EMERGING TECHNOLOGIES
Digital Video Update: YouTube, Flash, High-Definition

Robert Godwin-Jones
Virginia Commonwealth University

I last devoted an entire column to new developments in video technologies in May, 1998. At that time, I wrote about such new developments as the DVD, MPEG-2, and HDTV ("high-definition TV" - slated for first broadcasts in the US later in 1998). Today, the next-generation DVD standard has split into two competing formats (Blu-Ray and HD DVD), compression algorithms for digital video have advanced enormously, and US TV viewers are still waiting for the full rollout of HDTV. The big buzz recently about video has been something quite different: the enormous boom in the popularity of Internet sites such as YouTube for sharing video clips. We will explore in this column these and other developments in digital video and what they might mean for language learning.

YOUTUBE AND VIDEO SHARING

Over the past year YouTube has become enormously popular. A recent article in Wired cites an average of 65,000 uploads and 100 million videos viewed per day on YouTube. One might mention as further evidence the purchase of YouTube by Google for the amount of US $1.65 billion. The Wired article explores some examples of the wide variety of video content available on the site. Simply surfing through YouTube gives ample examples of that diversity. What is common to most clips is that they are amateur videos which document occurrences from the lives of non-celebrities. As such, the clips provide a huge multimedia library of real language use by real people, a potentially rich resource for language learning or corpus collections. The vast majority of clips are in English, and a number of ESL/EFL teachers have begun tapping into this source. While some provide sample lessons for students to view and discuss, others have uploaded videos of their own, with the specific goal of language learning in mind. Instructors of other languages, including Spanish, French, Japanese and Indonesian, have also found YouTube to be useful in language learning.

One of the differences between YouTube and other social networking sites [see a recent LLT column] is that it does not feature community tagging. Rather, the user posting the video supplies the tags. As is the case in most social networking sites, there are no prescribed, or even recommended, content tags. This makes searching for particular kinds of video clips or specific content very much a hit or miss enterprise. Searching on "Teaching English," for example, returns hundreds of results, most of them clips of teachers in action or class profiles, but the hit list also includes commercials that could be used in teaching English, as well as clips from commercial providers of language instruction. As with all clips on YouTube, clips in this category vary greatly in video professionalism, length, audio quality, and interest level for folks other than those directly involved as camera operators or subjects. Quite a few group projects from language classes are posted to YouTube as a method of sharing and publicizing. Some of the clips uploaded are just slideshows or videos shot with a static camera; others, however, are quite sophisticated in the use of lighting, captioning, camera angles, and transitions. Many come with a music soundtrack, often using commercially available songs, which for the time being some copyright holders (i.e. record companies) are allowing to be used in this way. The murky permission issues in the incorporation of copyrighted audio and video in uploaded clips to YouTube result in some clips being suddenly pulled from the site. This makes problematic any reliance on the availability of particular clips for instructional purposes.

Uploading video clips to YouTube is a quick and easy process and works in similar ways on other video sharing sites. Video clips can be in avi, mov, or mpg formats (MPEG4 is recommended) and be a maximum of ten minutes long. At least one content tag is required, along with a specification of the

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language used in the clip, presently restricted to a choice among English, Spanish, French, Japanese, Chinese, or German. Clips can also be uploaded directly from a digital camera or a PDA, as long as they are connected to the Internet. Video can even be directly uploaded to YouTube from a WebCam. Once uploaded, the file is converted to the Flash video format used for all clips. The URL is displayed to the uploader, along with the HTML code to paste into a Web page in order to display the video on one's own page. The ease with which anyone is able to upload video clips to sites such as YouTube, along with the popularity of shooting videos on cell phones or digital cameras has enabled the video sharing frenzy the US is currently experiencing. What also has contributed to this development is the rapid growth in broadband Internet connections in the US, as well as the increase in processor speeds in computers, making video editing and format conversion/compression significantly faster. This has been accompanied by the availability of inexpensive yet powerful video editing tools such as iMovie for the Macintosh or Jumpcut, Videoegg, or Eyespot for Windows. These products have specific tools for creating videos to be delivered in a Web browser. One of the most significant enabling technologies for the new video Internet age is the Flash video format, which is quickly becoming the format of choice for video on the Web, used by YouTube as well as by Google Video, MySpace, and many other sites.

