difficulty. Even for the two most difficult phonemes, the path of trajectory is different. These findings in phonological acquisition in L2 will serve as useful guidelines for developing materials for teaching Yami pronunciation and contribute to endangered language revitalization, as most of the Yami youth are learning Yami as a second language.

3.3 ACQUISITION OF WORD ORDER IN YAMI. In this section, we present the results of word order acquisition in Yami, using the VARBRUL program to analyze 500 tokens of word order data, gathered from four tasks: (1) choosing the correct Yami word order with Chinese translation, (2) choosing the correct Yami word order without Chinese translation, (3) translating sentences from Chinese into Yami, and (4) sentence arrangement test. The

four learners were asked to complete all four tasks in Mid-May 2007 toward the end of the language course. Before the results of word order acquisition are presented, a word on Yami word order is in order.

The unmarked word order in Yami is verb initial (VS) as in (12); however, a pronominal subject is fronted (SV) to mark the present tense (Rau 2005, Rau and Dong 2006) as in (13).

The VS order is unmarked in narratives but the SV order occurs frequently in conversations, the function of which is to mark present tense.

(12) k-om-an so   wakay   si   Salang.
     <intransitive>eat Oblique sweet potato Nominative personal name
        V   S

'Salang wants to eat a sweet potato.'

(13) kamo   m-angay   jino
     you (pl.)   intransitive-go   where
        S   V
'Where are you going?'

The results of word order acquisition are presented in Table 9. Word order in Yami for Chinese learners is not as difficult as expected, as the percentage of accurate production is 63% (Input probability= 0.63).

TABLE 9: VARBRUL results of word order acquisition

Factor Group	VARBRUL Weight (Pi)	Correct tokens/ Total tokens	%
Level			
Intermediate	**0.68**	171/250	68.4%
Novice	**0.54**	135/250	54%
Task			
Sentence Arrangement	**0.35**	111/236	47%
Sentence choice (with Chinese translation)	**0.68**	90/116	77.6%
Translation from Chinese to Yami	**0.50**	20/32	62.5%
Sentence choice (without Chinese translation)	**0.63**	85/116	73.3%
Total		306/500	61.2%

Input probability = 0.63 Total Chi-square = 6.4959
Chi-square/cell = 0.8120   Log likelihood = -307.427

Although intermediate students performed a little better than the novice group, both groups tended to provide the correct word order (VARBRUL weights are 0.68 vs. 0.54).

Among the four tasks in Table 9, except for translation from Chinese to Yami, which had no effect on the accurate production of word order (0.50), the other three all affected production of word choice one way or the other. Sentence choice with or without Chinese translation promoted accurate choice of word order (0.68 and 0.63). The sentence arrangement test, on the other hand, tended to inhibit it (0.35).

The questions in sentence arrangement test were further analyzed by running Item-Analysis, following Rau (1999), and only 11 question items with a facility index above .50 and a discrimination index of 1 were chosen to form the instrument for further analysis.

The internal consistency reliability of the question items was also analyzed. The overall Cronbach's alpha is 0.98, which is much higher than the acceptable rule of thumb of .70, set by Nunnally (1978). In other words, the revised sentence arrangement test has a high reliability.

Table 10 shows the implicational scale of the learners' accuracy in the eleven question items. The two intermediate students answered all eleven questions somewhat correctly,[13] while the two novice learners could not arrange any of the eleven sentences into the correct order. Moreover, according to the implicational scale in Table 10, we can predict that Q5, Q16, Q27, Q39 are easier than Q14, Q19, Q26, Q28, Q47, Q51, Q52. (See Appendix: Sentence arrangement test)

TABLE 10: The implicational scale of the students' Yami language acquisition with the eleven questions

Question \ Subject	Q5	Q16	Q27	Q39	Q14	Q19	Q26	Q28	Q47	Q51	Q52
DV	1	1	1	1	1	1	1	1	1	1	1
KR	1	1	1	1	0	0	0	0	0	0	0
CR	0	0	0	0	0	0	0	0	0	0	0
TR	0	0	0	0	0	0	0	0	0	0	0

All question items came from Yami lessons at the beginning level. Since the first four questions were selected from the early lessons, they tended to be familiar to and memorized by the learners. Once the word order departed from the SV, it posed a challenge to our beginning learners.

