FACES ON THE SCREEN

by Mr James Warren, Senior Research Officer, National Police Research Unit

AN Australian couple holidaying in London walked out their hotel and stopped dead when they saw their 22-year-old daughter standing in the street. The father went towards the girl and opened his mouth to say something. She failed to react to his cue. He said, 'I am terribly sorry, I thought you were somebody else'.

Monash University psychologist, Dr Don Thomson, had been studying the accuracy of police line-up parades, identikit photos, and courtroom identification and had flown the couple's daughter from Australia to London to conduct this experiment. Dr Thomson says that most people are inept at describing another person's face and that the ability to recall faces accurately is 'no better than chance'. The above event outlines the difficulties encountered by police when interviewing witnesses and eliciting descriptive information of an offender. Humans tend to rely on mobility of facial expression (e.g. recognition by smiling) to identify a person that they know. Any composite picture of an offender cannot convey this mobility feature of the human face. Children under 12 years of age have almost no ability to recognise parents coming home with a wig or strange clothes, except by connecting voice and mannerisms.

The difficulties can be alleviated to a certain degree by the use of professional interview techniques. Victims can suffer tunnel vision, they see only the gun or knife, which accounts for much of the unreliability of eye witness accounts. But the details are there. What the eyes sees, the mind 'photographs'. It can be relegated to the subconscious but a skilled operator can elicit a good likeness.

In 1986 the National Police Research Unit was asked to investigate current initiatives in computerised facial identification systems within the Australian police community and in overseas data holdings to identify the current 'state of the art' in computer-based systems.

This project arose when difficulties are being encountered with the Penry Facial Identification Technique (Photo-fit), which was introduced into all Australian police forces in 1970. Photo-fit is an identification technique based on the use of black and white photographs. The user can employ the photographic 'bits and pieces' to produce portraits of Caucasians, Negroes, North American Indians and Asians. Over 15,000 million different faces can be built up using the system. Continuing litigation proceedings involving the English inventors and American distributors has meant that the updating of hair styles, mouths, glasses, has been difficult. The photographs are subject to wear and tear. The Photo-Fit is restricted in that not all racial groups

comPHOfit   TM
COMPUTERIZED FACIAL IDENTIFICATION SYSTEM

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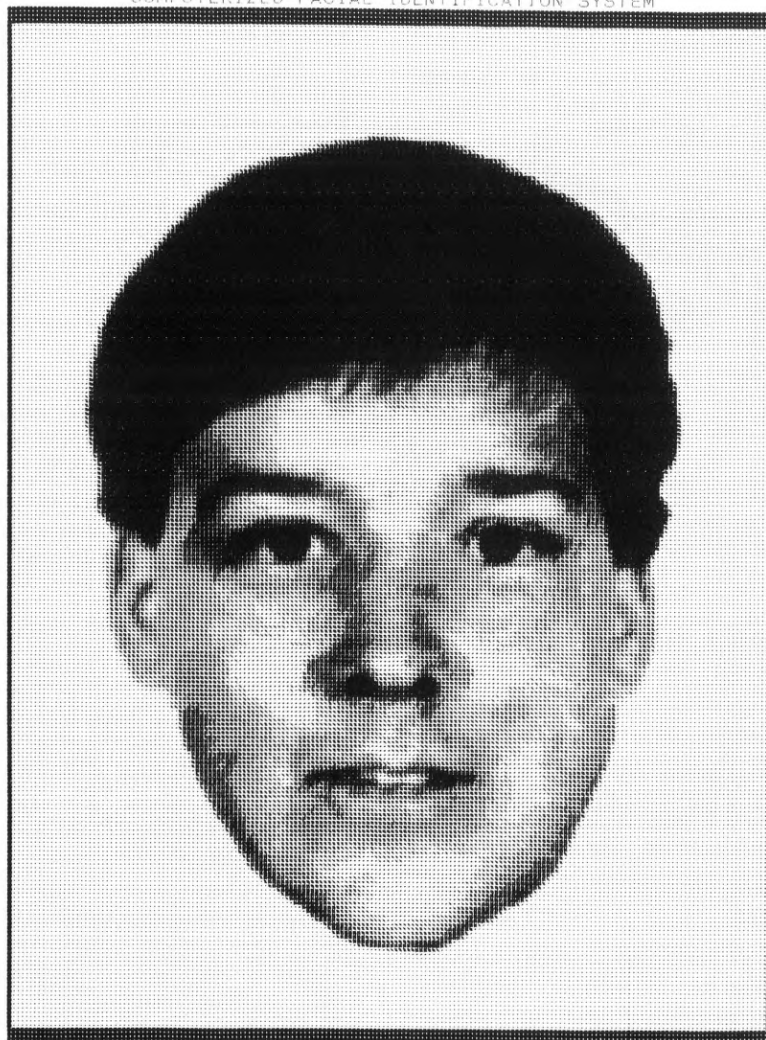
WANTED!

