

## THE PROMISE OF TELETEXT FOR HEARING-IMPAIRED AUDIENCES

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As the current closed captioning project has demonstrated, teletext-type technology is well suited for the delivery of information to deaf audiences. Newer developing systems will be able to provide a flexible system for captioning and a range of services which will expand the information accessible to deaf people. In its simplest form the interactive capability of the system to retrieve timely data promises the deaf user things many of us take completely for granted: knowledge of today's weather forecast, traffic conditions, news headlines, community bulletin boards, school closings, sports results and more. Captioning will undoubtedly continue, though, as a main attraction for deaf viewers to teletext technologies.

### Captioning outside the United States

Outside the U.S., teletext systems are more advanced, and virtually every country that has or is developing a system is planning to provide a captioning service. For the moment, however, very little captioned programming is available. In England, where two teletext systems are operational, one hour a week is broadcast over the BBC. In France, no captioned programming is currently available. Sweden, which has an operating teletext system, makes three hours of captioned programming available each week. In Germany, where teletext transmissions have just begun, no captioned programs are broadcast.

Australia recently adopted the British standard for teletext transmission, but is currently broadcasting no captioned material. Japan, too, is providing no special captioned programming for deaf audiences.

### Captioning in the United States

The American television industry seems uniquely prepared to provide an atmosphere in which large-scale captioning can exist. In contrast to foreign experience, the United States has a history of active support for captioned television. More captioned

programming is available here than in all other countries combined.

In 1958, Public Law 85-905 established Captioned Films for the Deaf, administered by the Department of Health, Education and Welfare, Bureau of Education for the Handicapped. Captioned Films provides a loan service of thousands of entertainment and educational films and videocassettes. It distributes these materials free of charge to about 6,000 registered accounts.

The FCC has been concerned with the needs of the deaf and television for a number of years. In a policy statement released in December 1970, "The Use of Telecasts to Inform and Alert Viewers with Impaired Hearing," the FCC enunciated a desire that licensees consider the needs of those with aural impairments.

In 1972, HEW mandated the first television program ever captioned: *The French Chef*. Julia Child's program, aired over PBS, was popular among deaf audiences and led to the development at WGBH of same-day news captioning in 1973.

In February of 1976, in response to a petition for rule making filed by PBS requesting an amendment of Subpart E of Part 73 of the FCC's Rules and Regulations, the FCC issued a Notice of Proposed Rule Making providing that line 21, field 1, and the available half of line 21, field 2, of the television vertical blanking interval be reserved for the transmission of captioned information for the deaf.

Numerous petitioners questioned whether a portion of the vertical blanking interval should be reserved for only one service. In the end the Commission ruled in December of 1976 that line 21 could be used for a captioning service on an optional basis. In addition the FCC authorized the use of line 21 for the display of non-program related material of a broadcast nature during the times when program-related captioning was not displayed. The Commission noted that while the data format for the use of this line were specified, it would consider the authorization of other signal formats on an individual basis.

Accordingly, the National Captioning Institute began providing captioned programming for PBS,

ABC, and NBC in March 1980. NCI is currently captioning about 20 hours of prime-time programming a week, broadcast in closed format over line 21 of the vertical blanking interval.

An open captioning service continues on PBS as well. This service includes *The Captioned ABC News*, now in its seventh year as the only national news program available to deaf audiences.

The United States is now on the verge of some fundamental decisions in regard to a teletext standard. Although the FCC has yet to take a position on the issue, American concern for captioning suggests that there will be active interest in incorporating captioning into the teletext system. The remainder of this paper suggests the particular advantages teletext will provide for captioning, and proceeds to give some suggestions for teletext design which reflect captioning requirements.

### The teletext advantage: Display systems

WGBH's captioning experience spans seven years and several system generations. Our current operations are founded on a hard-disc computer system tied directly to a broadcast-quality character generator. All our approaches, including the current one have been of the open caption variety, i.e., the entire audience, not just the target consumers, see the captions. We have good evidence, both empirical and informal, that the general public does not like open captions, and that hearing viewers tend to shy away from programs which look "special" in this way.

