



## CCTV: Constant Cameras Track Violators

**T**he use of closed-circuit television (CCTV) cameras to monitor public spaces is increasing, both in the United States and abroad. The Federal government, and NIJ in particular, has funded research into these systems because of their many security applications in both the domestic and international arenas. In England, CCTV systems have monitored public places for many years, partly due to concerns over terrorism. In Israel, police in the old city of Jerusalem use CCTV to monitor every street in many commercial and religious areas.

Many people are wary about the government watching and recording their movements as they pass through parks, streets, and other public areas. Yet despite the controversy, CCTV use by criminal justice personnel in the United States may be increasing.

Some governmental uses of CCTV technology, particularly in the field of correc-

tions, have sparked little or no controversy. (See "CCTV and Corrections.") But in other venues, CCTV use is raising constitutional and privacy concerns. For now, the most prevalent use of CCTV by law enforcement in the United States is the taping of traffic stops by cameras mounted in police vehicles. But it is starting to be used more broadly, as it is in other countries. How widespread that use becomes ultimately will depend on how Americans weigh the benefits of CCTV surveillance against its intrusiveness.

### CCTV in the United Kingdom

Until recently, cameras were rarely used to monitor public spaces in the United States. Most of the research on the effectiveness of such use has therefore been done in the United Kingdom. A study by the Home Office Police Research Group looked at the effectiveness of CCTV systems in three English town centers—

Birmingham, King's Lynn, and Newcastle.<sup>1</sup>  
Among the key findings:

- One of the most important benefits of CCTV is personnel efficiency. Cameras can “patrol” multiple areas without putting numerous officers on the beat. CCTV systems can help discover incidents as they occur. This information can be used to either coordinate an effective and appropriate response or to conserve resources by aiding in a determination that no response is necessary.
- CCTV videotapes can be very beneficial. Not only can they lead to prompt identification of a perpetrator, they can also provide valuable clues that can shape the direction of an investigation.
- Analysis of crime data shows that, at least in the short term, the presence of closed-circuit cameras can have a deterrent effect on a variety of offenses, especially property offenses. For example, in the section of Newcastle covered by CCTV, burglaries fell by 56 percent, criminal property damage by 34 percent, and nonmotor-vehicle theft by 11 percent.

However, it should be noted that such reductions in crime can disappear as publicity about and awareness of the cameras fade. In fact, a May 2002 report suggests that the sharpest decreases occurred when the cameras were being installed and public consciousness of them was particularly high—well before the cameras started operating.<sup>2</sup>

## The Pros and Cons

CCTV does have weaknesses—some technical, and some related to camera placement and monitoring. First, systems that are cheaply made or improperly installed have limited value. Cameras can be vandalized or disabled, and standard cameras do not capture images well under poor lighting

## WHAT IS CCTV?

In its simplest form, a closed-circuit television (CCTV) system consists of a video camera, a monitor, and a recorder. Complex, multicamera systems allow images to be viewed sequentially, simultaneously, or on several monitors at once, depending upon the system. CCTV systems can record in black and white or color, and camera positions can be either fixed or varied by remote control to focus on activity in different locations. Zoom lenses allow either a broad view of the monitored area or selected close-ups. In addition, advances in technology enable CCTV cameras to be smaller, to use night vision, and to transmit images over the Internet.

For more information, see “What is Closed-Circuit Television?” at [http://www.securitygateway.com/page.asp?c=facts\\_cctv](http://www.securitygateway.com/page.asp?c=facts_cctv).

## CCTV AND CORRECTIONS

Closed-circuit television (CCTV) cameras have been used in correctional facilities for years. They cut down on the number of officers needed to monitor inmates, allowing just one or two officers to keep watch on large numbers of inmates in widespread sections throughout the facility. Of course, the same privacy concerns are not raised as when cameras are used in public spaces.

New digital technology makes CCTV images even more useful in the field of corrections. Digital images can be scanned and searched in ways not possible with videotape.