To test whether novice learners tend to use the SV order whereas intermediate students are more willing to try the VS order, we coded the word order of all the utterances in the five guided conversations as the dependent variable with proficiency level and sentence type as the independent variables. The results are discussed in the following section.

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[13] DV created the sentence arrangement test and thus practice effect might have partially explained his perfect score on word order.

3.3.1 VS / SV VARIATION. A VARBRUL analysis was conducted on the 494 tokens from the guided conversations. The results indicate that the students' proficiency level and sentence type (interrogative vs. declarative) were selected to be significant factors that can account for the choice of word order between VS and SV.

TABLE 11: VARBRUL results of Yami VS word order production

Factor Group	VARBRUL Weight (Pi)	Tokens with VS / Total tokens	%
Level			
Intermediate	**0.55**	175/271	65%
Novice	**0.45**	118/223	53%
Sentence type			
Interrogative	**0.74**	168/204	82%
Declarative	**0.32**	125/290	43%
Total		293/494	60%

Input probability = 0.617   Total Chi-square = 0.2650
Chi-square/cell = 0.0662   Log likelihood = -291.339

As shown in Table 11, the intermediate level learners favored the usage of VS order (0.55), while the low level learners preferred the SV order (0.45). In addition, the occurrence of interrogative sentences strongly promoted the VS order (0.74), whereas declarative sentences favored the SV order (0.32). The following adjacency pair of question-answer in (14) at Time 2 illustrates the use of VS order in an intermediate student's question on whether the interlocutor (her Yami name is Magaga) would like to eat a sweet potato, but a novice student responded inaccurately with the SV order. Her answer is "I dare to eat the sweet potato," rather than "I would like to eat a sweet potato."

(14a) DV: mo Magaga, <u>koman</u> <u>ka</u> so wakay?
                       V   S
"Would you like to eat a sweet potato, Magaga?"

(14b) TR: nohon, <u>ko</u> <u>makan</u> o wakay.
                   S   V
"Yes, I dare to eat the sweet potato."

(The correct form should be <u>koman</u> <u>ko</u> so wakay "I would like to eat a sweet potato.")
                              V   S

The following pair in (15) also illustrates the misuse of SV order by an intermediate student addressing a novice student (his Yami name is Maoyong) in Time 4. Both (14) and (15) demonstrate that the learners actually had difficulty marking the distinction in tense by word order.

(15a) DV: mo Maoyong, <u>ko mitkeh</u> do jia an.
                               S   V
(The correct form should be <u>mitkeh   ko</u>)
                                       V   S
"I will sleep here, Maoyong."

(15b) CR: nohon,
       "OK."

In summary, the findings of acquisition of word order by Chinese learners seemed to indicate the SV order is acquired before the VS order. This might be accounted for by L1 transfer as the Chinese word order is SV. In addition, the learners associated word order with sentence type in their interlanguage rather than with tense distinction in the target language. This might be a case of exemplar-based learning (Bybee and Thompson 2000) in the interlanguage system where high type frequency in the input (as reflected in the contents and sequence of the teaching materials) led the beginning learners to hypothesize that declarative sentences were used frequently with SV order whereas interrogative sentences were used frequently with VS order. As with the findings in phonological acquisition, these findings in syntactic acquisition will not only be useful in sharpening linguistic description of Yami but also insightful in developing teaching materials for Yami word order.

4. APPLICATIONS OF THE YAMI CASE TO OTHER PROGRAMS OF LANGUAGE DOCUMENTATION AND REVITALIZATION. What can people working with other endangered languages learn from the Yami case? We believe the Yami language program has provided an integrated model for endangered language documentation, revitalization and pedagogical research, which can be implemented in two stages for language planning.

In the first stage of the language planning program, endangered language documentation (Himmelmann 1998, Woodbury 2003) should go hand in hand with development of teaching materials, especially in computer-based instruction (Yang and Rau 2005). The participation of three groups of people is crucial in this process, as described in Rau and Yang (to appear). The community members should be brought into the picture early to facilitate continued partnership of the community members with the research team. The university researchers are primarily content providers and e-Learning developers, with the potential goal of becoming learners. The targeted learners are university students, focusing primarily on graduate students who are interested in languages and cultures, with the potential of extension to the endangered language community members who are two or more generations removed.

In the second stage of the program after the infrastructure has been built, the launch of teaching and learning of the endangered language should go hand in hand with pedagogical research as a strategy for language revitalization. The activities of teaching and learning an endangered language in the university setting will undoubtedly raise the visibility and pres-

tige of the language. Furthermore, the process of pedagogical research will empower the participants of the language program. Finally, the results of the research will feed into the contents of documentation and development of teaching materials to strengthen the cycle.

