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Designing Online Intonation Practice With Open-access Tools

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Abstract

Intonation is fundamental to conveying meaning in human speech, but second language learners can struggle to produce or use intonation which suits their intended message. Researchers are exploring how technology can be used to teach second language intonation. However, previous uses of technology have often required specialized knowledge of intonation systems and instrumental phonetics. These technologies are frequently expensive and not freely available to the public. In addition, little research has targeted technology-based tools to help learners improve their intonation for tag questions (e.g., *It's late, isn't it?*). For these reasons, we conducted a feasibility study on the design and use of online open-access tools which provided audio-only and audio-visual feedback on the perception and production of English tag question intonation, using both isolated sentences and longer contextualized texts. Results showed that Mandarin learners of English, who engaged in about three weeks (total of 2 hours) of perception and production training and subsequently completed a semi-structured interview, considered the online tools to be useful and helpful. They became more aware of the intonation of tag questions and also showed some improvement in production. Implications are discussed for designing technology-based training for perception and production tasks.

INTRODUCTION

Intonation, which refers to speakers' use of fundamental frequency or pitch, is fundamental to human speech because it is central to conveying meaning. Every native speaker of a language can understand and use intonation to communicate his or her message. However, many second language (L2) learners sometimes use intonation in ways contrary to their intended message. They often do not recognize how L2 intonation differs from similar patterns in their first language (L1) or how different intonation patterns can affect meaning in the L2 (Verdugo & Trillo, 2005). Learners also often struggle to produce or interpret intonation appropriately in the L2 (Atoye, 2005). For this reason, it is important for language learners to understand L2 intonation patterns and how they are linked to meaning; it is equally important for language teachers to know of ways to help their students develop their L2 intonation. The goal of this paper is therefore to report on the development and feasibility testing of a tool which uses open-access technology to improve L2 English learners' perception and production of English intonation. This tool will be of interest to both teachers and learners as an accessible, customisable, and user-friendly way for them to target L2 intonation without the need for specialized training or access to costly speech software.

Use of Technology for L2 Intonation

Because of technological advances and more widespread access to computers and internet networks, we now rely on technological devices as tools for communication, teaching, and learning (Thorne & Smith, 2011). However, when evaluating particular technologies for their possible benefits to language teaching and learning, both researchers and teachers should consider several important criteria. According to Chapelle (2001), these criteria include:

1. Reliability and learner fit. Is use of the technology too easy or difficult for learners? How do learners' individual differences affect their performance?
2. Authenticity and generalizeability. How does use of the technology reflect technology use in the non-research environment? Can research results be generalized to other contexts?

3. Construct validity and operationalization of learning conditions. What theoretical constructs underlie use of the technology? How does use of the technology reflect those constructs?
4. Language learning potential and operationalisation of learning conditions. What potential does use of the technology have for language learning? How is that potential realized in its use in research?
5. Interactiveness and meaning focus. How does the use of the technology engage learners' meaningful use of communicative abilities?
6. Positive impact. How do learners benefit or suffer from use of the technology?
7. Practicality. How easy is it to find, modify, and use the technology in a non-research context?

In the current study, we adopt these criteria to evaluate accessible and user-friendly freeware. We create open-access tools which incorporate computer-based audio and audio-visual feedback to train L2 learners' in the perception and production of English intonation. Particular emphasis is placed on the issues of reliability and learner fit, meaning focus, as well as positive impact and practicality, in keeping with our belief that teachers and learners are best served through access to practical and usable tools which are capable of providing meaningful language practice.

Although the use of technology to learn L2 speech has increased exponentially, most likely prompted by the potential of technology to provide "relevant and useful feedback" (Zhao, 2003, p. 21), pedagogical applications of technology for the teaching of L2 *intonation* are limited both in terms of the tools used and the linguistic patterns targeted. When it comes to the types of technology used, existing research has generally used visual displays (typically, contours of pitch, relative duration, and amplitude) to provide learners with specialized feedback of intonation patterns, predominantly in laboratory-based research contexts. For example, de Bot (1983) showed that L2 English learners receiving audio-visual feedback showed more improvement in their production of intonation, compared to learners receiving audio feedback alone. Similarly, Taniguchi and Abberton (1999) found that L2 English learners receiving interactive visual feedback greatly improved in their production of English intonation, compared to learners receiving no visual feedback. Hardison (2004) reported that L2 French learners receiving implicit training in intonation with real-time visual pitch display showed

improved production at the suprasegmental level. This occurred even though participants received no explicit instruction (i.e., no metalinguistic information) as part of their training.