Another cost-saving use of CCTV technology in corrections is remote court appearances by inmates. For example, in January 2000, a county criminal court in Waukesha, Wisconsin, used CCTV technology to hold a plea hearing in a drunk driving case.<sup>1</sup> The technology allowed a defendant facing a drunk driving charge to testify from a Tennessee prison, where he was serving a 3½-year term for armed robbery. Using CCTV for this proceeding saved the county sheriff's department more than \$2,000 in airfare and other costs. Documents were transmitted via fax between the out-of-State prison and the county court. The video units used by the court were originally intended for juvenile hearings and mental health commitments.

1. Sink, Lisa, “Waukesha Holds First Criminal Court Proceeding Via Video Camera,” *The Milwaukee Journal Sentinel*, January 22, 2002: 3B.

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conditions, although newer technology can compensate for this.

Second, CCTV works best in areas with open and plain layouts. Complex areas and layouts make a high degree of camera coverage difficult to obtain.

Third, when cameras are used for surveillance, fatigue—both physical and mental—can affect the performance of staff watching the monitors.

Finally, some critics maintain that the cameras mainly record minor offenses, such as public urination, graffiti, and vandalism.

On the other hand, the growth in CCTV installations demonstrates a general consensus that the presence of cameras seems to deter crime. Moreover, so far no one has been able to prove definitively that the use of cameras in one area displaces crime to neighboring areas. (See “Does CCTV Decrease or Relocate Crime?”)

## The Next Step: Facial Recognition Technology

New computer technology allows CCTV systems to match recorded faces against a computer database of photos. Such facial recognition systems work in a variety of ways. For example, one system measures the distance between specific points on a face and calculates a numeric value, while another bases its matches on how closely

the face resembles one of a standard set of 128 facial archetypes.<sup>3</sup> Once a match is made that exceeds a user-defined confidence threshold, the system alerts the surveillance staff, who then decide whether to pursue a suspect for further questioning.

Like CCTV technology, current facial recognition technology has shortcomings. Its accuracy varies widely among vendors for different applications. A 2000 Defense Advanced Research Projects Agency (DARPA) study—cosponsored by NIJ, DARPA, and the Defense Department’s Counterdrug Technology Development Program Office—compared several such systems. The study found that “lighting, camera types, background information, aging, and other factors” all affected results.<sup>4</sup> For example, accuracy fell off “dramatically” when a face was viewed at more than 40 degrees off center, so users may need to arrange the system so as to catch people looking nearly straight at the camera. The DARPA report concluded that all the systems studied were far more useful for controlling access to a restricted area than for identifying possible felons in a large crowd.<sup>5</sup> A 2002 study showed a marked improvement in accuracy with a 50 percent reduction in error rates in systems studied as compared to the 2000 results.<sup>6</sup>

Casino operators were among the first to implement facial recognition systems to catch known cheaters. Illinois uses facial recognition technology to verify the identity of people applying for driver’s licenses, and several police departments use it to check the identity of suspects.

Use of facial recognition technology in public areas is not yet readily accepted in the United States, however, as demonstrated by the mixed reaction of residents in Tampa, Florida. People went along when the city installed a facial recognition system to monitor public spaces in Ybor City, a popular downtown district.<sup>7</sup> But, many residents raised concerns when a similar system was used in Tampa during the Super Bowl.

## DOES CCTV DECREASE OR RELOCATE CRIME?

Although the use of closed-circuit television (CCTV) cameras is increasing, researchers are still trying to determine if the cameras decrease overall crime rates. Several studies have looked at whether the targeted crimes were simply displaced to neighboring sites, but so far, no study has been able to prove if CCTV moves crime to other locations or if it really stops crime from occurring in both the targeted and adjacent areas.

In fact, the answers to this question are as numerous as the studies. Some studies have found that crime was displaced, some have determined that neighboring areas also experienced a decline in crime, another identified both of these phenomena, while still others found evidence of neither.

