AN EXPERIMENT ON THE PREVENTION OF SHOPLIFTING

by

David P. Farrington

Institute of Criminology, Cambridge University

Sean Bowen

Dixons Stores Group, London

Abigail Buckle

St. Catharine's College, Cambridge University

Tony Burns-Howell

Dixons Stores Group, London

John Burrows

Morgan Harris Burrows, Crime Management Consultants

and

Martin Speed

Dixons Stores Group, London

Abstract: *The aim of this experiment was to evaluate the effectiveness of crime analysis and situational prevention in preventing shoplifting. Three prevention techniques were compared: electronic tagging, store redesign, and deployment of a uniformed guard. Shoplifting was measured by systematically counting specified items every day and comparing the number of missing items with the number sold, given away or used in the store. Nine stores with high shoplifting*

Address for correspondence: Professor David P. Farrington, Cambridge University, Institute of Criminology, 7 West Road, Cambridge CB3 9DT, England.

rates were identified in a prior study. Electronic tagging was introduced in two, store redesign in two, a uniformed guard in two; and the remaining three served as controls, receiving no intervention. Shoplifting was measured during the week before the intervention, the week after, and three to six weeks later. The results showed that: electronic tagging caused a lasting decrease in shoplifting; store redesign caused an immediate decrease that was wearing off after six weeks; and the uniformed guard had no effect on shoplifting. A program of research focusing on crime analysis and situational prevention of shoplifting is recommended, especially aiming to achieve lasting benefits from store redesign.

BACKGROUND TO THE EXPERIMENT

Shoplifting, like other types of offending behavior, arises from the interaction between an individual, with a certain potential for offending, and the environment or situation, which provides opportunities for offending. It is plausible to suggest that the individual potential for offending, or antisocial tendency, depends on energizing, directing and inhibiting processes. Whether a person with a certain potential commits an offense in any given situation depends on situational factors such as opportunities, costs and benefits, and on a person's subjective probabilities of the possible outcomes. (For a more detailed exposition of this theory, see Farrington, 1993.) It follows from this theory that shoplifting might be prevented by targeting either the individual's energizing, directing or inhibiting processes, or the situational factors. This paper focuses on the situational prevention of shoplifting.

Situational Prevention

Most of the initial emphasis of situational crime prevention (Clarke, 1980, 1982, 1983) was on decreasing opportunities for offending by target hardening and environmental management, but there was soon an equal emphasis on increasing the probability of detection (e.g., by increasing surveillance). The latest definition is as follows:

> Situational prevention comprises opportunity-reducing measures that are (1) directed at highly specific forms of crime, (2) that involve the management, design or manipulation of the immediate environment in as systematic and permanent a way as possible, (3) so as to increase the effort and risks of crime and reduce the rewards as perceived by a wide range of offenders [Clarke, 1992:4].

The effort might be increased by target hardening or access control, the risks might be increased by entry/exit screening or surveillance, and the rewards might be decreased by target removal or property marking (Clarke, 1992:13).

According to Clarke (1992), any situational prevention project should include the following elements: (1) collection of data about the nature and dimensions of the specific crime problem; (2) analysis of the situational conditions that permit or facilitate offending; (3) study of possible methods of blocking crime opportunities; (4) implementation of the most promising, feasible and economic measures; and (5) monitoring of results and dissemination of experience. As pointed out below, specifically in connection with shoplifting, these elements have often been termed "crime analysis." In our view, it is essential to evaluate the success of crime prevention initiatives in rigorously controlled experiments (see, for example, Farrington, 1983). At a minimum, there should be pretest measurement, an experimental intervention, and posttest measurement.

The theory that has guided situational crime prevention is rational choice theory (expounded in detail by Clarke and Cornish, 1985, and by Cornish and Clarke, 1986). Essentially, this suggests that potential offenders weigh the likely benefits of crime against the likely costs, and choose to offend if the net expected benefits of crime outweigh the net expected benefits of alternative behavior. Rational choice ideas have a long history in criminology, psychology, economics and other behavioral and social sciences (see, for example, Farrington and Kidd, 1977; Cook, 1980; Trasler, 1986). These ideas suggest that offenders can be deterred by increasing their subjective probability of being caught or by increasing their subjective costs of being caught.

The major problem facing situational crime prevention is displacement: Offenders might choose different targets, different methods or different types of offenses altogether, rather than desisting from offending (see, for example, Barr and Pease, 1990; Gabor, 1990). Advancing knowledge about displacement is likely to depend crucially on knowledge about specialization or versatility in criminal careers (see, for example, Farrington, 1992). Several researchers (e.g., Trasler, 1986; LeBlanc and Frechette, 1989) have suggested that there are essentially two types of offenders: situational (opportunistic) and chronic (persistent). Situational crime prevention may be more successful with situational offenders, while displacement may be more of a problem with chronic offenders.

Preventing Shoplifting

Many shoplifters report that they are influenced by rational or utilitarian considerations, suggesting that rational choice theory and situational prevention might be applicable to shoplifting. For example,

Carroll and Weaver (1986; see also Weaver and Carroll, 1985) asked experienced and novice shoplifters to think aloud in stores, and found that both were concerned with the accessibility of items and with the risks of being caught. However, the experienced shoplifters were less easily deterred and developed plans for overcoming the difficulties posed (e.g., by security devices). Similarly, deterrence research shows that the frequency of shoplifting is negatively related to the subjective probability of being arrested (e.g., Montmarquette et al., 1985). However, other studies show that other motivations are also important in shoplifting, such as seeking excitement (West and Farrington, 1977), depression (Ray, 1987) and interpersonal problems (Schlueter et al., 1989).