To summarize, the use of visual intonation displays has overall positive effects on the learning of intonation for L2 learners; however, these findings have questionable relevance for teachers and learners, who may not have access to specialized software and/or program which shows pitch contours as visual feedback or may not have the training to interpret such displays which might be considered too technical. As for the kinds of intonation patterns targeted through pedagogical technologies, only short sentences and general wh- or yes/no questions have been focussed on (as in *Where did you go?* and *Did you have a good time?*). It is thus important not only to extend accessible uses of technology to the teaching of intonation but also to include other kinds of intonation patterns as targets of instruction. Therefore, we focus on using technology to target a little-researched question type: tag questions.

Tag Questions

Bolinger defines tag questions as “hybrids, part statement (as a rule) and part question” that are “generally restricted to utterances that contain a statement which is then immediately questioned by repeating the auxiliary verb” (1989, p. 115). Tag questions are also a common feature in spoken language. In the British component of the International Corpus of English, Kim and Ann (2008) found tag questions predominantly in speech, especially in such discourse types as private conversations. Of the 754 tag questions in the corpus, 62% (740) were found in spoken text types like classroom lessons, broadcast interviews, and business transactions, demonstrating that language learners in L2 environments consistently encounter contexts in which tag questions are spoken and heard.

English tag questions (e.g., *You’re late, aren’t you?*) can end either in a rising-falling or a rising intonation depending on what the speaker is expecting as an answer. Huang (1980, as cited in Celce-Murcia & Freeman 1998, p. 262) explains these two intonation patterns in the following manner:

“[T]he speaker’s intonation indicates how strong his or her presupposition that the assumption – positive or negative – will be confirmed by the listener. If the speaker uses rising intonation, the

expectation is weak. If he or she uses rising-falling intonation, the presupposition of confirmation is strong.”

Consider, for example, the tag question *You've lost your keys again, haven't you?* If the speaker uses rising intonation at the end, the speaker is not certain that the statement is true. If the speaker uses rising-falling intonation at the end, the speaker expects that the keys have been lost again and is seeking confirmation of that expectation.

Asking and answering tag questions is a consistent problem for many learners of English. A study by Verdugo and Trillo (2005) on Spanish speakers revealed that Spanish speakers tended to over-generalize the use of rising tone instead of the falling tone in interpreting and expressing English tag questions. The Spanish speakers tended to use the rising tone in a tag question even when a falling tone is required to achieve the intended message (expressing certainty about the proposition being stated) Parmelee (n.d) observed that Thai and other Asian learners usually answer a tag question solely with regard to the truth or falsity of the statement contained in the question, whereas native speakers respond to the truth or falsity of the tag following the statement.

Another study by Burleson (2007) on Japanese speakers of English showed that the pitch in tag questions differed between the non-native speakers and the native speakers. In the statement part of the tag question, the non-native speakers tended to use higher pitch on more syllables in the statement, implicitly treating more words as new information.

Therefore, the current study focuses on the learning of tag questions by one group of Asian learners of English, native speakers of Mandarin. Mandarin tag questions can either end in a final rising-falling or final rising intonation depending on what the speaker is expecting as an answer (Zhu & Wu, 2011). The tag questions are usually formed by adding the particles *shi ba* or *shi ma* to the declarative statement. The particle *ma* in Chinese has a rising tone while the particle *ba* in Chinese tags has a falling tone. For example, the tag question *He goes to school, doesn't he?* when used with a rising intonation would be *Ta1 shang4xue2 shi4ma*. In this situation, the speaker is not sure of the answer to the question. When the same tag is used with a falling intonation (*He goes to school, doesn't he?*), it would be *Ta1 shang4xue2 shi4ba*. In this situation, the speaker knows the answer to the question and is seeking confirmation (Zhu & Wu, 2011).

The difference between English and Mandarin tags is that in Mandarin, the intonation of the tag question is attached to a certain particle (*ma* or

ba). However, in English, the intonation of the tag is not attached to a certain particle but can be applied to any tag depending on the speaker's expectation. Thus, L1 Mandarin speakers might have difficulties perceiving and producing English tag question intonation because it is not attached to a particular lexical unit.

Current Study

To summarize, L2 learners, particularly native speakers of Mandarin, can have difficulty learning and using English tag question intonation. Previous interventions with technology have shown some success in helping learners perceive and produce English intonation patterns such as *wh*- and *yes/no* questions, but there is no published research on the use of technology to help L2 learners perceive and produce tag questions. Therefore, we undertook a feasibility study to design and pilot technological tools which provide learners with meaningful and contextualized yet restricted and focussed practice in perceiving and producing tag question. This feasibility study puts us at an exploratory and early stage where we can look at the impact and practicality issue by comparing learners' performance before and after restricted, focussed practice with tag questions. Technologies used in previous studies required specialized knowledge of intonation systems and instrumental phonetics and/or are expensive and not freely available to the public. We thus employed user-friendly freeware to create open-access tools which incorporate computer-based audio and audio-visual feedback. We choose to work with L1 Mandarin learners of English because question tag intonation in Mandarin is attached to certain particles, unlike in English where appropriate tag question intonation is independent of any tag.

