LESS CRIME, BY DESIGN

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'Proxmal Circumstances' now replaced by Conjunction of Criminal Opportunity – e.g. see https://5isframework.wordpress.com/conjunction-of-criminal-opportunity/

ABSTRACT: Design against crime has always existed, but a combination of circumstances has led to its recent take-off. Design seeks fitness for purpose and involves reconciling conflicting requirements, one of which may be crime prevention. The focus in this paper is on design changes to the physical world, whilst acknowledging links with social processes. The aim is to illustrate how design and prevention overlap, not to identify 'what works'. After a review of contemporary 'schools' of design, some of which can be criticised for narrowness and uncertain empirical base, a broader definition of prevention is proposed which allows less restricted exploration of how different types of prevention employ design. The paper then considers the **process** of preventing crime through design, discussing the special difficulties of designing when offenders can fight back. A wider-ranging look, from an ecological perspective, reveals interesting parallels between design against crime and other fields.

Bioline
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A visit to Crickley Hill, near Cheltenham, England, reveals a Bronze-age hill-fort whose entrance is designed to require raiders to negotiate tortuous turns whilst exposed to attack from the ramparts. In the 17th Century, a technological solution arose to the age-old problem of clipping of silver from the irregular edge of hammered coins (a practice which the threat of mutilation had done nothing to deter). The milled edge enabled an unambiguous periphery to be defined. The latest rolling stock on the London Underground has end windows to facilitate passenger surveillance of adjacent cars. Design against crime has always been with us, but its take-off in the last 15 years needs explanation. Several ingredients have come together:

*Freedom of movement and other features of urban life have reduced social control on potential offenders whilst simultaneously increasing opportunities for crime (eg houses left empty all day, automobiles left parked).[i] People paradoxically have to be 'gooder' than ever before to resist the pressure and temptation they are subjected to.

*Narrowly-applied efficiency drives have reduced staff on transport systems and elsewhere, who might otherwise have been available to guard people and property.

*There began a questioning of the effectiveness of the criminal justice system and police service,[ii] whose existence had arguably caused informal controls and preventive efforts to wither ('leave it to the police and the courts').

*The fixation on 'dispositional' explanations of behaviour in terms of individuals' pathology or wickedness ('offenders will always offend'), was supplanted by more 'situational' explanations[iii] ('most people can offend, given the right circumstances, but given **other** circumstances even hardened offenders can be put off'); this allowed people to contemplate altering situations conducive to crime, whether through management or design. Such responses could be focused on highly specific, local crime problems rather than on broad generalities such as 'theft'. While initial ideas for this approach came from North America, research conducted and sponsored by the UK Home Office led to its adoption in the 1980s by the British government.[iv]

*There was a retreat from the Sixties optimism on engineering major social changes to reduce the motivation to offend.

*Design itself has penetrated successively more aspects of life.

Design touches upon virtually every creative act. It is not merely aesthetic after-thought (does the automobile look good?). Rather, it seeks fitness for purpose (does the automobile work?), and in so doing involves reconciliation of conflicting constraints and requirements whilst respecting priorities specified by the user (does it 1) work, 2) work without putting the user at risk, breaking down, or being easily stolen or broken into, 3) at reasonable cost, whilst 4) looking good?). Design usually seeks to shape behaviour in statistical aggregates rather than imposing cast-iron control (except in extreme cases such as preventing aircraft hijacks), allowing that determined offenders will work around it in particular instances.

Crime has affected design in countless ways, many of which will be described below. Conversely, design has been roundly accused of causing crime in its turn, from the infamous Pruitt-Igoe high-rise blocks whose layout was thought to be sufficiently criminogenic for them

to be demolished,[v] to aluminium window-frames that can be quietly prised open.