Crime analysis has been advocated as an important technique for preventing shoplifting (see Ekblom, 1986, 1988; Burrows, 1988; Hope, 1991), and this general approach is used here. The first step is to identify when and where losses occur most often, the differential vulnerability of items, shoplifting opportunities, and who are the offenders. On the basis of this information, the second step is to identify and choose prevention methods, such as changes in store design (e.g., increasing visibility of items to staff), publicity notices (e.g., warning shoplifters, emphasizing the antisocial nature of shoplifting), security devices (e.g., mirrors, locked cabinets, closed-circuit television, electronic tagging), security staff (e.g., uniformed guards and plain-clothes store detectives), and other staff (e.g., increasing surveillance of high-risk groups of customers). The third step is to implement and monitor the prevention program, and the fourth step is to evaluate its effectiveness. The survey by Farrington and Burrows (1993) showed that the use by large British retail chains of closed-circuit television, loop alarms/display protection, electronic tagging, uniformed guards and warning notices all increased between 1985 and 1990, but the use of store detectives did not.

Previous experiments on the prevention of shoplifting have focused on the impact of warning notices, despite much evidence of the ineffectiveness of publicity campaigns against shoplifting (e.g., Sacco, 1985). McNees et al. (1976) argued that notices specifying that shoplifting was a crime had a reductive effect on shoplifting (although this effect is not clear in their Figure 1). More convincingly, they showed that marking frequently stolen items with a red star and posting warning notices identifying such items as frequently taken by shoplifters caused a significant decrease in the theft of these items, presumably because of deterrence. These results were replicated by Carter et al. (1979) in Sweden, but not by Thurber and Snow (1980) in the Pacific Northwest. Carter et al. (1988) also showed that providing store employees with regular information about the most frequently stolen items caused a

decrease in shoplifting, presumably because of increased surveillance. However, none of these experiments addressed the issues of staff theft and displacement.

Measuring Shoplifting

A major problem in studying shoplifting is to measure accurately its nature and extent. Stock audits reveal stock "shrinkage," or the disappearance from stores of merchandise that has not been sold, but it is impossible to know how much of this shrinkage is caused by shoplifting, as opposed to other causes such as staff theft, falsified deliveries, shop-soiled goods, system errors, in-store use of items and items given away to clinch sales. Generally, retailers are only able to attribute a small percentage of their total audit loss to specific causes, leaving most of this loss unexplained.

Information about shoplifting can be obtained from surveys of retailers (e.g., U.K. Home Office Standing Conference on Crime Prevention, 1986; Farrington and Burrows, 1993), from police records (e.g., Burrows and Lewis, 1987; Poyner and Woodall, 1987), from self-reported offending surveys (e.g., West and Farrington, 1977; Cooper, 1989), or from store detectives' records (e.g., Ekblom, 1986). However, all of these methods are indirect, biased and likely to underestimate the true rate of shoplifting. More accurate measures can be obtained by following shoppers and systematically observing shoplifting as it occurs (e.g., Buckle and Farrington, 1984). However, systematic observation is very expensive in terms of resources and difficult to implement on a large scale.

None of these measurement techniques is adequate for evaluating the large-scale implementation of strategies designed to prevent shoplifting. One of the most useful measurement techniques for this purpose seems to be the repeated, systematic counting of specified items. If items on displays are counted at least once a day, the removal of items can be detected, and shoplifting can be inferred if the items have not been sold, given away, used in the store, stolen by staff, damaged or moved to other locations. This technique seems to have been pioneered by McNees et al. (1976, 1980) in Tennessee. They attached tags or sticky labels to specified items that were removed by the cashier when the items were sold and made daily inventory counts. Similar methods were used by Thurber and Snow (1980) in the Pacific Northwest, and by Carter et al. (1979) in Sweden. Masuda (1992) compared systematic counting with computerized records to discover and correct inventory discrepancies and system weaknesses, and to reduce opportunities for theft (especially

by staff). Carter et al. (1988) relied on electronic stock control methods to measure shoplifting, but our experience suggests that this technique might be prone to considerable staff and system error.

The existing studies of shoplifting using systematic counting have two major limitations. First, each project was carried out in only one store, making it unclear how far this method could be implemented on a large scale. Second, our experience of using this method shows that there is great scope for errors by store staff (e.g., in not removing sticky labels) and by those making the counts, unless the whole project is vary carefully monitored. There are hints of difficulties in the existing literature; for example, McNees et al. (1976) discussed the problem of items being removed from the clothing department (the site of the research) to other parts of the store by customers or store personnel. However, it is not entirely clear that the necessary rigorous quality control was achieved in previous research projects.

The 1990 Measurement Study

The main aim of the 1990 measurement study, which was described in detail by Buckle et al. (1992), was to assess the usefulness of the method of measuring shoplifting by repeated, systematic counting and the feasibility of implementing it on a large scale. The research was carried out in Dixons and Currys electrical stores, which are both owned by the Dixons Group in the U.K. While some of the same types of small electrical goods are sold in both types of stores, Dixons stores specialize in electronic merchandise such as stereos, video recorders, and televisions, while Currys stores specialize in domestic appliances such as washing machines, dishwashers and refrigerators (see, for example, Burrows, 1988).

In the Dixons Group, small items such as audiotapes and films are referred to as "essentials," while larger items such as televisions or washing machines are referred to as "majors." The shoplifting of essentials is unlikely to be noticed, unless a large number disappear in a short time from one particular store location. The shoplifting of a major item may be noticed and reported to the Security Department (which maintains a database on reported shoplifting) but, often, store staff will surmise that missing items must have been sold. The aim of the research was to measure the shoplifting of essentials.

Thirty Dixons and Currys stores were chosen for study, drawn from all areas of Great Britain, in most cases because they were thought likely to have a high level of shoplifting. Fifteen management trainees each measured shoplifting in two stores during a full six-day trading week.