Two freeware tools were used to provide L1 Mandarin learners with perception and production exercises for English tag questions, including audio and audio-visual feedback. Learners received no explicit metalinguistic information about the intonation of tag questions and their underlying pragmatic meanings, so the kind of instruction implemented here provided a demanding test of whether the learners could extract the meaning of intonation patterns from experience with the language in the absence of direct teacher-fronted explanation or instruction. Learners engaged in perception and production training on English tag questions for two weeks, using the tools Online Audio Recording (2012) and WASP (Huckvale, 2000) in the environment of the open-access course

management system Moodle to receive both audio and audio-visual feedback. Our research questions for this feasibility study were:

1. How easy are the tools WASP and Online Audio Recording for learners to use? This question corresponded to the reliability and learner fit criterion identified by Chapelle (2001) as important in evaluation of technology use for learning.
2. Do the tools meet learner needs in terms of learning, particularly in terms of meaningful use of language? This question related to the meaning focus criterion.
3. What are possible implications of training with the tools WASP and Online Audio Recording for learners' interpretation and production of tag questions? This question targeted the positive impact and practicality criteria.

METHOD

Participants

Because the aim of this study was not to document the effectiveness of instruction but rather to explore the feasibility of two kinds of training using freely available technology resources, the learner sample was small ($N = 6$) to allow for focussed analyses. All six learners were native speakers of Mandarin who were international students from an English-medium university in Montreal ($M_{\text{age}} = 24$ years). They had lived in Canada for approximately two years ($M = 27.8$ months) and had studied at the university for a year or less ($M = 11.3$ months). All participants were given pseudonyms.

Training Tools

Three freely-accessible tools – Moodle, WASP, and Online Audio Recording – were used to design the training. Moodle is an open-source Course Management System, and the testing and training materials were delivered through the Moodle Assignments and Quizzes (<https://moodle.org>). All training materials (described in detail below) were uploaded and displayed on Moodle. Online Audio Recording is a Flash-based audio recorder that can be installed into Moodle as an activity module (<https://moodle.org>). It was used by learners to record their

speech during training. Online Audio Recording also allows for manual uploads of audio files produced by using other recorders. WASP (Waveforms Annotations Spectrograms, and Pitch) is a simple application for the recording, display and analysis of speech (<http://www.phon.ucl.ac.uk/resource/sfs/wasp.htm>). It was used by learners during training to record and replay speech utterances, as well as to view and compare waveforms and pitch display tracks for each sound file (see Figure 1).

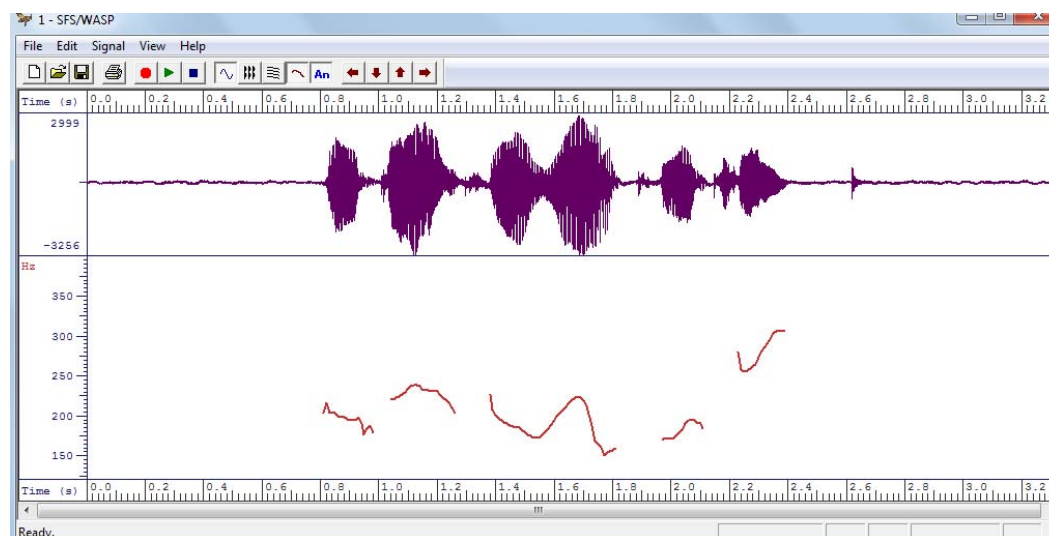


Figure 1. Visual display of the utterance *You're going for a walk, aren't you?* in WASP.

Materials

Questionnaire and Semi-structured Interview. To assess the learners' language learning history and to evaluate their perception of the training, a 30-item questionnaire and an interview schedule of 19 questions were developed. The participants were asked to complete a written questionnaire at the beginning of the study to gather some information about them. The questionnaire consisted of 30 questions in English about participants' language background and language learning history. The interview consisted of questions regarding the participants' performance and opinions on the material in general. The 19 questions created were piloted with a pilot group.

