**The Virtual Linguistics Lab**

**(Virtual Center for Language Acquisition)**

**What Is the VLL?**

The Virtual Linguistics Lab (VLL) provides a host of structured multimedia materials to support the study of research methodology in the field of language acquisition. The materials are intended to introduce basic principles and practices of sound scientific research in the field, doing so in a hands-on context, through a. virtual, medium.

An interdisciplinary team of psychologists and linguists across several institutions has created and assembled these materials. The VLL is designed for international use; it currently offers a Spanish version as well as an English one (although this Spanish version is incomplete).

The VLL is created by the members of a Virtual Center for Language Acquisition (VCLA) which ranges across institutions, languages and cultures (<https://vcla.clal.cornell.edu>)

It has been designed and assembled at Cornell in the Cornell Language Acquisition Lab by Professors María Blume and Barbara Lust, with grant support provided by NSF [Award ID 1463196] and Cornell [] including the Cornell Cognitive Science Program [].

**Why Use the VLL?**

The VLL may be used to support a comprehensive course (or set of courses) focused on research methodology. In turn, subsets of materials may be used to supplement other more general courses, e.g., courses in language acquisition, linguistics, psychology, multilingualism, and others. Its materials may be used, in whole or part, to introduce scientific research methods to new researchers who are pursuing a specific investigation in the fields of language acquisition. The VLL can also provide the foundation for scholars wishing to start a new language acquisition lab.

**Precedence for Use of the VLL Course**

The VLL course has been used for several years by Cornell University, and in collaboration with other institutions engaged in the VCLA (e.g., MIT, Pontificial Catholic University of Peru, Rutgers and others.)

**General Structure of the VLL**

The VLL consists of several independent modules of materials (Outline attached below). The modules are ordered to support a comprehensive course, but each can be used independently.

The first set of modules begins (1.1) with the most foundational materials necessary to scientific research in the area, viz., how to work with human subjects and what is required for this. This is followed by module (1.2) which introduces the concepts and strengths of using cyberinfrastructure, and the basic issues of data management and collaboration which it confronts and enables.

The next set of modules introduces the foundations for working with language data, i.e., the issues and principles of veridical transcription of natural language as data (2). A third set of modules introduces the basic principles of experimental methodology and banking critical metadata (3.1). This is followed by a series of modules introducing a set of the most basic methods for eliciting language behaviors from individuals being studied, those eliciting language production (3.2 & 3.3) and those eliciting language comprehension (3.4& 3.5). The last submodule of this section introduces the methods and challenges of acquiring and interpreting converging evidence across different tasks and methods, critical to the scientific method.

Finally, the last module teaches the student/scholar the structure and methods for critiquing an existing research study, preparing and proposing an original research proposal of their own, writing an abstract for conference submission describing their research, writing a technical research report; and finally conducting and participating in peer review of research proposals.

**The Structure of Each Module**

Each module provides a set of materials, usually in multimedia forms. The template for providing these materials includes: a **“Virtual Classroom”,** i.e., a set of basic Powerpoint Presentations which the teacher and learner can use in introducing the module area, a set of **readings** to accompany the module, as well as a set of **assignments**, and a set of **audiovisual materials** which demonstrate the data or data collection focused in the module. These audiovisual materials provide examples of use of the methods in different experiments/research studies which are available in the readings. They also provide the basis for assignments. Students can analyze the data the audiovisual examples provide, and are provided the means for doing so. Finally, a set of materials are provided to guide the student’s **analysis of data** in completing their assignments.

Students/VLL users can thus themselves learn the research elicitation methods that have been reported in a published research study. They can themselves analyze a subset of data collected with those methods, compare their results to those reported in the published study, and to those of their peers. They thus experience and learn the essence of critical analysis of published and proposed research, reliability assessments, scientific collaboration and peer interaction.

The VLL course, in whole or part, can be conducted synchronically with other institutions, or asynchronically, potentially enlarging the peer basis of scientific collaboration.

**The Readings**

For introduction to the use of cyberinfrastructure and the Virtual Lab Concept the VLL is supported by:

Pareja-Lora, A., Blume, M. Chiarcos, C. and Lust, B. (eds). (2019). *Development of linguistic Linked Open Data Resources for Collaborative Data-Intensive Research in the Language Sciences*. MIT Press.

Chapters 9 and 10 in that volume introduce the language acquisition data which are central to the VLL.

Throughout the VLL is supported by:

Blume, M. and Lust, B. (with collaboration of founding members of Virtual Center for Language Acquisition). (2017). *Research Methods in Language Acquisition: Principles, Procedures and Practices*. Mouton deGruyter/American Psychological Association. Washington DC. (Contributions by C. Dye, C. Foley, Y. Kedar and Y-C Chien.) This book provides in depth analyses of the different tasks, and methodologies, which are instantiated in the VLL.

In addition, individual readings are tailored to each module and to each method and assignment in the module. They often involve published papers involving the research method being studied in the module. This enables students/users to understand the scientific process which underlies research results they read about, and in their own assignments they can reapply these methods and assess reliability and replicability.