One store had to be deleted from the study because the uncooperative staff sabotaged the project by removing items, leaving 29 stores for analysis.

Over all 29 stores, the percentages of items leaving the stores that were stolen as opposed to sold were:

15 Dixons: audiotapes 11%, videotapes 15%, films 14%, headphones 24%. (The high rate of theft of headphones in Dixons stores is remarkable.)

14 Currys: audiotapes 4%, videotapes 8%, headphones 16%, small domestic appliances 4%.

Ten stores were the worst, since they had more than 10% of their items stolen and at least 20 items stolen in a week. These stores are shown in Table 1, together with their shoplifting rates in absolute numbers and by value. For example, the Bradford store had 59 of these items stolen and 110 sold, meaning that 35% of items leaving the store were stolen as opposed to sold. Comparing the total sales of these items of £784 with the total value of stolen items of £441 showed that 36% of stock by value was stolen as opposed to sold. These 10 stores were chosen for the prevention experiment.

Table 1: Shoplifting Rates of Ten Identified Stores in 1990

Store	Number of Items			Value (£) of Items		
	Sold	Stolen	% Stolen	Sold	Stolen	% Stolen
Dixons						
Bradford	110	59	34.9	784	441	36.0
Altrincham	56	27	32.5	541	253	31.9
Wolverhampton	198	53	21.1	1282	348	21.3
Peckham	141	37	20.8	1213	427	26.0
Reading	194	39	16.7	1569	299	16.0
Manchester	189	35	15.6	1311	384	22.7
Portsmouth	158	26	14.1	1090	198	15.4
Leeds	227	30	11.7	1581	188	10.6
Currys						
Glasgow	39	21	35.0	406	209	34.0
Walworth	91	20	18.0	915	262	22.3

Note: Based on theft of audiotapes, videotapes, films, headphones and small domestic appliances.

The average value of these essentials stolen in one week in these 10 stores was almost exactly £300 per store, or £50 per day. Bearing in mind the fact that the measurement study was carried out in January, at a time when stores are quiet, this gives an indication of the minimum potential savings that might be achieved if the shoplifting of these essentials could be prevented.

The measurement study showed that the method of measuring shoplifting by repeated, systematic counting was valid. The observed sales of essentials recorded by management trainees in the study week were significantly correlated (r= .49) with the average weekly sales of essentials according to stock audit figures. Exactly 3.4% of total sales by value were of essentials, according to stock audit figures and according to the observed sales expressed as a function of that week's sales in the 29 stores.

The observed shoplifting rate of essentials in the study week was significantly correlated (r= .52) with the recorded shoplifting loss of major items in the previous year, expressed as a percentage of the total sales by value. Hence, the stores with high recorded shoplifting rates for major items also tended to have high observed shoplifting rates for essentials in the measurement study. This increases our confidence in the validity of the project measurement of shoplifting and also suggests that the major determinant of the rate of all kinds of shoplifting might be the type of area and the clientele of the store.

Overall, Buckle et al. (1992) concluded that the counting method had sufficiently high validity to be used on a large scale to evaluate the success of experiments designed to prevent or reduce shoplifting.

THE 1991 PREVENTION EXPERIMENT

The aim of the 1991 prevention experiment was to evaluate the effectiveness of three methods of preventing shoplifting: electronic tagging (T), store redesign (R) and a uniformed guard (G). The store redesign was essentially intended to decrease opportunities for shoplifting by making it more difficult, while electronic tagging and the uniformed guard were intended to have a deterrent effect by increasing the subjective probability of detection. Warning notices, security cameras, loop alarms and locked cabinets were already used in most Dixons Group stores, while plain-clothes store detectives were not used. In regard to other possible preventive options, restricting access of high-risk customers to stores would be problematic, placing more items in locked cabinets might lead to fewer sales, and hiring more staff would probably be uneconomic.

In addition to the three prevention conditions, there was also a control condition (C) in which no prevention strategy was introduced, to control for changes or fluctuations in shoplifting that were unconnected with the experiment. The rate of shoplifting of essentials was measured using the same method of counting and labelling by management trainees as before. (We are very grateful to the management trainees for their assistance.) The effect on shoplifting was assessed using a pretest/post-test design.

Method of Measurement

Shoplifting was measured by repeatedly, systematically counting specified essential items each day, and by detecting disappearances of items that could not be otherwise explained. A small sticky label was attached to all such items on open display and not protected by loop alarms. Labels of different shapes and colors were used to identify different types of items in different store locations. The management trainees were asked to label audiotapes, videotapes, films, headphones and small domestic appliances.

Whenever an item was sold, given away or used in the store, the staff members were asked to peel off the label and stick it on a tally sheet held by the till. The trainees counted and recorded the number of each type of item in each store location, and attached labels on the day before the project began (the preparation day). They then counted and recorded the number of each type of item at the start and end of each day. By comparing the number of missing items with the number sold, given away or used in the store, a measure of the number of items shoplifted was obtained. The trainees were also asked to check the till rolls to ensure that items had not been sold without staff peeling off the labels. At the end of each day, the trainees completed a daily summary sheet showing the numbers of each type of item sold and stolen, and mailed it to the senior researcher in Cambridge. They were required to do this each day so that potential problems could be detected and rectified at an early stage.

The management trainees were responsible for replenishing stock, making sure that all relevant items on display were labelled and making sure that staff were efficient in removing the labels. They also monitored any rearrangement of displays and any transfer of minor items into or out of the store. They were told that they were not there to sell. Staff theft from the displays was unlikely during the week of the project, since the staff knew that the displays were being checked each day, and the managers were asked to increase the frequency of staff searches during

the time of the project. All trainees were visited during the project by a member of the research team, to check that the measurement was being carried out efficiently and to discuss and resolve any difficulties in particular stores. All trainees came to Cambridge for a detailed briefing day just before the pretest week and for a detailed debriefing day just after the posttest week. These visits were very important for ensuring the quality of their work, resolving questions and establishing the validity of the data collection.

