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## **A SHORT TECHNICAL HISTORY OF SUBTITLES IN EUROPE**

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It was not long after the invention of film that efforts were first made to convey the dialogue of the actors to the audience. They started with what we now call *intertitles*: texts, drawn or printed on paper, filmed and placed between sequences of the film. They were first seen in 1903 as epic, descriptive titles in Edwin S. Porter's *Uncle Tom's Cabin*. (The technique may have been invented by cartoonist and filmmaker J. Stuart Blackton.) The titles were from 1909 on called *sub-titles*, as they were used in the same way as subtitles in for instance a newspaper. Early, but rarely, the subtitles were placed *in the moving image*, for instance as in Porter's *College Chums* (1907) or the French films *Judex* (1916) or *Mireille* (1922). (*College Chums* was sometimes shown with live actors speaking the dialogue behind the projection screen!)

In the era of intertitles, it was easy to solve the translation problem. The original titles were removed, translated, filmed and re-inserted. Or a speaker was used to give a simultaneous interpretation of the intertitles, the French *bonimenteur* or the Japanese *benshi*.

In fact, the very first “subtitles” in the modern sense saw the light of day already during the silent film era. In 1909 M. N. Topp registered a patent for a “device for the rapid showing of titles for moving pictures other than those on the film strip”. With this method the projectionist, using a sciopticon (a kind of slide projector), showed the subtitles on the screen below the intertitles. However, this was never much more than a curiosity, although similar techniques, with the titles on a film strip instead of slides, have been used from time to time up to the present day (Brant, p. 30).

### **From intertitles to subtitles**

From the year 1927 on, with the invention of sound film, the audience could hear the actors, so the titles inserted between scenes disappeared and the problem assumed new dimensions. Of course, one could make several language versions, or have the film post-synchronized (dubbed) in another language. However, some film producers and distributors found this technique complex and expensive.

Why not use titles as before, inserting them in the picture? They thus became what we now call subtitles, and since this technique is comparatively cheap (subtitling only costs between a tenth and a twentieth of a dubbing), it became the preferred method in the smaller language areas, such as the Netherlands and the Scandinavian countries.

In the early days of film subtitling the main problem was to place the subtitles on the distribution copies, as the negative was usually in safe keeping in the country of origin. Norway, Sweden, Hungary and France quickly took the lead in developing techniques for subtitling films. However, "the first attested showing of a sound film with subtitles was when *The Jazz Singer* (originally released in the US in October 1927) opened in Paris, on January 26, 1929, with subtitles in French. Later that year, Italy followed suit, and on August 17, 1929, another Al Jolson film, *The Singing Fool*, opened in Copenhagen, fitted with Danish subtitles." (Gottlieb, p. 216)

### **The optical method**

To start with, attempts were made to breathe new life into the technique invented in 1909, i.e. manual projection of slides with printed texts directly onto the screen, but very soon, methods of copying photographed titles on to the film copy itself came into use. A frame containing the title was kept in position while the film negative and the positive print strip were fed forward and exposed.

Later on this process was made automatic. Exposed “blank” frames were inserted between the title frames and the titles were fed forward by means of a counter to ensure that the subtitles were the right length and came in the right place.

One problem with the method was that, since the original film negative was usually not available, it was necessary to re-copy the whole film to obtain a new negative, with a consequent loss of focus and substantial increase in the noise level—a serious drawback

in the early days of sound films.

But sometimes the film negative could be obtained, and it was soon realized that, if a large number of copies were required, the most efficient method was to photograph the titles onto a separate film of the same length as the original, with the in and out cue frames synchronized with the sound.

The film negative and the roll with the titles were then copied simultaneously, an operation which took much less time than repeating the slow exposure procedure frame by frame.