Crime control and design intersect broadly - whether the design of particular laws to limit certain behaviour without unduly restricting liberty, the design of bullet-proof vests for police, or the design of prisons for surveillance and intimidation [[(even, perhaps, 'convict chic' designer wear)]]. However, the focus of this paper is narrower. On the **crime** side, the central interest is in prevention of criminal events, and reduction of fear and the restricted amenity this may bring (like avoidance of going out at night). With **design**, it covers mainly changes made to the physical world of targets and environments of crime, whilst acknowledging the close links with social processes. The aim is to illustrate how crime prevention and design overlap, to achieve a deeper understanding of what has become a major avenue of crime control. Most examples are drawn from UK experience. This is not a review of 'what works' - these can be found elsewhere [vi]although it must be said that hard evidence from good-quality evaluations is lacking. Indeed, the academic status of the whole 'design against crime' approach is somewhat questionable: at the current state of development it resembles a **craft** more than a science, and one which has not yet attained the status of a discipline.[vii]

The first part of this [paper] briefly reviews the schools of prevention through design that have emerged in the last 30 years. Dissatisfaction with their rather narrow and isolationst approaches leads me to follow my own, less restrictive definition of the field in illustrating how different types of prevention employ design. I then consider the **process** of preventing crime and employing design. Before concluding, I ask what can be learned from the connections, some of them surprising, between design for crime prevention and fields such as ecology.

SCHOOLS OF CRIME PREVENTION THROUGH DESIGN

Over the past 30 years, several schools of crime prevention through planning and design have gained considerable influence, focusing on architecture, housing construction and street layout. Jane Jacobs, in her seminal book,[viii] decried the architectural trends preventing residents from keeping their eyes on the street, and reducing numbers of street users themselves. Such '**natural surveillance**' was one aspect, too, of Oscar Newman's equally-inspirational 'Defensible Space' approach,[ix] alongside **territoriality** (clear demarkation of buildings and land into private and public space, to discourage offenders and to encourage occupiers to defend them), **image** (designing of public housing to avoid stigma) and **environment** (juxtaposing public housing projects with safe zones in neighbouring areas). Building on Newman's ideas, the US government supported a major programme of demonstration projects, resulting in the broader and more eclectic school of '**Crime Prevention Through Environmental Design**',[x],[xi] whose main guiding principle is that design for security should be unobtrusive and reinforce, rather than supplant, 'natural', informal processes of crime control. In the UK particularly, Coleman [xii] identified 15 specific 'design disadvantagement' variables in housing, including high-level walkways between apartment blocks, which she associated with high levels of crime and social breakdown.

The authority of most of these pioneers has been questioned: the research methods and analysis on which Newman's ideas were based were fiercely criticised; [xiii],[xiv] likewise with Coleman.[xv],[xvi] A kind of protracted stand-off arose between those who viewed neighbourhood crime and disorder as mainly caused by social processes (such as child density, housing allocation policies which served to concentrate offenders in residence, estate management and formation of area reputations), and those they excoriated as 'architectural determinists'. The curious thing was, in retrospect, that neither side attempted to mount a study which would simultaneously embrace

both social and design factors, preferring instead to remain each within their own independent domain of theory, method and findings. One exception was a British study,[xvii] which showed in a large sample of public apartment blocks that whilst design did affect vandalism, its influence was swamped by social factors such as child density.

Nonetheless, the inherent simplicity and plausibility of these architectural approaches to crime has enabled them to achieve a degree of influence which may be greater than they merit. And the field continues to develop: Coleman's approach is currently the subject of a large-scale evaluation sponsored by the UK Government; a different perspective, based on geometrically-computed sight-lines and counts of pedestrian flows, is under development by Hillier, suggesting that, contrary to defensible space principles, **segregation** of residential areas encourages crime.[xviii] A less dramatic, but equally useful approach is that by Poyner and his associates,[xix] involving careful observation and analysis of crime patterns in a range of housing estates, showing that layouts seem to influence crime more than the design of the dwellings themselves. However, the findings, while plausible, need to be cross-checked on housing in a wider range of contexts and over longer periods of time.[xx]

THE RANGE OF DESIGN STRATEGIES SERVING CRIME PREVENTION

My own definition of crime prevention is '**intervention in mechanisms that cause criminal events**'.[xxi],[xxii] At the cost of some abstraction, this deliberately seeks to avoid the 'domain' problem of the schools described earlier, being open-ended and inclusive in terms of both types of prevention and causes of criminal events.