According to a Home Office Police Research Group study that evaluated CCTV systems in Birmingham, King's Lynn, and Newcastle—three English town centers—researchers linked the cameras to both crime displacement and elimination.<sup>1</sup> For example, personal crimes were pushed into nearby areas where there was either partial or no camera coverage, but property crime rates decreased without any signs of displacement.<sup>2</sup> The report listed several additional CCTV studies, which also seemed to provide evidence both for and against displacement.

A more recent Home Office report, *Crime Prevention Effects of Closed-Circuit Television: A Systematic Review*, summarized the findings of 22 British and American CCTV-related studies and could not conclude whether the cameras caused any crime displacement.<sup>3</sup> Not all 22 studies looked at displacement, but of the ones that did, 5 determined that CCTV did indeed displace the targeted crimes to bordering areas, 4 found evidence suggesting a diffusion of benefits, 1 discovered signs of both displacement and diffusion, and 4 uncovered no evidence of either scenario. One researcher found evidence that certain crimes, particularly robberies and residential burglaries, moved to areas not covered by the cameras, in direct contrast to the findings of the Police Research Group study.<sup>4</sup>

In a new effort to understand more fully the effects of CCTV initiatives, the Home Office is funding an evaluation of 17 CCTV systems. The study, which is being conducted by Professor Martin Gill, director of the University of Leicester's Scarman Centre, is looking at several key issues, including whether CCTV cameras do indeed help eliminate crime. The final report is expected in 2004.

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1. Brown, Ben, *CCTV in Town Centres: Three Case Studies*, Police Research Group Crime Detection and Prevention Series, Paper 68, 1995. Available at <http://www.homeoffice.gov.uk/prgpubs/fcdps68.pdf>.

2. Ibid., vi.

3. Welsh, Brandon C., and David P. Farrington, *Crime Prevention Effects of Closed-Circuit Television: A Systematic Review*, Home Office Research, Development, and Statistics Directorate, Research Study 252, August 2002. Available at <http://www.homeoffice.gov.uk/rds/pdfs2/hors252.pdf>.

4. Squires, P., *An Evaluation of the Ilford Town Centre CCTV Scheme*, Brighton: Health and Social Policy Research Centre, University of Brighton, 1998: 23.

## FACIAL RECOGNITION TECHNOLOGY IN ENGLAND

London's borough of Newham gained international recognition for its use of Facelt, a facial recognition system developed by Visionics (now Identix Incorporated). Begun in 1997, the system took 18 months to implement. Newham's manager of camera operations credits the system with reducing crime by one-third in the first year.

Signs throughout Newham notify pedestrians about closed-circuit television (CCTV) cameras. Bob Lack, operations manager of the borough's 300-camera system, says that in high-crime areas, a change in mindset occurs over what people view as acceptable behavior, which in turn leads to increased reported crime. Consequently, the Newham program largely targets so-called antisocial behavior, such as graffiti, public urination, and vandalism. In addition, a camera captures the license plate numbers of cars traveling down Newham's busiest street and matches them against a database of stolen vehicles.

According to Lack, only 150 of Newham's 250,000 residents are active, known criminals, and he contends that they are responsible for most of the crime. Lack indicated that the borough's CCTV system focuses on repeat offenders—those who, in his words, “commit so many lower level offenses that their behavior is completely unacceptable.” The public seems satisfied—a recent poll by the borough council found that 93 percent of Newham residents support the system.

Newham's CCTV system connects with facial recognition software. The police give the borough's Council Security Department computerized files with mug shots of repeat offenders—those already convicted and sentenced—and those who police believe commit these types of offenses. The department reviews the database every 12 weeks and deletes offenders who are no longer active criminals.

Lack explained that when the computer matches a face on the street with a mug shot from its files, the public safety operations team that controls the cameras verifies the match and then contacts the Newham police. “What the police do [in response] is their business,” says Lack. He explains that his system is “only aiming at those who are actively infringing on the civil liberties of the honest population and [who are] creating a fear of crime.”