LAST SEEN DRIVING RED 85 BMW-3201

Computer generated likeness from Com Photo Fit software

are represented and police artists are usually required to sketch in some ethnic details. Most people are aware of the poor quality of reproduction of photographs using the Photo-Fit system which appear in newspapers.

Photo-Fit

As is NPRU policy in relation to police research, front-line officers provide experience to the project. The 1987 Resident Researchers' Course consists of experienced police officers from five Australian police forces. The course runs for six months and is designed to equip the students with applied research skills which can be implemented in their home forces upon their return in November 1987. One of the students, Senior Constable K. Huber of the New South Wales Police force, was chosen to assist in this project.

When looking at a system suitable for introduction into Australian police forces we have decided to look, not only at fiscal constraints, but also at the quality of the composite obtained, compatibility with existing main frame computers in Australian police forces, ease of learning how to use the system, speed with which a composite can be completed, and portability.


Russel and Chadwick (S.A. Police)

A literature search has revealed very little published material on Facial identification techniques. The following techniques are in use around the world.

• Penry (Photo-Fit) — Assembly of black and white photographs.

• Identi-Kit Model II (U.S.A.) — Assembly of photographic transparencies with shading effects.

• Minolta Montage Unit (Japan) — System combining photography, optics and electronics with projections of composite photographs.

• P.I.K. (Federal Republic of Germany) — Composite drawing system.

• PS — 309 Composite photograph and projection system.

The most widely used of the five systems are the Photo-Fit and the Identi-Kit Model II.

The use of computer technology in facial identification is rapidly gaining momentum. Like the identikit, the user
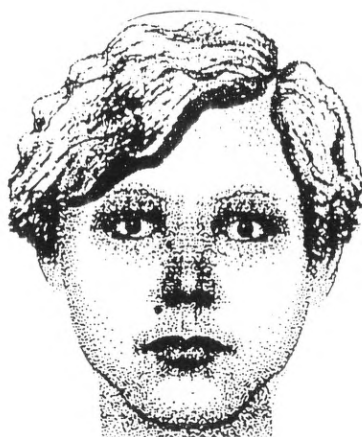
Compusketch

develops the likeness of the suspect by selecting and matching pre-drawn facial features. There are several advantages:

• All work is done on a computer screen.

• The computer allows the operator to mix and match features more quickly.

• Features can be adjusted.

• Customised touching up can be performed.

Research on using computers to build up composite portraits is being conducted in the United States, in Israel and in Austria where IBM is cooperating with the police on a system called the SIGMA project. The whole principle of SIGMA is that verbal descriptions should be abandoned in favour of the use shapes and graphics from the outset so that the portrait of a wanted person can be built up on a display screen without any use of language.

Mac-a-Mug Pro

Initially the face is broken down into separate elements of shape, mouth, eyes, ears, and so on, in exactly the same ways as for traditional composite portraits with one significant difference: when using traditional systems all the elements for a face are required while a SIGMA portrait can be compiled from a few basic features. The operator presses a key to choose the image which then appears on the screen and can be combined with others to built up the portrait. Once all the elements have been selected, the result can be stored in digital code form. Three-quarter and profile views can be displayed on the screen as well as the full-face view. Even a description as vague as 'a man aged somewhere between 20 and 30, about six feet tall, with fair hair and thin lips' can be used as a starting point to search for supplementary information. Future technological developments should make it possible to link the computer screen operations with information contained, for example, in fingerprint files. For the system to become operational, a catalogue of images of the different parts of faces would have to be prepared taking into account the latest anthropological research.