Design

It had been planned to measure shoplifting during a full six-day trading week in the pretest, then implement the strategy (T, R or G), and then measure shoplifting again during a full week in the posttest. Unfortunately, resource constraints meant that the pretest and posttest periods were restricted to only four days (Wednesday to Saturday). In the measurement study, the average shoplifting rate for Wednesday to Saturday (10.5%) was similar to the average rate for the full six-day week (10.9%). The majority of sales (73.8%) and shoplifting (71.3%) in the full week occurred between Wednesday and Saturday.

The pretest was conducted from January 30 to February 2, and the posttest from February 6 to 9. Unfortunately, there was heavy snow in the posttest week, particularly on Friday, February 8, which meant that stores were open for shorter hours and had fewer customers. The snow prevented one management trainee (in Peckham) from carrying out the posttest measurement, reducing the number of stores in the experiment to nine. Two other trainees could not get into their stores on one day but were nevertheless able to complete the counting satisfactorily.

The plan had been to use matched pairs of stores to evaluate the prevention strategies, but the loss of Peckham meant that the design of the experiment is best viewed as follows:

(1) Bradford (R) versus Altrincham (T);
(2) Wolverhampton (T) versus Reading (G) versus Manchester (C);
(3) Portsmouth (C) versus Leeds (G);
(4) Glasgow (R) versus Walworth (C).

The stores within each group were reasonably comparable in size and in sales volume in 1990, as well as in measured shoplifting rates. The stores were either in shopping precincts in city centers (Altrincham, Bradford, Manchester, Portsmouth, Wolverhampton) or on main roads in city centers or inner-city areas (Glasgow, Leeds, Reading, Walworth). This design allows the comparison of each experimental condition (T, R or G) with a control condition (C), and also the comparison of T with both R and G. However, the pretest/posttest comparisons are probably more important than the experimental-control comparisons.

In addition to the posttest, which was designed to reveal the immediate effects of the prevention strategies, a longer term follow-up was carried out since it was felt that immediate effects might not be lasting. In most cases, the follow-up measurement was carried out by store staff rather than by management trainees, and less information is available about it. However, the staff were specially trained, and they were familiar with the measurement technique as a result of their contacts with the trainees in the pretest and posttest weeks. All stores were visited during the follow-up weeks by a member of the research team to check that the measurement was being carried out efficiently. One effect of using store staff was that in some cases only a more limited range of items could be counted in the follow-up (only audiotapes, videotapes and headphones).

For the G conditions (Reading and Leeds) and for the C condition (Portsmouth), the follow-up was carried out three weeks after the posttest, that is, from Wednesday February 27 to Saturday March 2. This was the fourth and last week that the guard was stationed in Reading and Leeds. For the T conditions (Altrincham and Wolverhampton), for the R condition (Bradford), and for the C condition (Walworth), the follow-up was carried out six weeks after the posttest, that is, from Wednesday March 20 to Saturday March 23. This was the seventh week of the tagging for Altrincham and Wolverhampton.

It was not possible to arrange a follow-up measurement in Glasgow. A follow-up was carried out in Manchester, but the results were unreliable. Similarly, the results were unreliable in the pretest in Reading. Unless the counting and checking are done very carefully and conscientiously, there is the danger that items will be recorded as stolen when in fact they have been sold. There are many opportunities for staff error, including giving away or selling items, and breaking up multi-packs into single items without removing the sticky labels. We have only included results when we are confident that they are valid.

An attempt was made to rectify the missing pretest at Reading by measuring shoplifting there between Wednesday, April 24 and Saturday, April 27, eight weeks after the guard had been withdrawn. This made it possible to compare a no-guard with a guard condition in Reading. For ease of exposition, this April week will be referred to as the "pretest" week in Reading.

Changes Between 1990 and 1991

The most important change between January 1990 and January 1991 was that the Leeds store had a major refit in the summer of 1990 and moved to a different location in the same street. Its sales area was more than doubled, from 2,217 square feet to 5,274 square feet. Hence, Leeds in 1991 was a rather different store from Leeds in 1990. The other eight stores were essentially unchanged.

Tables 2 and 3 show some of the changes occurring between January 1990 and January 1991. The same manager survived in only three of the nine stores, perhaps reflecting the fact that they were generally in city-center locations with rough customers. The average store had just over 2,500 square feet of sales area in 1991 and six or seven staff members usually on duty (according to the management trainees). The average weekly sales of the stores declined by about 10% between 1990 and 1991, from £39,761 to £35,952. The decline in sales was especially marked for the two Currys stores in Glasgow and Walworth (both in very rough locations).

The average audit loss also declined, so that on average 1.92% of the items leaving the store were lost rather than sold in 1991, compared with 2.18% in 1990. This decline may have occurred because some of these stores had been identified for their high audit losses, and corrective action had been taken. The recorded shoplifting loss in the year ending January 1991 increased by nearly 20% over the previous year, from £2,115 to £2,513. This only covers large, costly major items whose disappearance was noticed. It can be seen that the recorded shoplifting loss, at about £50 per week, was far less than the previously measured loss of essentials, at about £300 per week.

In regard to existing security devices, these stores generally used loop alarms for large valuable items, kept small valuable items in locked cabinets and had security cameras (although these were not working in Portsmouth or Walworth). Hence, only the essentials, which were usually kept in front of the cash desk, were unprotected. After the measurement study revealed the very high rate of theft of headphones, a new headphone stand was introduced from which it was harder to remove headphones (and harder to knock them onto the floor). Staff were searched regularly (usually daily) in all stores except Leeds and Walworth.