FLASH VIDEO TAKES OFF

Flash video (flv) is popular largely due to its relatively small file size, interactive capabilities, and progressive downloading (with video playing before the entire clip is downloaded). Other video formats share this last feature, but they do not provide the interactive options available through Flash. They also are not as universal as Flash player, which has greater presence on personal computers than the players for Real, QuickTime or Windows Media. In contrast to video in other formats, which often is played in a dedicated external player, Flash video is normally embedded directly into the Web page. The advanced compression scheme in the latest version of Flash, along with progressive downloading, provides reasonably fast video playback at reasonably good quality without the need for a dedicated media server. There is also a streaming Flash video server, called Flash Video Server. Flash video has been in use for some time by media outlets, along with other video formats, but it is only in the past year that the popularity of YouTube has made Flash video so ubiquitous on the Web.

Flash has been around for some time, beginning with the initial release in 1996 of "FutureSplash Animator", designed as software for drawing and animation, using vector and raster graphics. Version 3 in 1998 added the ability to import audio and video, and version 5 in 2000 introduced ActionScript, a scripting language similar to JavaScript. It is this later addition that has made Flash into a powerful multimedia authoring tool. This allows, for example, video to be scriptable, so that it can respond to user actions such as mouse clicks, or to be overlaid with text or other objects. The most recent version of Flash also supports alpha transparency, which allows for multiple layers of video. Authoring is based on a time-line model, similar to Macromedia Director. Most of the interactivity in Flash movies (buttons, text entry fields, pick list, drag and drop) is created using ActionScript. The programmability of Flash offers the most important distinction to other video formats on the Web.

Since version 7 (2004), Flash has also had XML capabilities, which allow for on-the-fly incorporation of XML data in Flash movies within a Web browser. There is also the ability to store and retrieve persistent data through the use of "Flash cookies". Adobe (which acquired Flash from Macromedia) has also developed and released "Flex" (now at version 2.0), a development environment which is designed to build rich Internet applications based on Flash. Flex uses an XML-based language called MXML and comes with components and features that make it possible, and relatively easy, to add Web services, drag and drop, sortable columns and other advanced features to Flash-based Web pages. Flex seems poised to challenge Java as a programming option for interactive Web applications.

The capabilities of the latest version of Flash makes it on its own a powerful tool for development of browser-based applications, similar to AJAX. However, unlike AJAX, Flash is a proprietary technology,

not open source (although there are several open source projects involving Flash). Use of Flash also requires a browser plug-in, which although very widely installed - estimates gives the percentage of Flash browser penetration from 90 to 98% - still is not something developers can automatically count on a user having installed, particularly not in the most up-to-date version of the player. While Flash is cross-platform, and versions exist for playback on Windows, Macintosh and Linux, alternative and mobile browsers do not necessarily support Flash playback, although Flash Lite is available for some cell phones and other devices. Another concern some users have with Flash is its frequent aggressive and intrusive use in online advertising, leading to the development of tools such as Flashblock, designed to allow users to more easily designate which Flash content they wish to view.

Another major issue with Flash has been accessibility. Extensive use of Flash on a Web site can wreak havoc on alternative browsers. Recent versions of Flash have added accessibility functions. Flash 8 adds significantly to the ability to integrate accessibility through the support of a version of XML called XMP (Extendable Metadata Platform), which brings Flash into compliance with W3C guidelines for accessibility. Additional content or information associated with a Flash movie, such as subtitles or transcripts, can be included as XML metadata. This adds two additional benefits, namely making Flash content visible to search engines, and, of significant interest to language professionals, adding the ability to incorporate additional information in multiple languages, which can be easily manipulated through ActionScript.