Training Materials. Three types of training materials were created: individual audio tag questions, brief videos, and brief written texts (all

training materials can be obtained via e-mail). The tag questions included 50 rising and 50 falling patterns, embedded in simple sentences that were on average 6.2 words long and that featured positive and negative tags. Example sentences are listed in Appendix A. The sentences were recorded by three native speakers of English (two females and one male) directly onto a laptop using the open-access Audacity software (<http://audacity.sourceforge.net>). The tag questions were then viewed in WASP to ensure that they showed the appropriate final intonation. The final set of 100 tag questions were selected from the pool of questions recorded by the three speakers; the final set had clear sound quality and plainly displayed the targeted final intonation contour for the tag. Each speaker contributed roughly one-third of the final set of questions, which were normalized for loudness.

The other two types of materials included tag questions embedded in authentic oral (video - the use of language reflecting real life situations in a meaningful way) and written (text) discourse. Two short video clips were based on scripts that were about 240 words long. Each clip featured a two-sided phone conversation of 3-4 minutes, meant to show a larger context for tag question use as well as to provide visual information (e.g., facial expressions). Each conversation involved a common service transaction between a customer and a company representative (i.e., fast food order) and included five rising and falling tag questions asked by the customer. These questions were preceded by language from the customer which demonstrated his/her (lack of) certainty about the answer, as shown in the following excerpt from video conversation.

Florist:	Floral shop, how can I help you?
Customer:	Hello. I would like to place a delivery order please. You provide delivery, don't you?
Florist:	Yes, of course. What would you like to order?
Customer:	Hmm, what's in season? I'm sure roses are always available, aren't they?

The videos were recorded in a quiet room by two of the same male and female native speakers, directly onto a laptop using a digital video camera and two lapel-mounted wireless microphones. The customer was always shown on-screen, with the company representative off-screen but fully audible. The resulting videos were edited using a free trial version of VideoPad software (<http://www.nchsoftware.com/videopad>). In each video, the selected take was edited into sections divided by tag questions;

each section ended after a tag question to allow learners time to decide whether the tag rose or fell.

The written texts included six written dialogues, each about 130 words long (see Appendix B for example). The dialogues featured various everyday topics such as two people gossiping. Each text included five rising or falling tag questions, in nearly equal numbers within and across the texts, preceded by language which demonstrated the speaker's certainty (or lack thereof) about the answer to the question.

Timeline

Session 1: Familiarization and Contextualization. Throughout the study, learners were never informed about how final intonation patterns of English tag questions could shape the pragmatic interpretation of a question. The intention was to explore how learners' pragmatic awareness and use of tag questions developed after learners engaged in technology-enhanced perception and production practice. The goal of the first session was both to familiarize learners with the technology used in training and also to contextualize the use of tag questions within meaningful spoken and written discourse. The first training session took place in a computer laboratory, where the first author helped learners log into Moodle, create an account, and access the study site; learners then completed familiarisation exercises which showed them how to use radio buttons to choose the final intonation in each utterance (up or down) and how to use both WASP and Online Audio Recording to record, open, and save audio files (see Figure 2 for a screenshot of a familiarisation tag question exercise).

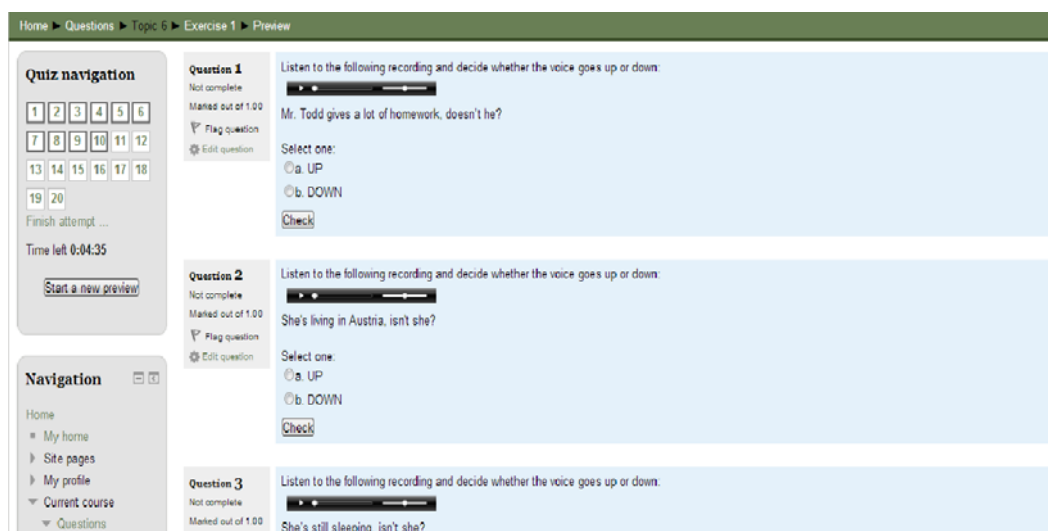


Figure 2. Screen shot of familiarization exercise for individual tag questions.