Table 4 shows the comparability of the shoplifting rates between 1990 and the 1991 pretest. For any given store, the comparisons are restricted to items measured in both years in that store, which means that each store is not always exactly comparable to every other store. Also, as

Table 2: Store Changes Between 1990 and 1991

Store	Manager Same?	Area Same?	Year	Staff	Staff Searched
Bradford	No	1,636	1990	3	Yes
		Yes	1991	3-4	
Altrincham	Yes	1,410	1990	2-3	Yes
		Yes	1991	4	
Wolverhampton	No	3,170	1990	8	Yes
		Yes	1991	6	
Reading	No	2,700	1990	10	Yes
		Yes	1991	9	
Manchester	Yes	2,600	1990	4-6	Yes
		Yes	1991	9-10	
Portsmouth	No	2,546	1990	5	?
		Yes	1991		?
Leeds	Yes	5,274	1990	8-9	No
		No	1991	10	
Glasgow	No	1,888	1990	4	Yes
		Yes	1991	6	
Walworth	No	1,496	1990	2-3	No
		Yes	1991	5	
Average		2,524	1990	5-6	
			1991	6-7	

Notes:
Area: Square feet sales area (area of Leeds in 1990 = 2,217).
Staff: Number of staff usually on duty on weekdays (estimated by trainees).
Staff searched: Yes= regular (daily) searches
No = never or hardly ever.

Table 3: Audit Changes Between 1990 and 1991

Store	Year	No. Weeks	Weekly Sales	Audit Loss	% Loss	Shoplifting Loss
Bradford	1990	75	19,889	188	0.94	2,750
	1991	74	20,747	41	0.20	670
Altrincham	1990	76	17,640	429	2.37	1,858
	1991	84	18,860	-109	-0.58	3,506
Wolverhampton	1990	67	41,986	384	0.91	1,100
	1991	76	38,600	920	2.33	1,793
Reading	1990	69	46,935	3,062	6.12	4,661
	1991	42	47,406	2,396	4.18	5,545
Manchester	1990	61	53,309	556	1.03	2,565
	1991	73	52,514	816	1.53	4,330
Portsmouth	1990	53	48,673	460	0.94	2,020
	1991	68	46,748	729	1.54	1,898
Leeds	1990	73	42,318	1,042	2.40	568
	1991	42	53,569	661	1.22	1,688
Glasgow	1990	61	56,404	475	0.84	1,720
	1991	88	26,643	284	1.05	1,570
Walworth	1990	67	30,786	1,393	4.33	1,795
	1991	74	18,478	593	3.11	1,613
Average	1990	67	39,761	888	2.18	2,115
	1991	69	35,952	703	1.92	2,513

Notes:
Weekly sales, audit loss given in average £ per week.
% Loss : % of weekly sales + audit loss.
Shoplifting loss: Total recorded (in £) in the year to January, 1991.
No. weeks: Refers to the time periods up to the latest audit date before January 1990 or February 1991. Audits of each store are taken at variable times, and it is only possible to measure sales and losses in the periods between audits. The 1990 audit period is a period of at least one year between an audit and the latest audit before January 1990 (which occurred, on average, on September 6, 1989). The second audit period was then the time between the latest audit before January 1990 and the latest audit before February 1991 (which occurred, on average, on December 31, 1990). The first audit period was greater than 52 weeks by design, while the second audit period was greater than 52 weeks in these nine stores, possibly because they were being audited more frequently in 1990-91 than in 1989 due to high losses.

Table 4: Shoplifting Rates in 1990 and 1991

Store	Items	1990			1991		
		Sold	Stolen	% Stolen	Sold	Stolen	% Stolen
Bradford	AVFH	110	59	34.9	106	61	36.5
Altrincham	AVFHO	56	27	32.5	27	12	30.8
Wolverhampton	AVFO	193	52	21.2	100	18	15.3
Reading	AVH	148	33	18.2	100	12	10.7
Manchester	AVFH	189	35	15.6	210	38	15.3
Portsmouth	AVFH	158	26	14.1	134	22	14.1
Leeds	AVFH	227	30	11.7	138	13	8.6
Glasgow	AVHD	39	21	35.0	31	10	24.4
Walworth	AVHDO	93	20	17.7	51	8	13.6

Note: A = Audiotapes; V = Videotapes; F = Films; H = Headphones; D = Small domestic appliances; O = Other.

already explained, the 1990 figures were based on six days and the 1991 pretest figures on four days. Nevertheless, the 1990 shoplifting rate generally agrees quite well with the 1991 rate, although 1991 rates tend to be lower. In no case was the 1991 rate significantly different from the 1990 rate on a difference-of-proportions test, although the Reading rates were nearly significantly different (p= .06), perhaps because the Reading "pretest" was carried out later, as explained above.

RESULTS OF THE EXPERIMENT

Effectiveness of Prevention Techniques

Table 5 summarizes the main results of the experiment. The number of items measured in each store was restricted to make the pretest, posttest and follow-up measurements comparable. For example, in Leeds, Portsmouth and Wolverhampton, films were measured in the pretest and posttest but not in the follow-up. The restriction of items meant that the results were based on smaller numbers but otherwise did not materially affect the conclusions. As before, the figures are less comparable among stores than over time, although comparability between stores is generally quite good.