### **Film subtitling using mechanical and thermal processes**

In 1930 a Norwegian inventor, Leif Eriksen, took out a patent for a method of stamping titles directly on to the images on the film strip, first moistening the emulsion layer to soften it. The titles were typeset, printed on paper and photographed to produce very small letterpress type plates for each subtitle (the height of each letter being only about 0.8 mm). Later, in 1935, a Hungarian inventor, O. Turchányi, registered a patent for a method whereby the plates were heated to a sufficiently high temperature to melt away the emulsion on the film without the need for a softening bath. However, both these processes were difficult to control and results often erratic, with poorly defined letters. Despite the drawbacks, this technique has been used by some film laboratories in eastern Europe, Asia and South America up to the present day.

### **The chemical process**

In 1932 R. Hruska, an inventor in Budapest, and Oscar I. Ertnæs in Oslo (later in Stockholm) simultaneously took out patents on an improved technique for impressing the titles directly on the film copies.

A very thin coating of wax or paraffin was applied to the emulsion side of the finished film copy. The printing plates were placed in a kind of printing press, into which each plate was fed and heated to a temperature of nearly a hundred degrees and one by one pressed against the paraffin coating at the bottom of the frame which corresponded to the beginning of the dialogue line. The paraffin under the letters melted and was displaced, exposing the emulsion. This process was repeated with all the frames on which this subtitle was to appear, corresponding to the duration of the speech. The same procedure was carried out with the next subtitle and so on throughout the film.

After the printing process the film was put through a bleach bath, which dissolved the exposed emulsion, leaving only the transparent nitrate or acetate film. The etching fluid and the paraffin were then washed away. This process produced clearly legible white letters on the screen, although the edges of the letters were slightly ragged due to the

variable consistency of the paraffin and variations in the penetration of the etching fluid.

Later on, this process too was automated by means of a counter, which fed the plates forward, counted the frames on the roll and ensured that the subtitles came in the right place and were of the right length.

This was the cheapest process when less than ten copies of a film were to be subtitled.

The chemical and optical processes described above are still used in many countries, more or less as before, except that the plate making process has been modernized. In the early days the titles were typeset (usually with a Linotype machine), printed on paper, photographed and then plates were made for each set. Later, with the adoption of new techniques in the printing industry, came phototype setting (e.g. Cinétype) and still later computerized typesetting. Nowadays computers are used for the production of the titles themselves, and they can be time coded and “simulated” on a videocassette for proofreading purposes.

The Norwegian-Swedish film laboratories Filmtekst in Oslo, Ideal Film in Stockholm and the Kagansky brothers' Titra-Film in Paris held the most important patents, as a result of which they dominated the European subtitling market from 1933 right up to the mid-50s and were very important also on other continents. (According to interviews given by O. Ertnaes's daughter and Mme Nina Kagansky, Paris. See also Brant, pp. 53-63. Her thesis contains a detailed description of all the stages in both the optical and chemical processes.)

### **Laser subtitling**

The latest development in this field is the use of lasers to burn away or vaporize the emulsion. This makes both typesetting and plates unnecessary. The technique has been developed by Denis Auboyer in Paris and by Titra-Film in Paris and Brussels and has, with great success, been in commercial use since 1988.

In this process a computer controls a very narrow laser beam, in the same way as in a modern typesetting machine, i.e. the beam virtually writes the text in such a way as to result in vaporization of the emulsion without damage to the acetate film underneath. It takes the beam less than a second to write a subtitle consisting of two lines, after which the next frame is fed forward. Where no subtitles are to appear the film is fast-wound to the next operative frame. The sharpness of the letters is excellent, the contours being enhanced by a slight shading caused by the darkening of the edges due to the heat.

The titles themselves are computer typeset and can be cued on the video display by means of time coding or frame counting.

Laser subtitling is cheaper than the chemical process, but requires costly investment in

equipment. However, the method is highly automated and needs very little personnel.

## Subtitling for television

Films for the cinema were soon shown on television. On August 14, 1938, the BBC broadcast Arthur Robison's *Der Student von Prag* in a subtitled version. (This was probably also the first scheduled showing of a film in the history of television.)