In the remainder of this session, learners performed two contextualisation exercises, one targeting authentic spoken discourse (based on video) and the other focussing on authentic written discourse (based on text). In the video exercise, learners watched a video and clicked the *up* or *down* option after hearing each of the five tag questions embedded in the video, at the end of each brief segment. The words *up/down* were chosen for the question tags instead of terms relating to the pragmatic meaning *certain/uncertain* in order to pinpoint whether the learners were acoustically perceiving the intonation patterns accurately. The goal was to sensitize learners to the direction of the pitch move in authentic spoken interaction. Learners could re-watch any segment and change their answer, but were not given any feedback since this activity served awareness-raising, rather than training, purposes.

In the text exercise, learners read a paragraph, and for each tag question shown, predicted the final intonation they expected by circling one of the options *up* or *down* on a paper containing the paragraph. Learners then read the entire paragraph aloud, recording it through Online Audio Recording as many times as they wished, with the goal of producing the intonation patterns they predicted. The objective of this exercise was to target learners' analytical prediction skills, which appear to underlie subsequent pronunciation performance (Dickerson, 1994).

Sessions 2-5: Training. Several days after completing the first session, learners started a two-week training period, completing 30-minute

training sessions twice per week (four sessions in total). The sessions were held both as in-person meetings with the first author and as individual practice through remote access on Moodle, with an equal number of sessions carried out in person and remotely. The goal of the sessions was to provide learners with focussed practice on the perception and production of intonation patterns in English tag questions. The training involved learners reading or listening to examples of tag questions and recording their own productions of the same questions. At each of the four sessions, learners listened to a unique set of 15 pre-recorded tag questions (with no transcript), repeating each question and recording their own versions as many times as desired. Learners also read a unique text provided on paper, circled the expected final intonation (*up* or *down*) for each tag question in the text, and then recorded their own version of the text. Learners completed one pre-recorded tag question activity and one text-based activity on each day of training, for a total of eight unique activities.

For half of all the activities, learners were asked to record their production of tag questions using Online Audio Recording, which allowed them to compare their production to the auditory model only, that is, in the absence of visual feedback (see Figure 3 for screenshot). In the other half of the activities, learners recorded their production of tag questions using WASP, which allowed them to both listen to the model and also to observe visual feedback in the form of a pitch track and compare it to the original. By looking at the pitch track, which represents a line connecting the points of a person's basic rate of vocal cord vibration at each sampled point in time, learners could see a line showing the pattern of rises and falls in pitch (i.e., the intonation pattern) for a given utterance (see Figure 1). Thus, across all activities, learners had experience with both audio and audiovisual feedback targeting English tag questions.



Figure 3. Screenshot of Online Audio Recording upload.

Session 6: Contextualization and Interview. After training, learners completed similar versions of the contextualization activities from the first session. The intent here was to provide learners with more opportunities to perceive, interpret, and produce English tag questions in the context of authentic spoken and written discourse, rather than in restricted practice. The two activities – one based on a video recording and the other based on a written text – featured different content but followed the same structure as those completed in the first session. At the end of the sixth session, each learner was interviewed individually in English for about 15 minutes; the content of the interview was audio recorded and transcribed.

Analysis

In feasibility studies such as this, within- and between-learner comparisons of performance on each task throughout the training are not of principal concern, and neither are conclusions concerning method effectiveness. Indeed, this study included no control group and no pre- and post-testing which would be necessary to draw such conclusions. Nevertheless, the text-based task completed as part of contextualization exercises in the first and final sessions allowed us to target the impact and practicality issue by comparing learners' performance before and after restricted, focussed practice with tag questions. The text-based task was also the only task that did not involve any models of tag questions produced, so learners had to rely on their intuition in order to predict the

intonation pattern and to implement it in production. The five tag questions in the text-based exercise from the first and the final sessions were scored in terms of learners' (a) prediction and (b) production accuracy. Learner prediction accuracy was scored as 1 if their choice of the intonation pattern (*up* or *down*) corresponded to the intended meaning of the utterance, and was scored as 0 if the chosen pattern was the opposite. Learner production accuracy was analysed in WASP to check the direction of final intonation contours. Contours showing the same direction as the intended meaning of the utterance was scored as 1, while the opposite contour was scored as 0.

The interview data were analysed through topic-oriented cyclical data analysis (Watson-Gegeo, 1988). Interview questions were categorized as relating to one of the three research questions. Then, through repeated readings of the transcripts, learner responses were coded according to the research question categories, although a response could be coded as belonging to more than one category.

