LARYNGOSCOPIC FIELDWORK: A GUIDE

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ABSTRACT

This paper discusses the issues and requirements associated with linguistic field research using transnasal laryngoscopy. New developments in the portability and robustness of equipment may allow laryngoscopic experiments to be carried out at or near remote sites in the field. Experiments to date have been conducted in hospitals, clinics, or labs, but that has often meant that only speakers who live in urban areas have been candidates for study. It would be of advantage to conduct the experiment in a venue closer to the participants. At the same time, serious consideration of possible added danger of a remote location must also be taken into account. This paper addresses how a study in or near a local site might be done and what conditions must be satisfied in order for it to happen.

Keywords: fieldwork, linguistic laryngoscopy

1. INTRODUCTION

The articulators of the lower throat are surrounded by darkness, are difficult to access, and are rapidly moving. It was only in the late 1960's that an endoscope sufficiently small to be inserted into the pharyngeal cavity, with cold light-sources and with video capture was developed [8]. Experiments with this new equipment began soon thereafter [4, 5, 6, 10]. Since that time, laryngoscopic study has become an important diagnostic procedure for e.g. throat cancer, routinely carried out in hospitals and clinics. While medical applications of this technique are now commonplace, experimental use by language researchers is still comparatively rare. Since a transnasal endoscope is relatively expensive, it takes a strong commitment from universities or funding agencies to support this kind of research.

1. EQUIPMENT

Modern rhino-laryngoscopes come with either digital fiberscopes or visual endoscopes. Both types of endoscope can produce excellent video quality.

As mentioned at the beginning, the pharyngeal area is very dark, so light sources will also be necessary. In line with simplicity and weight considerations, the best choice would be a unit that combines the video and light-source. That is why the best choice is probably the Olympus ENF-V2 Rhino-laryngo-Digital Videoscope, which has a very small tip with diameter of 3.2mm, coupled with the OTV-SI(A), which has a compact integrated camera control unit and light source. The OTV-SI(A) does not produce digital output, so there must be a-to-d conversion of the video signal.

Finally, if outside North America, one will need a 220-110 volt 2000 watt voltage regulator-converter-transformer, about $70 for the laryngoscope. This item can often be purchased onsite; as such transformers are very heavy.

If bought new, endoscopes and lighting would cost about $30,000. Much of this equipment can be purchased used at a considerable discount.

One needs high quality audio to accompany the video. So, any good dynamic unidirectional microphone mounted on a microphone boom with the microphone placed near the mouth would suffice. The capture of the synchronized video and audio could be with Quicktime Pro (Mac), Adobe Premiere, Vegas, etc. The total cost for the audio is about $350.

2. PREPARATIONS

Because laryngoscopic study involves medical procedures, it is crucial to enlist the aid of local scholars and leaders in the project well in advance of arrival to obtain permissions and a few items that must be obtained locally. They should be able to legitimize the project with authorities and get permission for customs clearance of equipment. In China and Vietnam, for example, one could contact the Chinese Academy of Social Sciences or The Linguistic Institute of Vietnam, who can help arrange a research visa. In other places universities have faculty members with students who might wish to be involved in this kind of project. In many

place assistants will likely want "research fees" or other gratuities.

Consider which port-of-entry to use and try to pick one that is closest to the work site.

A number of issues should be worked out prior to arrival. First, laryngoscopic research must have a physician in attendance, who will be responsible for placing the probe and for providing first aid in case of an emergency. In some studies general practitioners and anesthesiologists have served as the attending physician; laryngologists are always preferred. The possible emergencies that can arise are ones seen commonly in general practice, such as cardiac issues, throat spasms, and fainting from the unusual and invasive nature of the probe or anxiety about the upcoming process. These are extremely rare but possible reactions.

Second, the clinics or locations where the experiments are to be performed must be decided early with the assistance of the physician, as one must be certain that there is bottled oxygen with mask available in the event of throat spasm.

Third, the local physician also needs to assist in obtaining Cidex, the disinfecting agent for the endoscope, and the neutralizer needed when the agent is to be disposed of.

3. ETHICS ISSUES

Linguistic laryngoscopy is a research endeavor that requires review in advance by the Institutional Review Board or Ethics Committee of the researcher's home institution. It is also likely that phoneticians in countries abroad are unfamiliar with this prerequisite for conducting the research and for publishing the results, so it must be explained thoroughly to them, perhaps, using video from previous work. Also, many countries do not yet have ethics review provision. That means that the ethics review of the home institution must not only review and approve the proposed research, but also require the in-country researchers and physician to give written agreement to abide by the provisions outlined in the protocol. Before the experiments begin all participants must sign letters of Informed Consent (IC-letters) that state that their participation in the research is voluntary, that someone has described the procedures, has discussed the risks involved, and has described arrangements for treatment in case of emergency. Also they must be given the names of researchers present at the experiment and the head of the ethics review panel in the researcher home institution, so they can communicate with someone if they wish to withdraw from the experiment or have concerns afterward. Copies of the IC letter in a local language must be available to participants. One should discuss the amount of the honorarium for participants with locals and settle on an amount that is appropriate for the task. All food and travel expenses should also be compensated. One of the local assistants should read or explain the letter of informed consent to persons who are unable to read the IC-letter for themselves and let them signify assent.