The figures in Table 5 show the percentage of items stolen among all those leaving the store (stolen or sold) and the denominator on which each percentage is based. For example, in the Bradford pretest, 61 items were stolen and 106 sold, which meant that 36.5% of the 167 items

Table 5: Effects of Prevention Techniques

Store		Items	Pretest %	Pretest (N)	Posttest %	Posttest (N)	Posttest Sig	Follow-Up %	Follow-Up (N)	Follow-Up Sig
Bradford	(R)	AVFHO	36.5	(167)	15.2	(66)	.0002	27.1	(70)	*
Altrincham	(T)	AVFHO	30.8	(39)	7.3	(55)	.004	4.4	(45)	.001
R vs T			*		*			.0002		
Wolverhampton	(T)	AVO	17.3	(104)	1.4	(71)	.0001	5.5	(91)	.007
Reading	(G)	AVH	10.7	(112)	5.8	(120)	*	8.8	(147)	*
Manchester	(C)	AVFH	15.3	(248)	10.4	(230)	*	___	___	
T vs C			*		.0002			___	___	
G vs C			*		*			___	___	
T vs G			*		*			*		
Portsmouth	(C)	AVH	15.4	(123)	21.5	(79)	*	15.0	(127)	*
Leeds	(G)	AVH	6.9	(131)	8.1	(86)	*	18.6	(194)	.001
C vs G			.03		.015			*		
Glasgow	(R)	AVHD	24.4	(41)	5.0	(20)	.02	___	___	
Walworth	(C)	AVHDO	13.6	(59)	29.6	(54)	.04	22.0	(50)	*
R vs C			*		.002			___	___	

Notes: The figures show the percentage of items stolen: R = Redesign; T = Tagging; G = Guard; C = Control;
A = Audiotapes; V = Videotapes; F = Films; H = Headphones; D = Small domestic appliances; O = Other.
* = Not significantly different
Sig = Significantly different from Pretest
___ = Not available

leaving the store were stolen. In the Bradford posttest, 10 items were stolen and 56 sold, which meant that 15.2% of the 66 items leaving the store were stolen. Table 5 also shows the results of difference-of-proportions significance tests comparing changes over time and differences between stores. For example, comparing the pretest and posttest in Bradford, 15.2% of 66 is significantly (p= .0002) less than 36.5% of 167.

Electronic tagging caused a significant decrease in the shoplifting rate in the posttest compared with the pretest in both Altrincham and Wolverhampton. Furthermore, in both stores the rate in the follow-up was significantly less than in the pretest, showing that the benefits of tagging were maintained for several weeks after it was introduced.

Redesigning the store also caused a significant decrease in the shoplifting rate in the posttest compared with the pretest in both Bradford and Glasgow. However, these benefits were not maintained over time in the one store (Bradford) where follow-up data were obtained. Six weeks after the posttest, the shoplifting rate in Bradford was no longer significantly less than in the pretest.

There was no significant effect of the guard on shoplifting in either Reading or Leeds, when the posttest was compared with the pretest. However, in the follow-up three weeks after the posttest, the rate was higher in Leeds than it had been in the pretest. The follow-up rate was not significantly different from the pretest rate in Reading. These results show that the guards were ineffectual in preventing shoplifting.

In the control conditions, the posttest shoplifting rate was just significantly (p= .04) higher than the pretest rate in Walworth, but not significantly different (as expected) in Manchester and Portsmouth. By the time of the follow-up in Walworth six weeks later, the shoplifting rate was no longer significantly higher than the pretest rate, and the Portsmouth follow-up rate was also very similar to the pretest rate. Hence, the higher posttest rate in Walworth probably reflects a chance fluctuation, and it is likely that there was no marked underlying tendency for the shoplifting rate to change nationally during the short time period of this experiment. During the posttest week, as already mentioned, there was heavy snow. Also, there was a perpetual inventory count in all stores on the Wednesday of the posttest week, which might have resulted in more staff hovering round the displays and hence more deterrence of the shoplifting of essentials.

Comparing the tagging and control conditions, Wolverhampton (T) had a significantly lower shoplifting rate in the posttest than Manchester (C), although the two rates had not been significantly different in the pretest. This again confirms the effectiveness of tagging in reducing

shoplifting. However, Wolverhampton (T) was not significantly different from Reading (G), although it was clear that the decrease in shoplifting was far greater in Wolverhampton. Comparing the tagging and redesign conditions, Altrincham (T) and Bradford (R) were not significantly different either in the pretest or in the posttest, because in both cases shoplifting declined significantly. However, in the follow-up, Bradford (R) had a significantly higher shoplifting rate than Altrincham (T), essentially because the benefits of redesign disappeared over time, whereas the benefits of tagging were maintained.

Comparing the redesign and control conditions, Glasgow (R) and Walworth (C) were not significantly different in the pretest but were significantly different in the posttest, essentially because the shoplifting rate decreased in Glasgow (R) and increased in Walworth (C). These results again show the short-term benefits of store redesign. Comparing the guard and control conditions, Reading (G) was not significantly different from Manchester (C) in either the pretest or the posttest, again showing the ineffectiveness of the guard. The shoplifting rate in Leeds (G) was lower than in Portsmouth (C) in the pretest, which meant that these two stores were less comparable in 1991 than they had been in 1990, no doubt because of the major refit of the Leeds store. However, their shoplifting rates were not significantly different in the follow-up.

It can be concluded that: (1) tagging caused a decrease in shoplifting that was maintained over time; (2) redesign caused a decrease in shoplifting that was not maintained over time; and (3) the guard had no beneficial effect on shoplifting. The reasons for these results will now be discussed.

Tagging

The electronic tagging systems were installed by the Actron company, which also conducted staff training sessions. An alarm was supposed to sound if a tagged item was taken through the door of the store, which had been fitted with electronic gates. In some cases, these gates made it difficult to deliver large items to the store. When the alarm sounded, staff were supposed to approach the customer politely and ask to check the tagged item at the till for a possible error. It is extremely difficult to estimate the cost of this electronic tagging system in the long term, but the cost might be of the order of £10 per day per store if it was assumed that the system would be replaced after five years.