RESULTS

The first research question targeted the issue of reliability and learner fit by asking how easy the tools WASP and Online Audio Recording were for learners to use. Based on the interviews and the researcher observations, learners found the two applications user-friendly and practical for educational practices. As Yin put it, "interesting attached to education" [it was interesting for her to make use of the applications for learning purposes]. Learners thought that using WASP was helpful and relevant. For instance, Kew noted, "yes, [using the application] was fine, it was interesting". Yin said, "I enjoyed using the application", and this was true of all learners. Throughout the training, all learners appeared to use the tools confidently and fluently, and they completed all the training exercises.

The second research question concerned the meaning focus of the technology-based training by asking if the tools meet learners' needs in terms of learning. In fact, all learners stated that the applications helped them learn about the nature of tag questions. For example, at the beginning most learners were not aware of different intonation patterns for producing tag questions, as shown in this quote from Yin:

It just feel clearer than before... because the first time I did the testing in the lab I really didn't know about it, but now I know...ahh...it's going to

be like this [now the intonation is clearer... at the beginning I did not know about the intonation of the tag question, but now I know when I hear it that it is either going up or down].

Although the pre-recorded tag questions were the only exercises without a contextualized focus on meaning, even these exercises were reported by four of the six learners to be interesting and useful for their learning, "I can listen and practice and sometime I did two or three time and it helped me repeat and learn" (Yin).

Four of the six learners reported that it was not difficult for them to perceive the tag question intonation in the exercises, 'I believe I can distinguishing what up and what down" (Fu). However, all learners mentioned that they often struggled to select and produce appropriate tag question intonation during contextualized practice. The following quote from Hao exemplifies this:

"If the text let you to choose up and down you gonna judge it, you're gonna read the whole text and try to figure whether it goes up or down. It's more difficult than just listen to them."

Three learners stated that the visual feedback from WASP, showing the model intonation and their own intonation as pitch tracks, was helpful. Hao noted, "By looking at the graph you're gonna like clearly know whether you did good or not," and Kew reported "Sometimes I look the line is going up but my voice is going down so I can do it again."

The third research question focused on the positive impact and practicality of the technology-based training by asking what potential implications the training had for learners' interpretation and production of tag questions. Five of the six learners stated that the training helped them recognize the final intonation contours of tag questions as used in authentic communication, as in "I'm able to tell... I can recognize [if it is going up or down]" (Kew).

Table 1 lists individual learner prediction (interpretation) and production scores from the text-based exercises completed in the first and last training sessions. As this table shows, learners overall tended to improve in their performance, with both prediction and production performance showing improvement. Although no definitive conclusions can be reached based on these data, these results are nevertheless revealing of some positive impact of the training on learner performance. Not only did learners become more aware of interpretation of tag questions but also possibly improved their production. Even after

training, however, all learners still had room for improvement. In fact, three of the six learners mentioned during the interview that it was still difficult for them to accurately predict a rising or a falling tag question in a given context. For example, Hao explained, “Not very hard, but sometimes I got confused about whether it goes up or down.”

Table 1. Prediction and production accuracy in text-based exercise.

Learner	Session 1		Session 6	
	Prediction	Production	Prediction	Production
Hao	0.50	0.25	1.00	0.50
Yin	0.75	0.00	0.75	0.50
Kew	0.75	0.75	0.75	0.75
Xin	0.75	0.50	0.75	0.25
Ji	0.50	0.75	1.00	1.00
Fu	0.25	0.25	1.00	0.75
<i>Mean</i>	0.58	0.42	0.88	0.63

Note. Proportion accuracy (based on five tag questions) in each text-based exercise from the first and last training session.

The strongest evidence for the positive impact of the training comes from learner comments in the interview regarding their ability to interpret English tag intonation patterns. The training, as it was implemented here, included no explicit explanation of the pragmatic meaning of English tag questions, beyond showing examples of rising and falling patterns within contextualized examples, so any awareness of different pragmatic meanings of intonation could be interpreted as a positive consequence of the training. During the interview, all learners commented that they had not been aware of the different interpretations of rising (seeking information) or falling (confirming information) tag questions before the training. Notably, one learner (Fu) reported always using a rising tag before and during the pre-test:

“I think is always use up pronunciation, but I heard some experimental is use some down pronunciation [I have always used

up but during the study I realized that a falling intonation exists]... but always there is some confused because I don't know what time I need to use the up, what time I need to use the down because before I always use the up pronunciation [Now that I realize there is a rising and a falling intonation I am somewhat confused about when to use either one]."

In contrast, at the end of the training, four out of the six learners were able to explain the pragmatic meaning of tag question patterns, and all had become aware that there were different pragmatic meanings. This awareness thus likely developed as a result of the meaningful, contextualized practice, that is, experience with perception and production of tag questions in the absence of explicit instruction.