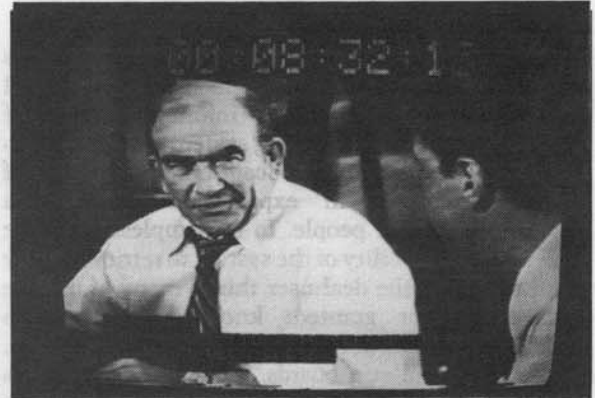
Our colleagues at the National Captioning Institute are working with the line 21 closed captioning system. They therefore avoid the open captioning general audience problem we have faced, and brisk decoder sales indicate that hearing-impaired people are responding to the line 21 approach.

All of us involved in creating captioning would therefore agree that one of the major advantages of teletext is that it is "hidden." You only see the captions if you choose to.

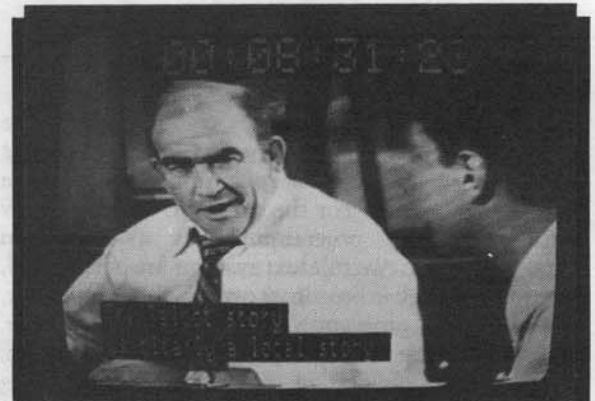
WGBH's research and experimentation suggest that there are a number of other advantages unique to the teletext approach to captioning. We have had the opportunity to work directly with the ANTIOPE system, producing captioned versions of several public and commercial television programs. We have carefully studied British approaches at the BBC and the IBA, and had a look at Telidon in February at the Toronto SMPTE conference. It appears to us that all these teletext schemes offer the following technical advantages for captioned broadcasting:

1. The structure of teletext, its magazine format, allows a large number of simultaneous captioning

and subtitling "tracks." The Multi-level Captioning Project at the WGBH Caption Center has demonstrated already the value, and the appeal, of different captioning styles for different target audiences. Specifically, children, pre-lingually deaf people, and older people who have lost some or all of their hearing later in life, constitute highly dissimilar populations with widely divergent vocabulary and reading skills. Multiple teletext magazines will make it possible to broadcast more specialized captioned versions for each of these groups.



*Teletext allows captioning at several language levels, including verbatim...*



*...and simplified versions, edited for vocabulary and syntax.*

The same story applies, with increasing significance, to verbatim subtitling accompanying television programs. Spanish-speaking people, who will form the largest U.S. minority group within a few years, have become a more insistent programming concern due to the recent dramatic influx of Cubans. At a first cut, teletext will provide the capacity for a Spanish-language version of both national and regional programming. More imaginatively, however, it will also be possible to create different Spanish magazines, accommodating the substantial variations between Puerto Rican and

south-western dialects. At the same time, other regional language groups, such as French-speaking people in New Hampshire and Portuguese people in Boston, could lobby with their local broadcasters for subtitled versions in their own native languages.



*Teletext page capacity permits foreign language subtitling, including Spanish...*



*...and French translations.*

2. Most teletext systems afford the captioner complete freedom in the screen placement of text. Many people, unfamiliar with the requirements of



*Placement variation provides cues for attributing dialogue to the correct speaker.*

captioning, draw false analogies from subtitling. One of the most common such false assumptions is that captions always occur in the center of the lower third of the screen. In subtitling applications, the viewer can hear which character, even off screen, is speaking, and needs to know only the content. But hearing-impaired audiences must be given more explicit cues about who is uttering which captions, and variable placement is probably the most important tool we have to meet this need.

