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EMERGING TECHNOLOGIES
New Developments in Digital Video

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Contents:

- Formats
- DVD, DV, HDTV
- Standards
- Input Options
- Language Learning
- Resources

Digital video today has become a hot item in the commercial world and in education. A slew of acronyms reference this trend: DVD, HDTV, MPEG, and DV. Given the maturing state of digital video and its tremendous potential in language learning, it may be time to take stock of what's happening in that area and how we can tap into it to our advantage.

Formats

For other disciplines, multimedia is a viable teaching tool; for language learning, digital audio and video offer not only exciting ways to teach about our field, but to immerse our students in real use of language captured in full linguistic and cultural context. I remember well the first time I saw digital video on a personal computer, which was Apple's QuickTime, version 1.0, in 1992. The video was postage-stamp size (160 X 120 pixels) and jerky but even so, the power of the medium in that format was immediately evident. The fact that video displayed right there on screen, alongside other data, offered incredible possibilities for incorporation of video into multimedia authoring programs like HyperCard or Toolbook. Of course, laser discs pre-date digital video and many excellent multimedia learning programs have taken advantage of that medium.

QuickTime was followed by a number of digital video formats including Video for Windows (VfW), M-JPEG, and MPEG. The standard that is of particular interest is the latter. There is not just one MPEG standard, but a range of video encoding formats. MPEG-1 is the most familiar, having been used now for several years to encode video on CD-ROM. MPEG-1 playback typically requires additional hardware in the form of a dedicated card. Some newer, faster machines are capable of playing MPEG-1 without additional hardware. MPEG-1 can provide reasonable quality playback from CD-ROM drives, which are at least double speed (any recently purchased CD-ROM drive will be much faster, from 16 to 24 speed). Some shorter movies and TV shows are available on MPEG-1. Most CD-ROMs use QuickTime or Video for Windows rather than MPEG, since no additional hardware is required; however, they are not full screen or full motion. On the other hand, a good many video-centered multimedia programs have been created not with digital video, but with laser discs, which is an analog medium. In fact, laser discs have considerable advantages in terms of multimedia learning programs, including easy single frame access, bar-code compatibility and good full-screen picture quality. Programs like *A la rencontre de Phillipe* or *Exito* take advantage of these features. But the medium also has limitations, including limited video length, expensive hardware, and limited distribution.

DVD, DV, and HDTV

Any one contemplating creation of multimedia programs today is most likely considering DVD delivery. DVD is the new kid on the block with general availability of DVD-video players of less than a year. DVD (digital video/versatile disc) is a medium arising out of a number of years of intensive discussions and

negotiations about different proposals for replacing CD-ROM with a new medium. DVD is a medium for both computer and video use and, in fact, for the much-ballyhooed merger of the two. The increased capacity of DVD (initially 4.1 GB, but eventually much more) allows for much longer video at higher quality. Video on DVD is typically encoded as MPEG-2, although other formats can be used as well. DVD movie players are available from major electronic outlets. On computers DVD-delivered MPEG-2 playback also requires additional hardware. This is generally included as part of DVD drives now available as options for both desktops and laptops (current Apple DVD drives do not support DVD-video without additional MPEG-2 decoding hardware).

DVD movies in themselves offer some interesting additional features beyond videotape and laser disc which may prove of interest to language teachers. These include alternate sound tracks in different languages as well as possible additional materials such as movie trailers, profiles, interviews, or additional footage. A disadvantage, however, in comparison with laser discs is the greater effort needed to retrieve single frames of video. Because MPEG compresses by saving information on changes in images rather than the images themselves, it is not a simple process of retrieving a frame number, as it is on a laser disc. On computers, DVD-ROM (a standard not yet finalized) is a medium which can store very large amounts of data on one disk.

DV is not the same as DVD. DV (digital video) is again a format created by industry consensus. In this case, DV is a standard for digital video for both professional and consumer media. It offers the advantage of recording in digital format with better quality than S-VHS or Hi8 and then transferring directly to editing programs on computers. This process avoids the loss of quality in the current process of digitizing analog video. The video in DV format is best transferred using an interface called "Firewire" (officially IE-1394; developed originally by Apple). Firewire interface cards are available from Radius and Adaptec. One of the other key advantages of the DV and mini-DV formats is the small size cameras which can be used. Consumer and professional DV cameras are available now, but cost considerably more than VHS-C (compact VHS) or 8mm cameras.