The model of prevention built upon this definition does, though, focus on the '**proximal**' (or immediate) circumstances of the criminal event. Such proximal circumstances can be described for every type of crime in terms of an interaction between the **disposition** of a potential offender, and the **situation** in which the crime occurs. In an extension of the widely-adopted 'routine activities' aproach,[xxiii] a criminal event occurs when there is a certain **conjunction of opportunity** comprising:

*a ready, willing and able **offender** and

*a **situation** whose elements are

*a **target** of crime (property or person) that is vulnerable and attractive or provocative

*the absence of willing and able '**modulators**' - people (who may or may not be the victims of the crime themselves) who can take action to forestall the event, to intervene in it or to react after it has happened

*a physical and social **environment** conducive to crime in terms of its logistical aspects (eg facilitating escape, hindering pursuit) and its motivating aspects (eg thin walls between neighbours engendering rows over noise).

Preventive methods can be classified according to which aspects of this conjunction they seek to block, divert or alter. The most fundamental divergence is between **offender-oriented** action and **situational**. Offender-oriented action is divided in turn into **criminality prevention** (changing people's basic dispositions - their motives, morals and emotional reactions) and changing their **current life circumstances** (such as poor housing or debt) which may be

activating those dispositions. On the situational side, prevention can of course involve changing targets, **modulators** and **the environment**. A strategy that bridges the main divide is **exclusion of offenders** and/or their weapons **from particular situations** - for example keeping would-be hijackers and their guns out of airliners.

Design most obviously comes in on the situational side of prevention - but not exclusively so (eg housing can be designed to promote social interaction between residents to support the socialisation of children; and design can enhance the desirability of residential areas to avoid their becoming the last choice of the desperate, thereby concentrating people with problems). And even situational prevention can rely for its impact on mechanisms involving the offender's decision-making[xxiv] based on their perception of risk, effort, reward and their own personal resources such as skills and courage.]

Although situational prevention does employ other strategies such as site management, it is becoming a field of design of its own, as the following brief tour reveals. **Targets** can be hardened - their resistance to breakage or removal enhanced, as with the safe or the anti-bandit-screen in taxis or post-offices. Target-hardening can deter offenders by virtue of increased effort and skill, increased time exposed whilst picking the lock, or increased noise from the sound of breakage. Targets can be removed - as with the replacement of coin-operated telephone boxes by cash-free systems. They can be rendered less attractive through property-marking; less distinctive (expensive in-car entertainment systems disguised with an ordinary-looking cover); or less provocative (some carelessly-designed posters virtually demand graffitti).

Design can also aid **modulators.** A buzzer can remind drivers to lock their vehicle, and central locking can reduce the effort required to do so; likewise, electronic point-of-sale systems in a supermarket can require sales staff to check the customer's credit before the transaction can be completed. People can be helped to intervene by activation of alarms to detect shop theft. Reaction after the event may be made more effective by specially-designed identification systems such as chassis numbering on vehicles or individual-coding of expensive computer chips.

The **environment** - the physical, social and perceived context in which the offender and the modulators act with respect to the target and to each other - can aid either offender or moduator. The **logistical** aspects of the environment can hinder the offender's approach to the target (such as concrete posts preventing 'ram-raiding' of electrical goods shops using stolen vehicles, or more sophisticated access-control systems involving keys or codes); execution (as with the reduction of 'kerb crawling' to pick up prostitutes by blocking vehicular through routes (Matthews 1993)); or escape (as with reducing 'rat runs' - houses set in a maze of alleys). Likewise the logistical environment can be designed to aid the modulators - clearing bushes and improving sight-lines can improve the scope for surveillance. Entry-phone systems can help residents control who approaches their apartment. 'Defensible space' principles give clear guidance as to when a potential offender has crossed the line into private property so action can be taken (although if the principles are narrowly applied, enhanced privacy through enclosure can actually facilitate burglary).