5. CONCLUSION. This study presented the results of a longitudinal study of adult learners' acquisition of an indigenous language in Taiwan. We found that learning an endangered language by Chinese learners as a "foreign" language in Taiwan will undoubtedly raise visibility of the language and promote revitalization. The results on phonological and syntactic acquisition will guide the development of teaching materials to further strengthen teaching and learning of the endangered language.

This study of acquisition of an endangered Austronesian language demonstrates cogently that language is a complex adaptive system (Ellis and Larsen-Freeman 2006). In phonological acquisition, the trill was the most difficult phoneme to learn. It was not usually acquired within the first year, but was usually replaced by lateral [l] or retroflex [r]. We also found systematic variation for the variables (ŋ) and (s), constrained by both markedness and interference. Furthermore, learners tended to interpret Yami orthography based on their knowledge of English and thus pronounced /k/ as aspirated [kʰ] and trill /z/ as [z].

In word order acquisition, learners performed much better than expected, partially because the present tense, coded by the SV word order, is the norm in Yami conversations, and thus we did not test if the learners could distinguish between VS and SV in narratives. However, we still found students inaccurately associated word order with sentence type rather than with tense distinction, probably an artifact of the curriculum. Future studies on word order variability should collect narrative data from advanced learners.

Overall, the research presented in this paper makes a contribution both to second language acquisition research and to language revitalization since it brings together two distinct but crucial areas. The program highlights a much-needed area of language research that integrates endangered language revitalization with pedagogical research – in this new area, researchers from both sides need a step-by-step guide to resolving the issues they will face.

APPENDIX

Sentence arrangement test

Q5: <u>malavayo</u> <u>sira</u> <u>pa</u> <u>ina</u> <u>ya</u> <u>na</u>?
　　　①　　　②　③　④　⑤　⑥
Are her parents still young?
Correct answer: ya pa malavayo sira ina na?

Q16: <u>mangay</u> <u>kamo</u> <u>jino</u>?
　　　　　①　　②　　③
Where are you going?
Correct answer: kamo mangay jino?

Q27: <u>romiag</u> <u>an</u> <u>kamo</u> <u>pa</u>?
　　　　①　　②　　③　④
Would you still like to have breakfast?
Correct answer: romiag kamo pa an?

Q39: <u>ya</u> <u>aro</u> <u>o</u>　<u>ya</u> <u>mibozo</u>.
　　①②③　④　　⑤
Many people are playing basketball.
Correct answer: ya aro o ya mibozo.

Q14: <u>vazay</u> <u>ikong</u> <u>o</u> <u>mo</u>?
　　　　①　　　②　③④
What is your job?
Correct answer: ikong o vazay mo?

Q19: <u>pa</u> <u>ji</u>　<u>do</u> <u>kamo</u> <u>takey</u> <u>nimangay</u>?
　　①②③　④　　⑤　　　⑥
Didn't you go to the mountains?
Correct answer: kamo pa ji nimangay do takey?

Q26: <u>kamo</u> <u>na</u> <u>niromiag</u>?
　　　　①　②　　③
Did you have breakfast yet?
Correct answer: kamo na niromiag?

Q28: ciaha, <u>rana</u> <u>namen</u> <u>ta</u> <u>mabsoy</u>.
　　　　　　①　　②　　③　　④
Don't worry. We are full (satiated).
Correct answer: ciaha, ta namen mabsoy rana.

Q47: citoai na am, <u>ko</u> <u>pisikingen</u> <u>inio</u>.
　　　　　　　　　①　　②　　　③
I am going to give you a test in a moment.
Correct answer: citoai na am, pisikingen ko inio.

Q51: <u>ipivatvatek</u> <u>pa</u> <u>ko jim</u>o <u>so</u> <u>mamood</u> <u>an</u>?
　　　　①　　　　②③④　　⑤　　⑥　　　⑦
May I borrow a pen from you?
Correct answer: mamood ko pa jimo so ipivatvatek an?

Q52: <u>nivatvatkan</u> <u>malas</u> <u>ya</u> <u>ya</u> <u>ko</u>.
　　　　①　　　　②　　③④⑤
I wrote this wrong.
Correct answer: ya malas ya ko nivatvatkan

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