Newham's system differs from others in several ways. For example, the borough has several moveable cameras, which it focuses on “hot spots.” Although Lack

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emphasizes that there is no evidence suggesting that crime is being displaced to neighboring boroughs, he admits that the cameras could conceivably displace crime to areas out of camera range. Therefore, the borough's system allows for changes in camera locale.

In addition, the town council rather than the police operates the system, so beat officers are not taken off patrol to monitor cameras. Although the police provide the mug shots and ID numbers, those running the CCTV system do not know the names of people in the facial recognition database. The council publicizes a telephone number that citizens can call to report suspicious activity; the cameras can then focus on the trouble spot and record activity until police arrive.

In Newham, Lack reports a 35-percent reduction in crime since installing the borough's CCTV system. For example, burglaries declined by 72 percent even though the system was not originally intended to target those crimes. Lack attributes the drop to burglars being “more professional . . . they just don't want to be seen in the area.” The Newham data come from police department records of reported crimes and data from control room logs; outside research has not been done.

One of the system's great successes involved a soccer match between West Ham and Leeds, two rival teams. Although individuals known to disrupt England's sporting events are banned from attending games, they often try to sneak past stadium guards anyway. On the day of this particular match, Leeds police gave the Council Security Department mug shots of 32 known rowdies expected to show up. Game time was 4:00 p.m., and at 1:00 p.m. the control room began monitoring cameras at local subway stops. Within 3 hours, the computer had scanned 4,300 faces exiting the subway and spotted 12 of the targeted individuals among them. The information was given to the police, who prevented the men from entering the stadium. Lack notes that humans alone could not easily have accomplished such a massive task.



## OTHER USES OF CCTV

Use of closed-circuit television (CCTV) cameras has expanded tremendously in the past two decades. According to a Security Industry Association (SIA) report, sales of CCTV systems rose from \$117 million in 1980 to \$807 million in 2000, a six-fold increase.<sup>1</sup> The Association projects continued growth in the coming decade, with an expected rise from \$1.04 billion in 2001 to \$1.63 billion in 2005.<sup>2</sup> The SIA report notes that although commercial users are still the primary purchasers of CCTV systems, governments at all levels are increasingly using CCTV.

### Uses of CCTV include:

**Businesses.** Besides securing businesses from external and internal theft, CCTV systems also can protect businesses from liability. For example, a store that captures teenagers on video horsing around on floors clearly marked “wet” is less likely to be held legally responsible if one of these youths is injured.

**Law enforcement.** A survey conducted by the International Association of Chiefs of Police found that 80 percent of responding police agencies use some form of CCTV.<sup>3</sup> The most common settings for CCTV were in police cars, in interrogation rooms, and at access points to government buildings. Sixty-three percent of the respondents found CCTV useful in conducting investigations, and 54 percent said it was helpful in gathering evidence. Just 20 percent thought that their use of CCTV reduced crime. Significantly, although most police agencies use CCTV, only 53 percent of survey respondents reported having documented CCTV guidelines or policies.

**Courts.** Closed-circuit technology is often used in cases involving young child abuse victims, allowing them to present courtroom testimony without having to appear in the same room as the accused. The practice was approved by the U.S. Supreme Court in *Maryland v. Craig*, 497 U.S. 836 (1990).

1. Security Industry Association, *2001 Security Industry Market Overview*, Alexandria, VA: SIA, 2001: 24.

2. *Ibid.*, 23.

3. International Association of Chiefs of Police (IACP), *The Use of CCTV/Video Cameras in Law Enforcement*, Executive Brief, Alexandria, VA: IACP, May 2001. Available at [http://www.theiacp.org/documents/index.cfm?fuseaction=document&document\\_id=164](http://www.theiacp.org/documents/index.cfm?fuseaction=document&document_id=164).