The **motivating** aspects of the environment can also serve prevention. For example, environmental sources of conflict between neighbours - such as thin walls or ambiguous garden boundaries - can be remedied or avoided. More broadly, there may be certain places, such as shopping malls, where it is appropriate to channel young and old users in different directions.

CRIME AND THE DESIGN PROCESS

Situational crime prevention began in a 'solution-driven' state in which fixed means (such as locks and bolts) were applied off-the-shelf to a wide range of problems as they arose, or generalised publicity campaigns exhorted citizens to 'lock it or lose it' [[(which in the case of the notoriously insecure automobile, unfortunately often became 'lock it and lose it')]]. During the 1980s, prevention picked up the message of 'problem-oriented policing'[xxv] in which the choice of solution became subordinated to identification of the precise crime problem to be tackled. Such crime problems are now understood to be highly specific (theft of luggage from airport transit passengers, say, rather than theft in general) and often very local (at a particular airport with its particular clientele, proximity to particular groups of resident offenders and particular physical layout and facilities). The work of the preventer of crime has consequently now come to involve application of a rational sequence of actions known as the 'preventive process'.[xxvi] These involve:

*Collecting information on crimes (eg from local crime records held by police or other agencies)

*Analysing the information to reveal patterns (such as 'hot-spots[xxvii] where particular types of crime frequently occur (such as a market where pickpocketing is common;[xxviii] and interpreting these patterns in the light of familiarity with preventive thinking, local knowledge, site visits and interviews with offenders[xxix],[xxx]

*Devising preventive measures to tackle the selected crime problems in their specific context

*Implementing the measures

*Evaluating their impact on crime, fear and amenity, making adjustments where necessary or abandoning failures

The preventive process, to work properly, requires a body of properly-evaluated crime prevention knowledge, a common technical language and a clear conceptual framework. Unfortunately, none of this is true.[xxxi] Many handbooks are based on common sense and some practical experience at best; at worst they disguise a lack of hard knowledge of both practicality and impact. Formal evaluation of impact, although difficult to do well,[xxxii] is often virtually non-existent. At worst, the demand for good-quality guidance on prevention outstrips supply and 'pop' ideas are sucked in to fill the gap.

This apart, the preventive process is now not very different from the equivalent 'design process'. Some features of the preventive process are common to any kind of design; others are more particular to crime.

Crime prevention as design

Designing crime prevention measures involves the familiar reconciliation of conflicting constraints. Security and fire safety have, for example, often been antagonistic considerations - the one usually aiming to lock offenders out, the other to allow occupants to escape in emergencies (a conflict which has sometimes had tragic consequences). However, even before the freedom offered by the electronic era (with sensors and microprocessors able to serve both functions equally well) unhappy compromise has sometimes been sidestepped by a creative leap: fire escapes in many US cities have the bottom run of steps drawn up, like castle

drawbridges, allowing easy exit but difficult entry.

Design **failures** can be instructive, showing where users' real priorities lie: inconvenient self-locking communal entrance doors to apartment blocks - a nightmare to anyone with heavy shopping - can often be found propped open or removed altogether.
Nowhere is design conflict more marked than with attempts to develop the 'crime free car' - an important task, given (in the UK at least) that over a quarter of recorded crime involves theft of and from vehicles, excluding traffic offences.[xxxiii] A feasibility study[xxxiv] identified a daunting range of design criteria - a gauntlet which each bright new idea for security had to run:

*Cost
*Convenience
*Reliability
*Safety
*Maintenance
*Power supply
*Electromagnetic compatibility
*Design freedom (avoiding constraining other aspects of car design)

Despite these stringent constraints, the study concluded that significant improvements in security in mass-market vehicles were possible and this went on to influence UK government policy in seeking to pressurise and assist manufacturers to follow this lead, as described in a later section.