4. CONDUCTING THE EXPERIMENT

The following is a set of general preparation and conduct of the experiment.

4.1. Participants and assistants

The local researchers should be able to help with translation, and with recruiting participants. They will also assist in the experiment. Their contribution, if warranted, should be recognized by making them coauthors of publications or websites or, otherwise, acknowledging their contribution to the project.

Choosing participants is an issue that the visiting researcher should be involved in personally. The first task is to carry out field study of a day or two, concentrating on sound data. The visiting researcher must then decide what phonetic feature(s) to focus on. Phonetic features that can be imaged well with the laryngoscope include: creaky voice, harsh voice, stiff voice, pre- or post aspiration, lax voice, all sounds with glottalic initiation, fortis/lenis (long/short) consonants, post-velar consonants, and velaric initiation, etc. [1, 2, 7]. Participants can be of either sex; but, they should not be minors or over 65 years of age. The attending physician should conduct a brief examination of vital signs, blood pressure, pulse-rate in a sequestered space. The candidates should also be questioned about known ailments. Under normal circumstances two or three persons, ideally of differing ages, should be selected for the experiment.

From the earlier collected data-set of lexical items, compounds, and short phrases, one selects a list of 40-60 items. The items should show the phonetic feature(s) being studied, but also consider the presence of certain sound combinations. Generally, high front sounds allow the best observation; expressions with high back vowels would be an alternative. The vowels [ɔ ɑ] should

be avoided as they will cause the tongue to back in a manner that obscures the view.

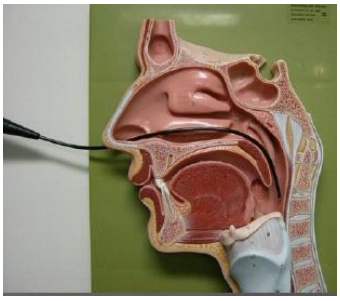
4.2. The experiment

Before the experiment begins, the researcher and associates must setup the equipment while the attending physician with gloves, mask, and goggles pours the Cidex into the disinfecting vessel. The endoscope must remain in the solution undisturbed for 20 minutes. As a consequence, there must be a 20 minute rest period before the next participant for disinfecting.

Cidex, after the pour, retains its efficacy for 28 days. Then, neutralizing chemicals must be added to it to dispose of the spent liquid in the drain. Since Cidex is quite toxic and can attack flesh and breathing; it must be handled with great care.

At the end of 20 minutes, the attending physician removes the endoscope from the disinfectant bath and rinses it in clean water and then in isopropyl alcohol. The endoscope is then connected to the integrated camera control unit and light. The gloved physician put a bit of clear lubricating jelly onto the tip of the endoscope, and the experiment begins. The probe of the videoscope is inserted into one of the nostril of the participant. If the choice of the nares was fortuitous, then the probe can continue into the pharyngeal cavity, as is seen in Figure 1; if not, then the other nostril should be tried; the physician can use a small amount of xylocaine for sensitivity to the probe. The laryngoscopic image and sound should now be visible in Quicktime Pro.

Figure 1: The position of the endoscope in transnasal laryngoscopy.



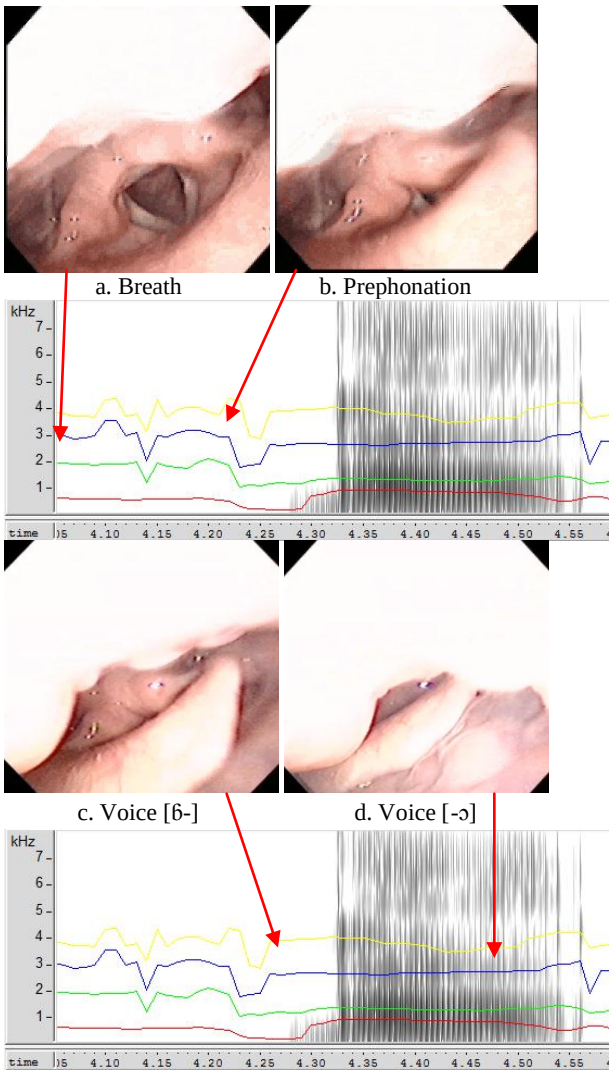
At this time, one of the associates assumes a position visible to the participant and begins to read the cues to which the participant responds with this item in his/her language, while Quicktime captures the sound and video image synchronously. The entire word list should be no more than 20-40 minutes, which is enough time to see the patterns, but exposes the participant to discomfort for a relatively brief time. Some people have sensitive nasal tracts and need xylocaine and some time to accommodate to the probe.