DISCUSSION

There were multiple benefits to using the technology-based tools to design and deliver the training featured in the current study. The first benefit pertained to what Chapelle (2001) terms reliability and learner fit. Learners enjoyed using the tools and found them very user-friendly. The tools show the potential for enhancing language learning, particularly for learners who struggle to perceive intonation contours in English and for learners who are not aware of the acoustic or pragmatic characteristics of intonation contours for tag questions. These results also have implications for researchers' and teachers' use of freeware in designing tools for speech perception and production.

The first author, a teacher who developed all testing and training exercises, has average computer literacy skills, yet she managed to adapt all tools quite easily while designing exercises. Materials developers and classroom teachers with minimal technical skills can employ these user-friendly tools to create pronunciation, listening, or speaking tasks. Chapelle also queries how the use of technology relates to the need for learners to encounter meaningful examples of language and how such experience enhances language learning. In terms of providing meaningful language experience, the training involved multiple types of activities featuring authentic examples of tag questions used in both spoken and written discourse. The training also involved several skills, including perception and production, and capitalized on audio and audiovisual feedback to help learners 'visualize' intonation patterns presented in

context. And in terms of language learning, through using the tools, learners reported becoming more aware of the characteristics of tag question intonation in context. The data from the text-based task administered in the first and last session implied that learners' knowledge of how to produce tag questions was undergoing some change, potentially leading to more nuanced understanding of how tag question intonation is produced in context.

Indeed, the data shown in Table 1 suggest that accurate production of tag questions in context appeared to be a continuing challenge for learners. The production exercises throughout training forced learners to make their choices (up or down) in context, without metalinguistic instruction, feedback, or audio models to show the appropriate direction. As Table 1 shows, a high proportion of all *prediction* responses were accurate in the final session. According to Schmidt's (1990) Noticing Hypothesis, a particular feature in the input needs to be noticed for learning to happen. All learners stated that initially they had been unaware of different pragmatic meanings for the two tag question contours but most credited the training with helping them acoustically perceive and recognize intonation patterns of tag questions in authentic communication they experienced outside of the training. Therefore, learners may have used this authentic input to develop 'rules of thumb' to match tag question intonation with pragmatic meaning; this may explain why learners became more accurate over time at selecting intonation contours in context.

However, learners were more accurate at selecting intonation contours than at producing them. It may be that learners would have benefited from more practice in producing tag questions in context. Learners may have developed their declarative knowledge (rules of thumb) about tag question intonation, but may have needed more practice in using that knowledge productively to record their tag questions (see DeKeyser, 2007, for more on declarative, procedural, and automatized knowledge). In interviews, learners were asked if they could produce the tag questions. Most said yes, but it was not easy for them. To create greater potential for learners to strengthen the link between pragmatic meaning and intonation contours, future training could include more opportunities for learners to select and produce tag questions in context with pragmatically appropriate intonation. In this way, learners' production may become more fluent and consistent.

CONCLUSION

Although a number of studies have explored the use of technology in learner development of speech prosody (e.g., rhythm, stress, intonation), very few have targeted the development of intonation in English tag questions, particularly for L1 Mandarin learners. The aim of this study was to investigate the feasibility of using open-access computer-based training and feedback to train Mandarin ESL learners in their perception and production of tag questions. Two open-access tools which incorporate computer-based audio (Online Audio Recording) and audio-visual feedback (WASP) within the environment of the open-access course management system Moodle were used. As is common for feasibility studies, the sample size of participants was small. Future studies with larger numbers of participants, different groups and different combinations of tools are needed in order to determine the efficacy of the tools for different learners and different contexts. In addition, the short training period meant it was difficult to establish firm links between the training and learner perception and production of tag question intonation, which should be explored in the future. Results show that the training generally fit its stated purpose in helping learners develop control over their pragmatic understanding and productive use of tag question intonation. Overall, activities incorporating open-access audio and audio-visual tools appear useful for the development and use of pragmatic knowledge of tag questions in L2 learners.

REFERENCES

- Audacity (Version 2.0.5) [Computer software]. Available from <http://audacity.sourceforge.net/>
- Atoye, R. O. (2005). Non-native perception and interpretation of English intonation. *Nordic Journal of African Studies*, 14, 26–42.
- Bolinger, D. 1989. *Intonation and its uses: Melody in grammar and discourse*. Stanford, CA: Stanford University Press.
- Burleson, D. F. (2007). Intonation patterns in English tag questions of Japanese speakers of English as a second language. *IULC Working Papers Online* 7- 04. Retrieved from <https://www.indiana.edu/~iulcwp/>
- Celce-Murcia, M., & Larsen-Freeman, D. (1998). *The grammar book: An ESL/EFL teacher's course*. Boston, Mass: Heinle & Heinle.
- Chapelle, C. (2001). *Computer applications in second language acquisition: Foundations for teaching, testing and research*. Cambridge: Cambridge University Press.