Proponents of facial recognition systems cite the advantages of such technology. They point out that these systems require less concentration from human staff, making the monitoring process more efficient and freeing employees for other tasks. By allowing small police forces to cover larger areas, facial recognition systems can lead—at least in theory—to a greater number of arrests.

## Privacy Concerns

Privacy advocates are uneasy about using CCTV to monitor public meetings and demonstrations. They cite research showing that some camera operators focus on individuals based on their own prejudices.<sup>8</sup> In addition, some privacy advocates note that unscrupulous camera operators have circulated clips from surveillance cameras

## THE LATEST FINDINGS

The British Home Office has released a meta-analysis study of 18 evaluations of CCTV.<sup>1</sup> Thirteen of the studies were from the United Kingdom and five from North America. The Home Office report reveals much important information about the effectiveness of CCTV in the prevention of crime:

- Generally, CCTV had a small but significant desirable effect. The overall reduction in crime was 4 percent.
- Exactly half of the analyzed studies (nine) showed evidence that CCTV can reduce crime. All of these were conducted in the United Kingdom. The other nine studies, including all five of the North American studies, found no evidence that CCTV reduced crime.
- The most promising data were found in evaluations of CCTV in parking lots. A significant reduction in vehicle crimes—about 41 percent—was seen in lots with CCTV as compared to lots in the control group.
- In studies looking at city centers and public housing, a small but significant average reduction of 2 percent was found in the U.K. studies. In these same settings, however, no effect on crime was found in the North American studies.
- There was conflicting evidence on the effectiveness of CCTV in public transit systems. Two studies found a desirable effect, one found no effect, and one found an undesirable effect on crime. The use of other crime intervention methods—such as special police patrols—in conjunction with CCTV made it difficult to say with certainty that the effects seen were the result of CCTV use.

### The report states:

“Exactly what are the optimal circumstances for effective use of CCTV schemes is not entirely clear at present, and needs to be established by future evaluation research.... Overall, it might be concluded that CCTV reduces crime to a small degree.”

1. Welsh, Brandon C., and David P. Farrington, *Crime Prevention Effects of Closed-Circuit Television: A Systematic Review*, Home Office Research, Development, and Statistics Directorate, Research Study 252, August 2002. Available at <http://www.homeoffice.gov.uk/rds/pdfs2/hors252.pdf>.

and even used the cameras to fulfill their own voyeuristic tendencies. Training programs, clear policies and procedures, personnel background checks, and strict supervision of camera operators can help to mitigate these abuses. Other opponents of CCTV say that camera monitors run afoul of Fourth Amendment guarantees against unreasonable searches and infringe on the right to privacy. However, the courts

generally have ruled that people do not have a reasonable expectation of privacy when in public because their actions are readily observable by others.<sup>9</sup>

Some privacy advocates look at facial recognition technology with greater concern than simple CCTV, contending that it increases the possibility of violations of civil liberties and privacy. Others see it

as having the potential to alleviate some of the concerns about CCTV. By cross-checking faces captured on camera against a database of images of convicted criminals, facial recognition technology may in fact lessen the potential biases of those monitoring the cameras.

## Outlook for the Future

It seems likely that CCTV use will continue to grow, as will the use of CCTV to enforce traffic laws. In July 2002, Virginia Beach, Virginia, began testing CCTV with facial recognition software along the city's ocean-front resort strip.<sup>10</sup> Other cities, including Atlanta, which rejected facial recognition technology because of concerns over its effectiveness, are monitoring the results of systems being used in other places. For its part, NIJ continues to support research into these evolving criminal justice technologies.

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## Notes

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2. Nacro, *To CCTV or Not to CCTV?* Community Safety Practice Briefing, May 2002. Available at <http://www.nacro.org.uk/data/briefings/nacro-2002062800-csps.pdf>.
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9. Bickel, Robert D., *Legal Issues Related to Silent Video Surveillance*, Alexandria, VA: Security Industry Association, 1999. Available at [http://www.securitygateway.com/E/E3\\_4.html](http://www.securitygateway.com/E/E3_4.html).
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