5. WHAT THE TECHNIQUE CAN REVEAL

One very important question one must ask is whether the results of endoscopic study justify the expense and effort described above.

In the following we demonstrate how endoscopy can reveal new features of implosion in contrast to plain voicing in Vietnamese. This work was not carried out in a field setting but in a regional hospital in Taiwan. The participants were international students at Taiwanese universities. Figure 2 shows the chain of stages for bỏ túi.

Figure 2: Sequence of changes of glottal states in the production of [ɓɔ] in *bỏ túi* [ɓɔ tui] 'put in the pocket' (Hue speaker).



Vietnamese implosion in initial position begins from breath, then transitions to a slightly open

(preglottalized) state, to allow air to leak into the supralaryngeal cavity, [7]. Voicing begins while the laryngeal plane is lowering. The depression continues far into the syllable, cf. 2d.

Figure 2 should be contrasted with Figure 3, which shows plain voice with pulmonic initiation. Vietnamese is not supposed to have plain voiced stops, only preglottalized or implosive voiced stops [9]. The plain voicing occurs in reduplicated forms or in de-emphasized contexts. Hanoi, Vinh and Ho Chi Minh City varieties all had the weaker form.

Figure 3 begins with breath and abducted vocal folds. From this state there is rapid engagement of the concave-convex prephonation state.

Figure 3: Sequence of changes in glottal states in the production of bị [bi] 'bag' for the Hanoi speaker.

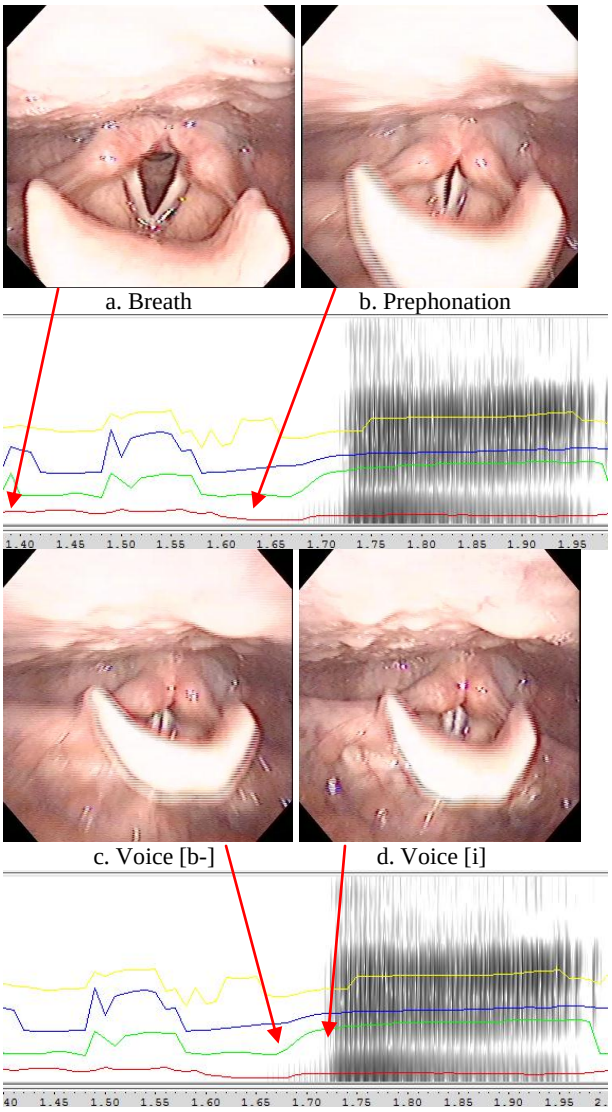


Figure 2 shows in sequential steps the epiglottis virtually disappearing into the pharyngeal cavity with prephonation engaged. The synergistic role of the pharyngeal wall is also clearly in evidence. There are also other details to note. For instance, before the onset of voicing of [ɓ-] one can hear for some time unphonated air seeping through the vocal folds before phonation.

Laryngoscopic study gives new detail to current ideas of implosion and lays bare new perspectives of the articulation including the role of prephonation, the pharyngeal walls, and the perseveration of glottal depression until syllable end.

Using a laryngoscope in the field is challenging. Endoscopic experiments have many components. Key areas for special attention are: the equipment, the physician, the nearness of emergency help, and the availability of medical supplies. Finally, as we move experiments to the field we must be ever mindful to keep risk to the subject minimal.

6. REFERENCES

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