DIGITAL VIDEO AND LANGUAGE LEARNING

Despite the concerns about Flash, it has proved to be a popular tool for the development of interactive Web pages, including content for language learning. Jim Duber has been one of the pioneers in the use of Flash in language learning through his Cutting Edge CALL demos site. The examples he provides feature lessons and activities for students of ESL/EFL. These include examples such as *Who came?*, offering practice in minimal pairs and demonstrating interactivity created with ActionScript; the *Paralinguistic Basics Toolkit*, which showcases the interactivity possible between Flash player and a microphone or Web camera; and *LetsTalk*, which demonstrates the audio recording, archiving and streaming capabilities of the Flash Media Server. Most of the examples include the ability to have email reports sent back to the instructor. Commercially available software for language learning tends to make extensive use of Flash. One prominent example is Tell Me More! from Auralog, a very sophisticated language learning application, that relies heavily on Flash video and features voice recognition to help in developing pronunciation and oral skills. Adobe markets a product called Captivate that is designed to make it easy to create flash-based interactivity for teaching and learning, especially the ability to create simulations easily.

There are, of course, many other uses for Internet-delivered video in the service of language learning. The wide variety of media outlets in languages world-wide provides a rich storehouse of on-demand video clips. In contrast to YouTube, the content of streaming video from television stations is much more predictable, and, generally, considerably more professional. While the advantages of viewing up-to-date materials, presented in authentic language are evident, so are the difficulties for language learners in coping with video presented at a normal rate of speech with the full range of vocabulary available to a native newscaster. Many schools and universities who encourage their language students to work with authentic video often provide suggestions on how the student can best take advantages of that experience as part of their language learning strategy.

Another option is to provide vocabulary, annotations, and/or transcripts to help students work with authentic video. This can be a time-consuming process, as it may involve instructors creating transcripts of their own as well as developing vocabulary lists and/or questions/exercises. Subscribers to SCOLA broadcasts have the advantage of already edited video clips with a rich array of vocabulary and exercises, as well as transcripts and English translations, through the Instaclass service. For instructors or other

language professionals who want to create annotated versions of clips of their own choice, a number of tools are available to make that task somewhat easier, at least as far as the technical side is concerned. Victory Author, from Purdue University, for example, allows for creation of custom video-based lessons, using an easy template-based system with a number of interactive exercise formats and other interactivity options. A very sophisticated system for use of video in language learning has been developed and marketed by Yabla. They offer subscription services in French, Spanish, or ESL/EFL, which provide a rich and continuously updated supply of annotated authentic video and include features, such as on-demand target language or English captions/subtitles, pitch corrected slow play, and clickable word/phrase look-ups.

HIGH-DEFINITION VIDEO ARCHIVES

In addition to the growth in popularity of Flash video, another new development in the video arena is the introduction of two new competing (and incompatible) high-definition video storage and playback formats, Blu-ray and HD DVD. Both new disc formats provide large capacity storage, from 25 to 50 GB, allowing the discs to contain enough data to show movies in high definition (up to 1920 x 1080), as well as to include higher quality audio and interactive features. Although players for both formats have been released, there has not been a rush by consumers to purchase them, partly because they are so expensive and, more importantly, because consumers want to wait and see which format will win out. The advantage of high-definition video from one of the new disc formats will only be apparent when viewed on a high-definition TV or monitor, another consideration that has slowed adoption. Blu-ray is supported by Sony, Apple, Samsung, Phillips, and Panasonic, while HD DVD has on its side Microsoft, Intel, NEC, and Toshiba. The major movie studies are also split in their support for the competing standards. The fact that the new Sony game console, Playstation 3, incorporates Blu-ray capabilities does provide some market penetration for that format. It should be noted that the new optical format players are designed to be backwards-compatible, with the ability to play standard DVDs. An interesting product released in fall, 2006, from VidaBox is a player/media center that can play both Blu-ray and HD DVD discs. JVC has developed a three laver technology that allows putting together both standard-definition DVD data and high-definition data on the same disc, allowing transparent playback in the appropriate encoding, depending on the player being used. Optical drives in both formats are being introduced into personal computers, but that process is proceeding rather slowly.