One development in video slated for a Fall 1998 rollout is the US version of high definition television (HDTV), which is also a digital format (in contrast to other systems, like that in Japan, which are analog) and which provides greater resolution and a "letterbox" format for video playback. There is not a single standard for US HDTV, but rather a range of possible ways to encode video. The idea is to let the marketplace choose which will become the eventual standard. Unfortunately, that will be a U.S. rather than a global standard. HDTV sets are available now, but stations will not begin broadcasts in HDTV until Fall 1998, and then only for selected programs.

Standards

Unfortunately, in the case of both DV and DVD, the original industry standards have spawned some proprietary implementations. There are "professional" variations including Panasonic's DVCPro and Sony's DVCAm, which are mutually incompatible. A variation of DVD called Divx (from Digital Video Express) has also emerged. Not supported by current DVD players and drives, Divx is being promoted by Disney and several other major studios. Its chief financial backer is Circuit City. Divx is for video only, and proposes to offer movies on disk. However, while DVD's can be bought or rented, as with videotapes currently, Divx disks are purchased inexpensively (under 5$ US), but can only be used during a 48-hour period. What makes that doable is the proprietary, and more expensive, Divx player (which can also play normal DVD-Video). Clearly, from an institutional vantage point, Divx is not a positive development, since it prevents permanent use of the encoded film.

One promising development in the standards area is the industry adoption of the proposed "Real Time Streaming" protocol (RTS) for use of streaming video (and audio) over the Internet. The industry leader in Internet streaming, Real Networks, has announced support of RTS, as has Apple for integration into

QuickTime. QuickTime 3 is scheduled to offer streaming capabilities this fall. The current QuickTime version 3 already offers pseudo-streaming over the Internet, as well as other enhancements such as additional compression codecs and enhanced Web integration. QuickTime has been selected as the basis for development of the next generation MPEG, MPEG-4.

Input Options

In addition to the new Firewire interface for the DV format, there are some other interesting new options for capturing and digitizing video. Some recent high-end laptops, for example, have built-in (NTSC) video out and video in. Many also have a "zoomed video" PC card slot, which supports high quality video input. New PC card video input devices such as the CapSure card as well as small video cameras (Kritter) are designed to take advantage of the zoomed video port. Those mentioned work on both Windows and Macintosh systems, and support PAL and SECAM video-in as well as NTSC.

Another new hardware feature being added to desktop and laptop computers is the USB port (universal serial port). This is not specifically designed for video input and, in fact, does not have nearly the throughput of the Firewire interface, but it can be used to connect peripherals such as video digitizers or cameras. There is, for example, a USB version of the popular QuickCam camera. USB is currently supported on Windows only (and requires a recent version of Windows95 or Windows98). Apple has announced support for USB in future MacOS models.

Language Learning

Most of the developments discussed here are too recent for there to be language projects or uses to point to. Clearly, the capabilities of DVD in particular offer significant advantages. Projects formally on multiple CD-ROM or laser disc, for example, can be transferred to DVD. Currently DVD-writable drives are not widely available. Converting to MPEG-2 also requires expensive hardware. Given those facts, it may be some time before we see many DVD language learning products.

Resource List

Digital Video

- QuickTime, version 3
- Digital Fact Book, extensive information on digital video, listed alphabetically
- Wired Inc popular MPEG decoders

DVD

- Hey, there's a DVD under my bed! excellent primer on DVD for education (Jim Taylor)
- DVD Live, commercial site with updates on DVD-Video releases
- Is DVD Ready for Prime Time from ZDnet, story on adoption of DVD
- Digital Bits, updates in developments in DVD

DV

- Magazine Watch for Digital Filmmakers, current periodicals list
- DV Links from Adaptec, one of the first companies to support DV/Firewire

All links validated on June 12, 1998.