3. Some of these same considerations apply to other teletext characteristics. Systematic variations in both foreground and background color, for example, can help to clarify the attribution of



*Color and font size options also contribute to orienting the viewer.*

captions to speakers. A range of font sizes is also useful: Small characters can be used for identifiers, and for significant non-dialogue cues, such as laughter or applause. The double height option available on most teletext systems aids reading of the main captions, particularly for older viewers, who may suffer some visual impairment in addition to hearing impairment.

4. It has been widely noted that many teletext features, such as textual news, weather, bulletins, and announcements, will be of special service to hearing-impaired users. There is also, however, a nontrivial interaction between captioning specifically and the depth of other teletext information features. One of the greatest challenges in captioning programs is to give viewers adequate background information while keeping pace with the dialogue and action. Separate teletext pages will allow captioners to create program-related introductory texts which hearing-impaired people can sample at their leisure prior to the start of a broadcast. These pages might feature such information as definitions of unfamiliar terms, summaries of previous episodes, explanation of the color-coding scheme to be used in the program captioning, and descriptions of the multi-level linguistic scheme.

5. While it is easy to make too much of this feature, it should be noted that a teletext graphics capability can directly serve captioning needs. At WGBH, we have frequently used the power of our computer-based character generator to create unusual effects for special programming purposes. We have, for example, made the words of songs move in rhythm with the music, "painted on" captions a character at a time, and added image-effects by keying slides into the program video. Many of these techniques may prove too taxing for a time-shared teletext broadcast source, but graphics effects can provide another route to the same end.

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#### The teletext advantage: Socioeconomic factors

In addition to its technological merits, teletext has other attractions as a delivery system for program captioning. Making television fully accessible to hearing-impaired people is a social goal, one founded on concepts of equity and of "mainstreaming." The latter term refers to the policy of integrating disabled people as closely as possible into the general patterns of American social life. From the perspectives of both social justice and social policy, implementing captioning via a teletext system offers these advantages:

6. Teletext decoders will be marketed to and purchased by the general television public. Hearing-impaired people will benefit directly from participating in such a mass market. All the constraints attached to the current closed caption decoder—fixed high price, single source of availability, inconvenient purchase and service provisions—will disappear when captioning can be received by means of a general purpose teletext decoder. Competition among television component manufacturers will assure a diversity of models, sources, and support services. Market studies indicate that the teletext decoder *may* cost as much as the line 21 decoder (currently \$250), but mass production and competition will deliver increasing performance curves for the same outlay.

7. We are all familiar with a friend or relative who won't admit that he or she needs glasses, or a cane, or a hearing aid. There is still a stigma attached to devices which aid us in overcoming our handicaps. A line 21 decoder is just such a device, and there are undoubtedly cases, particularly among older people who are losing their hearing, in which the benefits of captioning are not perceived to outweigh the stigma of a specialized appliance. A teletext decoder, on the other hand, will serve the general public; owning one will connote normal, even positive status, and not a handicap.

8. Because speech is so important to language learning, deaf people tend to have moderate or severe deficiencies in reading skills. They therefore tend to

miss out on a great deal of useful information from newspapers and magazines, with obvious consequences for socialization, employment, and citizenship. We believe that the general information capacity of teletext will be as important as captioning *per se* in bringing deaf Americans into the mainstream of society. Because information will be so available—on television—and so accessible—in simple vocabulary and syntax written for the screen—teletext will help to penetrate the isolation hearing-impaired people are often forced to endure.

9. Finally, there are many information needs which are indeed peculiar to the hearing-impaired community. There is a substantial but clearly minority interest in such events as signed performances, TDD services, and deaf club meetings. In the past, hearing-impaired people have frustrated both themselves and local broadcasters with their desire for television announcements and reports of special interests. Broadcasters quite reasonably contend that air time and production facilities are simply too expensive to respond to these needs. Without radio and without general telephone service, however, hearing-impaired people have nowhere else to turn. Teletext, with its numerous, inexpensive, ephemeral pages, is perfectly suited to meet these special communications needs of hearing-impaired citizens.