- de Bot, K. (1983). Visual feedback of intonation 1: Effectiveness and induced practice behavior. *Language and Speech*, 26, 331-350.
- DeKeyser, R. (2007). Skill acquisition theory. In B. VanPatten, & J. Williams (Eds.), *Theories in second language acquisition: An introduction* (pp. 97-113). Mahwah, NJ: Lawrence Erlbaum Associates.
- Dickerson, W. B. (1994). Empowering students with predictive skills. In J. Morley (Ed.), *Pronunciation Pedagogy and Theory: New Views, New Directions* (17-35). Alexandria, VA: TESOL
- Hardison, D. M. (2004). Generalization of computer-assisted prosody training: Quantitative and qualitative findings. *Language Learning & Technology*, 8, 34-52.
- Huckvale, M. WASP. (Version1.53) [Computer software]. Available from <http://www.phon.ucl.ac.uk/resource/sfs/wasp.htm>
- Kim, J. B., & Ann, J. Y. (2008). *English tag questions: Corpus findings and theoretical implications*. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.186.4617&rep=rep1&type=pdf>
- Moodle (Version 2.2). [Computer software]. Available from <http://moodle.org>
- Online Audio Recording (Version1.1.1). [Computer software]. Available from https://moodle.org/plugins/view.php?plugin=assignment_onlineaudio
- Parmelee, J. (n.d.). Tag Questions Made Easy for Asian EFL/ESL Learners. *Employer Preferred TEFL Courses for Teaching English Abroad*. Retrieved from http://www.teflteachthai.com/Tag_Questions_Made_Easy.html
- Schmidt, R. W. (1990). The role of consciousness in second language learning. *Applied Linguistics*, 11, 129-158. doi:10.1093/applin/11.2.129
- Taniguchi, M., & Abberton, E. (1999). Effect of interactive visual feedback on the improvement of English intonation of Japanese EFL learners. *Speech, Hearing and Language: Work in Progress*, 11, 76-89. Retrieved from <http://www.phon.ucl.ac.uk/home/shl/>
- Thorne, S. L., & Smith, B. (2011). Second language development theories and technology-mediated language learning. *CALICO Journal*, 28, 268-277.
- Verdugo, D. R., & Trillo, J. R. (2005). The pragmatic function of intonation in L2 discourse: English tag questions used by Spanish speakers. *Intercultural Pragmatics*, 2, 151-168.
- Videopad (Version 2.41) [Computer software]. Available from <http://www.nchsoftware.com/videopad/index.html>
- Watson-Gegeo, K. A. (1988). Ethnography in ESL: Defining the essentials. *TESOL Quarterly*, 22, 575-592.
- Zhao, Y. (2003). Recent developments in technology and language learning: A literature review and meta-analysis. *CALICO Journal*, 21, 7-27.
- Zhu, C., & Wu, X. (2011). A study of yes/no questions in English and Chinese: With special reference to Chinese EFL learners' understanding of their forms and functions. *Journal of Pragmatics*, 43, 632-647. doi:10.1016/j.pragma.2010.09.009

APPENDIX A

SAMPLE SET OF INDIVIDUAL TAG QUESTIONS

- (1) You're going for a walk, aren't you?
- (2) He works in a bank, doesn't he?
- (3) He doesn't want to go, does he?
- (4) He is alone, isn't he?
- (5) Mr. Todd gives a lot of homework, doesn't he?
- (6) The doctor was late, wasn't he?
- (7) He sings beautifully, doesn't he?
- (8) He looks handsome today, doesn't he?
- (9) It's raining outside, isn't it?
- (10) She's living in Austria, isn't she?
- (11) You are happy, aren't you?
- (12) She doesn't drive, does she?
- (13) My hair doesn't look strange, does it?
- (14) You came in first, didn't you?
- (15) She's still sleeping, isn't she?

APPENDIX B

SAMPLE WRITTEN TEXT

Ella and Dillan were at home getting ready to go to work. Ella was having breakfast when Dillan came rushing into the kitchen and started moving everything around. Ella looked at him and said "It happens every morning. *You've lost your keys again, haven't you?*" (UP / DOWN) Dillan didn't answer and kept moving objects around until the entire room was a big mess. Dillan turned to Ella and said, "I have no idea where I put them! Maybe you can help. *You don't know where my keys are, do you?*" (UP / DOWN) Ella thought carefully. "Let me think... I know your habits well. *You always put your keys on this table, don't you?*" (UP / DOWN) But they aren't there now. Why not? " Dillan said, "Well, when I came home last night, my arms were full of groceries. I couldn't also put down my keys. It would have been impossible." Ella asked, "What did you do after you came in with the groceries?" Dillan answered, "Why do you want to know that? I walked into the kitchen and put the groceries away. *I didn't put the food in the wrong place, did I?*" (UP / DOWN) "Aha!!" said Ella. "Wait here." Ella walked to the refrigerator and opened the door. The keys were lying on the shelf next to the orange juice!