Beyond the technical and economic aspects, common anxieties about situational crime prevention have focussed on the creation of a 'fortress society' in which ugly and fear-inducing security shutters and bars spoil the environment and reduce social interaction even further. Likewise, obtrusive security in shops can violate the civility of the customer-shopkeeper transaction, perhaps harming trade. However, these are just examples of bad design. Poyner[xxxv] observes how traditional Austrian window-bars and shutters successfully blend aesthetics and security. Obtrusive mirrors at subway corners can be replaced by mirror-finished wall-panels. (This is not to sweep aside all such objections - the balance to be struck between privacy and security in the installation of TV cameras on public streets will remain sensitive.[xxxvi])

It is possible to discern an evolutionary process in design where a new function - such as crime prevention - begins by being bolted on as an ill-fitting afterthought, and ends up fully-integrated and unobtrusive. In the case of the automobile, for example, what began with the 'Krooklok' (a massive lockable hook connecting steering wheel and brake pedal) ended up as a set of authorising and immobilising functions embedded within the vehicle's computer. Sophisticated approaches of this latter kind usually involve an understanding of the ergonomics, subtleties and contingencies of real-life use - drivers who lock themselves out, or are too lazy to remove the keys - and incorporate such human factors into the design.[xxxvii]

[[A particularly challenging design problem is set in the landscaping of England's new urban-fringe 'comunity forests', intended to be accessible to all. Here, a study[xxxviii] which involved taking 'fearful' user-groups (such as young mothers and Asian women) on guided walks into such environments has revealed that the very features which frighten away such users - such as unpredictable changes of view, being out of sight of origin or destination, concealment from other people, and dense undergrowth - make forests what they are, rather than tame urban parks.

(The fear-inducing features of the forest were surprisingly similar to fear-inducing features of urban environments.) Encouraging the fearful without destroying the forest they have come to find may require deliberate but unobtrusive landscape engineering of a kind not seen since Capability Brown designed the grounds of England's stately homes). This is not impossible (for example, guided paths might always offer a marked choice between 'wilder' and 'tamer' branches); however, the limit to design-based solutions may be reached when it becomes more cost-effective simply to boost the number of modulators, by taking on more wardens.]]

The active offender

Offenders sometimes fight back: this bestows a particular quality on crime prevention design. The concept of **displacement** describes the possibility that offenders, blocked in their first choice of target, will not always give up but try different methods of attack, seek similar targets at other times and places, or change to another type of target altogether.[xxxix] If overall crime levels are not actually reduced the gain to society from the investment in prevention is neutralised.

There is no doubting the active, adaptive nature of offending, which sometimes involves a design process of its own. Elizabethan fraudsters had apparently developed 14 different kinds of crooked dice.[xl] More recently, auto thieves, according to police wisdom, will rent a new model to reveal its vulnerabilities (for example, thieves discovered on a particular model whose central locking system relied on compressed air lines, that a tennis ball with a hole cut into it, when placed over a door lock and struck, obligingly caused all the locks to open.) The fruits of such 'professional' research and development may be transmitted to a wider circle of 'amateur' offenders. More sophisticated developments still, involve remote locking devices: simple systems transmitting a single fixed access code have proved vulnerable to electronic 'grabbers' which can detect and mimic the signal; consequently, manufacturers have been forced to create the equivalent of the spy's one-time pad, where the access code resets after each use in quasi-random fashion.

Like the spy too, security systems can themselves be particularly vulnerable to 'turning' into double agents: pickpockets can watch commuters helpfully pat their concealed wallets as they pass a 'beware - pickpockets' poster; in the comfort of their own homes, residents can monitor TV pictures of communal entrances to apartment blocks to see, not which stranger is coming in, but which neighbour has just gone out.