In Altrincham, the staff did not think that the detection rate of tagged items was very high, but felt that the equipment was a good deterrent to shoplifting. The staff thought that shoplifters would gradually discover

ways of stealing without activating the alarm, so that any effect of the tagging would gradually wear off. For example, it was possible to leave the shop with a tagged item by shielding the tag with a coin. The store was short-staffed, but the staff members were aware of shoplifting and alert. They were efficient in responding to the frequent (almost invariably false) loop alarms and never left locked cabinets open. The tagging alarm sounded three times in the posttest week, twice because of staff error in deactivating tags and once because it was activated by a security pass. Four essential items (value £39) were stolen in the posttest week without activating the alarm, in comparison with 12 in the pretest week (value £110), so about £18 per day was saved on essentials. In the follow-up week, two items (value £25) were stolen, representing a saving of about £21 per day.

In Wolverhampton, the staff members were aware of shoplifting but made no effort to prevent it. There had been a new manager since last year, and the store was now better run. The staff became fed up with the time-consuming process of applying the tags and they were sometimes too busy to respond to alarms. The staff thought that the equipment probably deterred shoplifters from entering the store, but that potential offenders would soon find out that the tags could be peeled off in 30 seconds. Indeed, in the first few days some tags were found stuck to display shelves, presumably after deliberate removal by customers. Also, items held close to the body would not activate the alarm, and neither would items in foil bags (e.g., freezer bags). There were also problems if a group of people went out together or if people ran through the doors quickly. The tags were unsuitable for items with a high metal content such as batteries or high quality audiotapes. The trainee thought that the tagging system was unlikely to affect sales but might make staff less vigilant. The alarm was activated twice in the posttest week, by hotel and factory pass keys. One essential item (value £8) was stolen in the posttest week without activating the alarm, in comparison with 18 in the pretest week (value £242), so about £59 per day was saved on essentials. In the follow-up week, five items (value £65) were stolen, representing a lower saving of about £44 per day.

Store Redesign

The strategy in the redesigned stores was to use the results obtained in the pretest week to inform changes made before the posttest week (typically, on the Tuesday of the posttest week). Hence, it may be that part of the success of this strategy was attributable to the staff's heightened awareness of the items that were being stolen and the store

locations that were the most vulnerable. Also, the management trainees were given a great deal of responsibility in this condition, since to a large extent they were asked to show initiative and put their own ideas into practice. Both trainees were highly motivated, but it is unlikely that their stake in the success of the measures led to any biasing of their measurement.

The Glasgow store was in a rough area with rough customers. The staff members were resigned to shoplifting and did not care much about it. The trainee told staff about essentials that were stolen in the pretest week, but the staff had not noticed anything missing. The main items stolen in the pretest week were small packs containing two or three high-quality four-hour videotapes from near the floor, in front of the cash desk out of the vision of staff members working at the till. Consequently, the trainee moved these items in the posttest week to a higher-up, more visible location and replaced them with multi-packs (nine-packs) of videotapes. The staff members were puzzled by this and doubted if it would do any good, but no videotapes were stolen in the posttest week. The trainee also put up posters warning that security cameras were operating (although this was not true). The posters were greeted with cynicism by the staff, but the trainee thought that they were noticed by teenagers who might be potential shoplifters. On the Tuesday of the posttest week, the trainee talked to the staff about security, using the pretest results and the Dixons security booklet, and thought that staff became more sensitive to shoplifting in this week. The trainee also recommended placing a perspex shield in front of the shavers and focusing an operating security camera on the items in front of the cash desk.

Bradford, like, Glasgow, was a relatively small store, and this limited the scope for redesign. Also, Bradford was understaffed. In the pretest week, the trainee found that essentials in front of the cash desk were particularly vulnerable to shoplifting. Consequently, in the posttest week she moved some of these items to the stockroom and condensed the remaining items to the front of the stands to make the displays look full. This made it easier to see when an item was taken and also increased the staff's visibility of the items. Previously, their vision had been obstructed by items piled high around the cash desk. The trainee also decreased the number of items piled up in dump bins. She would have liked to move more items into the stockroom but was limited by the space available.

There were two security cameras in Bradford in the pretest week, but they were not mounted in sensible directions and there were no warning notices. Consequently, in the second week the trainee cleaned

up the cameras, pointed them in sensible directions (moving the old-style headphone stand in front of one of them), and put up warning notices saying that security cameras were now recording. She also moved a large 9-pack videotape display from a dark corner. The trainee thought that the counting did not make the staff more aware of shoplifting, although they did pay attention to groups of schoolchildren and teenagers.

By the follow-up week, the displays had been changed. Indeed, the manager and staff changed displays almost on a daily basis in the interests of maximizing sales. The display in front of the cash desk was no longer neat. However, the warning notices were still in place. The store was even more short-staffed, and the effects of the store redesign were probably wearing off because the redesign was not maintained over time.

Guard

In Reading, there had been a major security problem about seven months before, when all existing staff had been dismissed. Consequently, security was on everyone's minds. There was high staff awareness of local shoplifters and their methods of working, and suspected shoplifters were carefully watched. A guard came on the Wednesday of the posttest week, but no guard came on the Thursday, presumably because of the snow (despite promises made in response to repeated telephone calls). A different guard came on the Friday and Saturday. He had never worked before as a security guard and asked the trainee what he should do. Both guards were in uniform but were relatively small in stature. They spent their time walking around the store and concentrated on the cash desk and doors.

The Leeds store, as mentioned, had moved to a new location in the same street since the previous year. It was busy and well-staffed. The essentials were now all behind or very close to the cash desk, whereas they were displayed more openly last year. This could be one reason for the decreased shoplifting rate in this store in 1991. The staff members were not sensitive to shoplifting and did not think of the implications for shoplifting when they were arranging displays. They thought that there was no shoplifting problem. There was no staff training in preventing shoplifting, and the main priority was on sales. However, the manager was aware that headphones were being stolen. The headphone stand was in a blind spot. The guard was aged nearly 60 and was small and not well-built. He stood mainly by the door but also walked around the store. He was vigilant towards customers and went over to groups of young people. However, most customers did not seem to notice him. The staff thought that having a guard was a waste of time, and that a

guard should be young, tall and strong-looking, with more of a physical presence. However, the staff seemed to be even less vigilant when the guard was present.