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#### Design considerations

For all these reasons—technical, social, and economic—we are persuaded that teletext promises the brightest future for captioning and other services targeted to hearing-impaired people. With this commitment, and on the basis of our captioning experience, we have identified certain features that we consider essential in an optimal teletext system. We have submitted these to the Electronic Industries Association (EIA) Broadcast Television Systems Subcommittee on Teletext, for consideration in the formulation of an American teletext standard. They are offered here in the hope that circuit designers, receiver engineers and manufacturers, and other interested professionals will find them useful in planning teletext encoding and decoding equipment.

1. For both the writer and the viewer, complete flexibility in the composition and layout of every frame is the key to successful captioning. Nothing must be allowed to impinge upon the creative freedom of an editor or designer in laying out a text display. Specifically, teletext encoding schemes in which the control characters require printing spaces would severely detract from the service.

2. Attractive page designs, with adequate blank spaces, create a need for higher character density in those areas used for text. The same principle applies

to captioning, where the goal is to obscure as little of the primary video as possible. At the same time, we have determined in the course of our own research that character height is crucial to legibility. We therefore advocate a system featuring variable font sizes, with options for increased character height.

3. The chief special requirement engendered by captioning is the need for transmissions in precise time relationship with the accompanying television program. From an operational point of view, the ideal teletext system would offer these timing characteristics:

- a. automatic updating;
- b. completely flexible time code assignments, approaching as nearly as possible the limit of frame-by-frame changes;
- c. simple editorial procedures for entering both time in and time out codes; and
- d. provision for "on the fly" marking of time in and time out caption change points.

4. Beyond time code handling routines, a captioning editorial console for teletext must retain the flexibility of the most advanced character generators. Among the most important of these features are:

- a. automatic row and page centering;
- b. programmable settings (and defaults) for foreground and background colors, and for font sizes;
- c. block text movements, both left/right and up/down; and
- d. automatic frame number incrementing.

5. Captioning must of course be legible against the program video, but most viewers prefer displays which block as little as possible of the original scene. To avoid the inflexibility and unattractiveness of black-box "label" style captions, a "misted," semi-transparent background scheme should be available. The IBA's Oracle teletext system has already demonstrated this technique.

6. Teletext specifications should include techniques for introducing special symbols as required for particular captioning purposes. We have relied regularly, for example, on a musical clef sign to denote the words of a song. Effects already achieved with a "down-loaded" graphic alphabet suggest that symbols can be readily accommodated within a teletext format.

7. Because public broadcasting is primarily a local system, we have a special receptivity to captioning initiatives on the part of individual stations. The cost of teletext origination and transmission equipment must be kept low enough to encourage

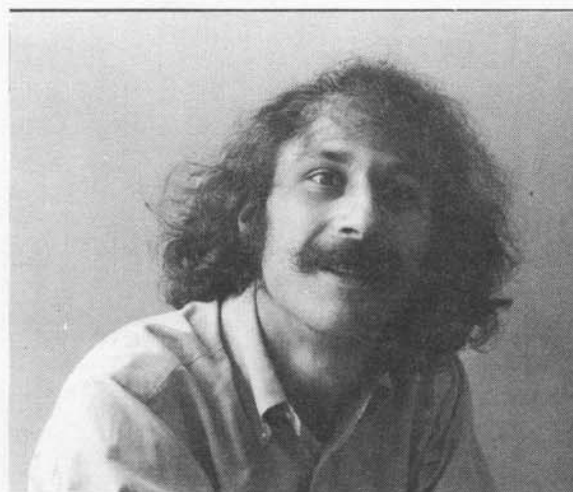
national captioning for network programs and regional or station captioning for local programs.

8. Like most public broadcasters, WGBH programs for considerably less than 24 hours every day. During non-programming periods, enormous quantities of specialized information could be transmitted to minority audiences, including hearing-impaired people. An ideal teletext system will incorporate provisions for a full-frame transmission mode, capable of such high density service, and a decoder with programmable frame-grabbing and local storage functions, so that minority audiences can seek and retrieve specially targeted pages.

### Summary

Hidden captioning promises to make television, the central information medium in American life, increasingly available to hearing-impaired people. Teletext appears to offer a superior technical approach to hidden captioning, together with a number of other services which are responsive to the unique information needs of hearing-impaired people. A properly conceived teletext system will expand the range and facilitate the use of these services for both programmers and viewers.

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