But it was soon discovered that the prints with subtitles intended for the cinema caused a number of problems. The titles, legible enough in the cinema, were very difficult to read on the television screen. One reason for this is the difference in the speed at which the audience can read subtitles on television as compared with the cinema, but the main reason is that the picture on a TV set has a narrower contrast range than that on a cinema screen. What was needed, therefore, was a method for incorporating subtitles produced for television into untitled film copies or video tapes.

### Optical film subtitles for television

In countries where the optical process was used for subtitling films, attempts were made to use the existing subtitle film strip and run it in parallel with the original untitled film in a second film scanner. The title images were mixed electronically into the film images so that it looked to the viewers as if the titles were on the film, except that it was now possible to control the whiteness of the letters. If a roll with subtitles was not available, one could be ordered from a company that made subtitles for films. This method is still used occasionally today.

At about the same time work started on the development of a rather crude, but cheap and reliable, optical subtitling process for television: The titles were typed on paper and then one-frame stills of each title were made with a film camera. The resulting film negative was put in a scanner and then either the translator fed in the titles manually, one at a time, synchronizing them with the programme, or an automatic system was used to feed in the titles, more or (usually) less reliably, with the help of punched-out marks on the edge of the film.

The title images (usually with white letters against a black background, a "letter box", the whiteness and blackness being controlled to ensure optimum readability) were mixed into the programme images and transmitted or taped. Where no subtitles were to appear, exposed frames—blank frames—were placed between the subtitle frames.

Quite soon, some improvements were made on this method. For example, the titles were printed with more attractive proportional typefaces on offset compositors, i.e. simple

typographical setting machines which also allowed the use of italics and kerning, squeezing the letters together. The titles could be written on punch cards, inserted in a feed mechanism and either photographed onto a roll of film or displayed live using a TV camera with image inversion (black shown as white and vice versa). This “rapid subtitling” method was used mainly for news items. Thus, photographing the subtitles and developing the film were no longer necessary, but the feeding system was unreliable: sometimes the machine supplied several cards at a time or none at all.

Both these techniques allowed manual feeding of the subtitles during recording or transmission or, as with film subtitling, automatic feeding by means of a frame counter.

### **Caption generators**

When caption generators of various types (such as Aston, Capgen, Logica, Vidifont) started to be used to insert captions in the television image by electronic means, this made it possible to generate subtitles directly in the transmitted picture itself.

However, caption generators, which were intended for various kinds of captions or titles and offered a wide range of typographical variation, proved impractical for subtitling in large quantities. They were difficult to operate, their word processing functions were very rudimentary, and above all they were extremely expensive.

### **Subtitling equipment**

It was therefore only natural that efforts should be made to produce dedicated subtitling equipment, and this was achieved in the 1970s, more or less simultaneously in several places. Two main systems were developed, both based on the use of a word processor with a special subtitling program which made it possible to write the subtitles in a form identical to that shown on the television screen.

The first system is based on the teletext principle (Oracle, from the U.K., and Antiope, from France, are two examples). A computer generates concealed signals in the image data, in response to which a simple character generator in the receiver creates the characters and mixes them into the television picture when a specified teletext page is selected.

The second system uses a computer-controlled character generator in the transmitter—much less sophisticated and much cheaper than a caption character generator—and when the subtitler cues in a new subtitle, the characters are generated by electronic means and mixed into the transmitted image. Such systems are e.g. the BBC TV’s Television Electronic Characters (TEC) system from 1976, the SVT–TeleEkonomi’s system, which came into operation in 1981, and the Screen Electronic system, from about the same time.

## Time codes

But why feed the titles manually when time codes, which have so many other functions in television, could do the job?

When a video tape is time coded, a "clock" is recorded on the tape which tells you to the nearest 1/25 of a second when a particular frame will appear on the screen. This time code can be read while the video tape is running and used to start or stop some process, e.g. to show a selected subtitle, as desired.

Soon further advances were made, which made it possible to install the complete subtitling system on a personal computer, thus allowing the subtitler to carry out the whole job, including the cueing of the subtitles in the right place in the programme, in a continuous operation and in his own home or office.

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