Hence, the ineffectiveness of the guard condition could have been partly a function of the inappropriateness or poor quality of the particular individuals employed as guards. The cost of a guard was of the order of £50 per day.

Controls

The trainees in control stores were asked not to tell the staff what items were being taken or what were the vulnerable store locations so that there would be no changes in the store between the pretest and posttest weeks.

The Walworth store was in a rough area, with rough customers. The staff turnover was high; only one member of staff was left since the previous year. The staff knew that shoplifting occurred but thought that there was nothing they could do to stop it. The trainee thought that the counting did not make the staff more aware of shoplifting.

In Portsmouth, nearly all essentials were kept in front of the cash desk, and the staff's view of them was often obscured. Some videotapes were kept in an open bin. Most items were stolen from the top shelf display in front of the cash desk. The staff members were either bored because of the lack of customers or were milling around the cash desk, which may have deterred shoplifters. However, at busy times there were also customers milling around the cash desk.

In Manchester, the trainee thought that the counting made the staff more aware of shoplifting. The staff members were very busy and put security far down on their list of priorities. They did not respond promptly to loop alarms and sometimes left cabinets unlocked. The headphones were still on old-style hooks and were in small packets that were easy to steal. There were still open bins, audiotapes and videotapes were in blind spots, and the headphones at the edge of the cash desk could not be seen. Large groups of youths came into the store and sometimes knocked items off displays and picked them up. However, fewer youths entered in the second week because they were more interested in playing in the snow and throwing snowballs.

CONCLUSIONS

The experiment was successful in showing the effectiveness of electronic tagging, the short-lived effectiveness of store redesign, and

the ineffectiveness of the guard. As already mentioned, the ineffectiveness of the guard may have been partly a function of the particular individuals employed as guards, but it seems unlikely that a guard could be cost-effective in preventing shoplifting in the majority of Dixons stores.

The amount saved by electronic tagging probably exceeds its long-term costs. However, it is not clear whether its effectiveness will gradually wear off as customers devise ways of beating the system. Another problem is displacement. In Peckham, where tagging was introduced into the Dixons store, the manager of the nearby Currys store thought that his shoplifting rate had increased markedly as a result. It would be desirable to investigate displacement in future experiments. Tagging would not be cost-effective if it merely displaced shoplifters from some Dixons Group stores to other Dixons Group stores.

A guard or electronic tagging may possibly be effective and desirable in some stores. However, in the majority of stores, redesign seems the most attractive option. This is a relatively inexpensive strategy. The experiment shows that redesign can lead to a marked decrease in shoplifting, but that the decrease is not maintained over time. The challenge for the future is to develop a redesign strategy with lasting effects. This will involve making staff more concerned about shoplifting. At present, staff members are mainly concerned with sales, and shoplifting has a very low priority, partly because in most cases staff are not aware of it. However, the profits of a store depend not only on maximizing sales but also on minimizing losses and costs. It is desirable to develop some system of incentives for staff to minimize losses.

Our experience with research on shoplifting in Dixons Group stores suggests that in many cases it would be possible, within one hour of visiting the average store, to recommend changes in displays that would cause a significant decrease in the shoplifting of essentials. Some changes might be applicable to all stores. For example, previous research using the counting method has highlighted the vulnerability of open bins and of headphones, leading to the company policy to eliminate open bins and to the development of the new headphone stand.

While it is possible to make redesign recommendations based on experience, recommendations based on one week of measuring shoplifting using the counting method may be more convincing to the store staff. This method is likely to be most cost-effective in relatively small stores in inner-city areas with the greatest shoplifting problems. It would be desirable to carry out further experiments using management trainees. Quite apart from any other consideration, measuring shoplifting by systematic counting is a useful learning exercise for trainees. It makes

them more sensitive to shoplifting and also to wider security problems through their contact with the Security Department.

This research was carried out at minimal cost. If significant financial resources were available, items could be counted over a longer time period. It would be desirable to allow more time initially for training and practice, and a longer follow-up period after the experimental intervention. With more financial resources, trained research assistants could be used rather than management trainees, and reliability checks could be carried out more effectively. Also, a variety of different retail chains could be studied to see how far the results obtained in Dixons and Currys stores are generalizable. In our opinion, it would be cost-effective to invest in a program of situational prevention of shoplifting, focusing primarily on store redesign.

The systematic counting method is labor-intensive and laborious, but it yields valid results in most cases. Eventually, computerized stock control methods might be used to measure shoplifting, but these are currently prone to staff and system errors, and it seems likely that they would have to be used in conjunction with systematic counting of stock. A priority for future research is to devise more efficient and more accurate methods of measuring shoplifting.

Three key issues were not addressed in our experimental project. The first is the prevalence of staff theft and the effect of shoplifting prevention methods on staff theft. We tried to minimize staff theft in our research. The second issue is the effect of shoplifting prevention techniques on sales. This could not be investigated in our research because of the freak weather in the posttest week. The third issue is displacement. Future research should be designed to address all three of these important topics.

Our major conclusion is that the method of crime analysis, focusing particularly on situational prevention, can be used effectively to prevent shoplifting. A larger research program on this topic should help to specify in more detail the conditions (e.g., types of stores, types of area, types of merchandise) under which crime analysis and situational prevention are more or less effective. The cumulative knowledge thus obtained should help to develop guiding theories (such as rational choice), and more detailed prescriptions about crime analysis and situational prevention, so that shoplifting can be minimized.

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