In addition to the large storage capacity and higher quality video, another feature of the high definition video formats of particular interest to language professionals is the interactive programming of which both formats are capable. Blu-ray uses Blu-ray Java Interactivity (BD-J), while HD DVD features iHD. iHD offers a shallower learning curve than BD-J, as it combines fairly well-known technologies, namely CSS, JavaScript and XML. BD-J represents an easier transition for Java programmers; it also provides more options for customization through a full-fledged programming environment. Its use also allows programs to run on any Blu-ray player, whether it is a drive on a computer, in a game console, or in a stand-alone player. Both Blu-ray and HD DVD are also designed to support always-on Internet connectivity and to allow regular updates of programs as well as peer-to-peer and server-client interactions. It remains to be seen to what extent easy-to-use authoring tools will be developed to facilitate authoring of the interactive capabilities of both disc formats, but it seems likely that some language professionals will begin to look at the possibility of embedding annotations and user interactivity in the presentation of video, whether it be feature films, documentaries, or custom-produced video.

For folks who have an interest in creating high-definition video of their own, to be delivered on one of the new generation of optical discs, there are HD camcorders presently on the market. One of the more popular and less expensive is the Sony HDR-HC1, which shoots video in 1080i resolution and uses the same MiniDV tapes used in standard-definition MiniDV camcorders. Writable Blu-ray and HD DVD

drives are also becoming available, but are still high priced. One of the most controversial aspects of the new optical disc formats is digital rights management (DRM). DRM is built into both formats in significantly different ways but with the same goal of restricting illegal ripping and mass copying. In the process of incorporating a variety of strict DRM measures and devices (including in the case of Blu-ray a "digital watermark"), the designers of the formats have made it difficult for anyone other than professional video houses to produce high-definition discs that will play without difficulty. Some consumers are rebelling against the constraints on usage and draconian remedies built into the disc formats (including a possible player "self-destruct" mechanism upon playing a tampered disc), as evinced by such sites as bluraysucks.com and hdboycott.com.

RESOURCE LIST

Digital Video

- Digital Video From wikipedia, good intro
- Digital Video File Formats Good explanation of the differences among formats
- DV, DVCAM,DVCPRO Formats Tech details, FAQ and links on DV and its variants
- Digital Video Formats Explanation of the distinction between video formats, containers, and codecs
- Understanding Video Output Formats Distinctive features and advantages of various digital video formats
- How to make streaming video Basics, from mediacollege.com
- Streaming media From wikipedia
- Replay A/V Tool for saving YouTube and other flash-based video

YouTube

- Suggestion for learning: YouTube Using YouTube for Spanish
- Nihongojouzu Includes discussion of TV and YouTube for learning Japanese
- Surprised by YouTube An instructor on the power of YouTube
- Learn Japanese with Yan-san (and a little help from YouTube) From Japan Probe
- Eensy Weensy Spider YouTube clip of song
- TEFL TUBE #1 Teaching Basic English Short clip on YouTube
- Indonesian 101 Indonesian lessons on YouTube

Flash Video

- Flash Video Learning Guide From Adobe
- Importing Video: Files and Encoding Guidelines From Adobe
- Delivery Options for Flash Video From Adobe's Flash Video Guide
- How to convert AVI to Flash Using Flash Video Studio
- On2 Truemotion VP6 for Flash About the compression codec for Flash 8 video
- Delivering Flash Video: Understanding the Difference Between Progressive Download and Streaming Video Very good explanation, from Adobe
- Flash Video Player Non-Adobe player
- Extensible Metadata Platform XMP, which is being used to make Flash accessible

Language Learning

- Cutting Edge CALL Demos From Jim Duber
- fenetiks: the sounds of spoken language Flash-based phonetics project from the University of Iowa

- English Language Tests and Games Includes Flash-based exercises
- Auralog Developers of Tell Me More! langauge learning software
- Victory Author For annotating video for language learning
- Yabla Video subscription service for langauge learning
- Scola Long-term provider of video broadcasts in a variety of languages

High Definition Video

- HD DVD / Randomness... Sample iHD code from Peter Torr's blog
- HD DVD Interactivity Authoring Microsoft programmng forum
- Blu-ray Wikipedia article
- HD DVD Wikipedia article
- Sony cuts HD camcorder down to size From CNET
- Making Movies: HD Camcorders not Ready for Prime Time? From PC World