**The AudioVisual Materials**

The AV materials involve examples of trained researchers using the task focused in the module, setting it up, and then systematically testing a child by use of the task, according to standardized conditions. Both experimenter and child behaviors are demonstrated.

**The Accompanying Users’ Manual**

A manual, “Entering a Virtual Linguistics Lab”, is currently being prepared by members of the VCLA to provide an “envelope” for the digital VLL materials. It will provide a guide for the teacher-user of the VLL. A chapter linked to each module will introduce the importance of each module, the underlying structure of the materials, and its potential use in generating student understanding and discoveries.

**The Future Agenda**

At present, in addition to the current VLL materials (outlined below), VCLA members are interested in developing further additional modules:

* one devoted to extending methods to study multilingualism. At present the VLL links to an EDEX on line course “Acquiring Multiple Languages” which Cornell makes available, but has not disseminated. <https://edge.edx.org/courses/CornellX/CLAL1000-2x/Fall_2014/about>
* one devoted to methods testing infant language
* one devoted to methods for comparison of automatic speech transcription (which ‘artificial intelligence’, or ‘machine translation’ provides) to human speech transcription

In general, the VLL is infinitely expandable over time. New tasks can be added following the same template of presentation and use. The Cornell Library maintains a set of audiovisual and other materials (audio visual and paper documents) related to many cross linguistic experiments conducted in the Cornell Language Acquisition Lab over 40 years in a special collection , ”Words of the World’s Children” which are archived and available for perpetual reuse (<https://rmc.library.cornell.edu/EAD/htmldocs/RMM08525.html>).

**The Technology**

The VLL site is currently hosted on a Cornell server maintained by the Cornell Language Acquisition Lab (CLAL) ([https://vll.clal.cornell.edu](http://vll.clal.cornell.edu/)). The tools are built using Drupal, an open-source PHP-based content management system.

As long as the source files and structure are kept, the actual presentation of the materials can be accomplished in various technological formats.

**The Data Transcription and Analysis Tool (DTA Tool)**

At present, the VLL integrates with a web-based tool for Data Transcription and Analysis (DTA) developed through funding by NSF and work with a web developer, Gorges of Ithaca, NY (see chapter 9 by Blume et al in Pareja-Lora et al 2019, p 151 f). This web-based tool can be dissociated from the basic content of the VLL, which stands alone. Maintenance and development of the DTA tool would require its own independent funding; and can be considered a separate project to be developed in the future.

**Our leading Intention Now**

To enable wider access of and use of the VLL; now limited and password protected to VCLA members.

To archive and preserve materials which have been created

**VLL Learning Topics**

**Outline**

1. **Preliminaries**
   1. **Working with Human Subjects:** *Introduces the whys and the hows of protecting human subjects*

* Virtual Classroom: Powerpoint Presentations
* Readings
* Assignments
* Documents to assist assignments

1.2 **Building a Virtual Linguistics Lab:** *Teaches the virtues and challenges of cyperinfrastructure, data management and collaboration in study of language*

* Virtual Classroom: Powerpoint Presentations
* Readings
* Assignments

1. **Transcription:** *Teaches the nature of the essential challenge of capturing speech for scientific study and issues of reliability and replicability*
   1. **Observational Method**

* Virtual Classroom: Powerpoint Presentations
* Readings
  1. **Capturing Natural speech**
* Virtual Classroom: Powerpoint Presentations
* **Audio and Video Examples**
* Readings
* Assignments
* Documents to support assignments

1. **Experimental Methods:** *Teaches the foundations of experimental methodology. Then introduces several types of task for studying language production and comprehension experimentally.*
   1. **Introduction to Experimental Methods**

* Virtual Classroom: Powerpoint Presentations
* Readings
* Assignments
* Documents to Support Assignments

**3.2 Production: Elicited Imitation**

* Virtual Classroom: Powerpoint Presentations
* **Audio and Video Examples** of use in experiments
* Readings
* Assignments
* Documents to Support Assignments

**3.3 Production: Elicited Production**

* Virtual Classroom: Powerpoint Presentations
* **Audio and Video Examples** of use in experiments
* Readings
* Assignments
* Documents to Support Assignments

**3.4. Eliciting Comprehension:Act Out**

* Virtual Classroom: Powerpoint Presentations
* **Audio and Video Examples** of use in experiments
* Readings
* Assignments
* Documents to Support Assignments

**3.5 Eliciting Comprehension and Grammaticality**

* Virtual Classroom: Powerpoint Presentations
* **Audio and Video Examples** of use in experiments
* Readings
* Assignments
* Documents to Support Assignments

**3.6 Converging Evidence**

* Virtual Classroom: Powerpoint Presentations
* Readings
* Assignments
* Documents to support assignments

**4.0 Proposal Report and Critique Preparation:** *Teaches the basics for critiquing an existing research article and for proposing an original research project, writing an abstract, conducting peer review*

Virtual Classroom: Powerpoint Presentations

* Readings
* Assignments
* Documents to support assignments