Kiwisoft, a three-person software and applications development house in New Zealand, have marketed a computerised identity kit system. This system involved the development of a unique colour scanner for the capture of colour images on a computer screen. The scanner is linked to a Professional 380 computer. The development of a suite of powerful graphics software named Cadpic enables the system to include a large number of colours.The Kiwisoft system has been bought by the largest prefecture in Tokyo. However, the price tag of almost $NZ100,000 places it out of the reach of many Australian police forces.

Research on imaging systems has been in progress in Australia since 1985. The Victorian companies Vision Control and Insystems have been developing identity kit systems based on micro-computers and high resolution video screens. The features of large numbers of people of

different ages, sex and ethnicity are captured by the video camera digitised onto a disk. These features can be recalled and manipulated to suit the operator. Vision Control feel that they can market a suitable system for less than $20,000.

Two South Australian police officers, Senior Constable David Russell and First Class Constable Tracy Chadwick have been working with a commercially available graphics program on their privately owned Commodore Amiga computers. The program allows manipulation of images already contained within the program. Basically, the face is broken into composite parts as in the Penry System. These parts are then manipulated to form an image consistent with the witnesses' impressions of the offender. The image can be stored on floppy disk, printed out in black and white or colour, transferred to a video tape or transmitted by telephone line to another compatible computer in a matter of seconds. This system is reasonably portable. The disadvantage of this system is the incompatibility of the Amiga System with the IBM computers in use by most Australian police forces. The price tag on such a system, around $4,000, is not prohibitive. There are a number of packages available in the U.S.A. (Compusketch, Com Photo Fit and Mac-a-Mug Pro) which are designed for use in the Apple Macintosh computers. The prices of these packages are also well within reach of most Australian police agencies. Software and Hardware for these systems would cost less than $4,000.

The various police forces would have to make their own decision as to the purchasing of a system which IBM compatible or a stand-alone system such as the Commodore Amiga or Macintosh. The stand-alones can, with extra hardware, become IBM compatible. Regardless of the system purchased, portability is a factor which must be seriously considered, and lap-top computers would seem the ideal size for police use.

It should be remembered that a composite impression should be looked upon as a summary of the suspect's features, not necessarily as an accurate photograph. Experienced police believe that the more accurate or lifelike a composite is, the more suspects are missed. It makes sense that if the picture is very specific then people will only look for a person who fits that exact description. We must allow for inexact descriptions of an offender given to the investigating police. Using a system that produces a magnificent, life-like composite picture

This Kiwisoft application uses video or scanner input to allow fast and flexible compilation of Identikit images.

may then, in fact, be a negative feature of the equipment. It must be remembered that newspapers will only produce black-and-white pictures.

With this in mind, we must look for a system that allows:

- expansion intonvaried polygeneric facial features, including male and females of all ages;

- faster, more accurate, high quality descriptions in colour and black-and-white;

- assistance with analysis of photographic and video images of offenders from surveillance and security cameras;

- prompt media release in both video and printed form;

- faster retrieval and production of stored images for ongoing investigations;

- rapid alterations and updates of variations to known offenders and escapees;

- enhancement of public relations and responses by more professional presentation; and

- the storage of new styles as an updating capability: hair, beards, moustaches, fashions, disguises, jewellery.

The National Police Research Unit is not approaching this project with the view 'because it's computerised it must be better'. A thorough testing program is envisaged for the various facial identification techniques available. The testing will involve asking a person to give descriptions of a subject shown to them for a brief period of time, to: a police artist, a photo artist, a photo-fit specialist, and a police officer using computer-assisted methods.

The resultant impressions can then be examined for similarity to the subject.

The research for this project is well under way and it is to be hoped that the recommendations flowing from the work will be of practical value to police in this country.

IDENTIKIT IMAGES

ORIGINAL MODEL —

SWAP MOUTH AND EYES

VERSION 1 —

FATTEN FACE

VERSION 2 —

ADD SPECTACLES & DARKEN SKIN

VERSION 3 —