Despite these anecdotal examples, how much displacement actually occurs is unclear.[xli] Whatever the case, the wise designer considers the offender as an active adversary. [[This can involve several strategies:

*anticipating criminals' immediate tactical countermoves, whether from direct experience, from interviews with offenders or employing a 'retired' offender on the design team to try to find vulnerabilities.

*blocking as many such countermoves as possible - for example by designing household security as a holistic package in which there are no Achilles' heels (there is little point in fitting strong locks if burglars can simply kick the weak door frame in). There is a need, nevertheless, to remain aware of diminishing returns and costly 'over-engineering' to counter the professional when most offenders in the particular local circumstances are amateurs.

*acknowledging that even the best preventive measure will have a limited life span.

*designing not to fixed constructions, such as incorporating a particular type of lock, but to performance standards (eg 'the lock must be able to withstand 20 kg of force and to resist expert picking for 20 minutes'). This slows down obsolescence: it gives designers the freedom to devise a range of different solutions rather than constraining them to a single one whose vulnerabilities can quickly be learned and transmitted among offenders. (It also prevents manufacturers from 'designing down' to minimum specifications and thereby absolving themselves from responsibility.)

*in general, considering the causal mechanisms by which the measure works:[xlii] if the measure is supposed to work by heightening subjective risk, is the risk posed plausible?

*setting up a 'learning path' in which systematic assembly of crime incident information can speed up the process whereby designers get feedback on the vulnerability of their products and make suitable adjustments. (For example it rapidly became clear that a superb new deadlock fitted on one make of car could simply be bypassed by extracting the whole assembly with a corkscrew - the designers had neglected to strengthen the mounting.) In this way, products can be kept ahead of most offenders.]]

Inserting crime prevention within the design process

Designers, manufacturers and builders are required by law to ensure their products are not hazardous, especially from fire. Crime prevention has no such powers to draw on, and without explicit efforts to support it, can lose out in the setting of design priorities. Designers may simply be unaware of the opportunity for crime their product has created. If the crime falls on the user (eg the vulnerable car is stolen), they may eventually hear about it; if it falls on third parties (eg the costs of shop theft and dealing with the shop thieves are passed onto consumer and taxpayer[xliii]) only government action or lawsuits will bring it to their attention.

Designers and producers may of course be aware of the problem but can lack the motive to address it, especially if they are striving to control cost in a competitive market. This was the case with automobile security in Britain until the mid-eighties, when the 'crime-free car' study[xliv] began a series of government initiatives intended, not to legislate, but to create a climate in which consumers' choice of model took security into account, design guidelines were developed (through the British Standards Institute) and market forces did the rest. The crux of this process was the publication of the Car Theft Index[xlv] ranking models by risk of theft per vehicle on the road. All this seems to have worked in harnessing car security to the powerful force of competition: British automobile advertisements now regularly feature sophisticated security systems alongside sunroofs and acceleration that really bites - and the public now **expect** manufacturers to have some responsibility for selling less vulnerable cars.

Installing security into products or environments is a continuing process in terms of both motivating designers and helping them do it. Housing now has the benefit of British Standards and a voluntary National House-Building Certificate. The police have a 'Secure by Design' scheme in which specially-trained 'Architectural Liaison Officers' work with designers and developers from the inception of a project; there is also a 'Secured Car Parks' scheme, which attempts to get beyond the 'parking at owner's risk' syndrome. More recent interest has been returning to city planning - the layout of city centres in concentrating rowdy young people, for

example.[xlvi]

[[Planning opens up another dimension to design - the constraints and requirements to be reconciled may stem from different interests. In the shopping mall, for example, young people may want a central place to gather, whilst the old want freedom from noise, jostling and fear; one shop may wish to sell fast food, while its neighbours may not wish to be buried beneath boxes of half-eaten chicken legs. Good design including detailed attention to the layout and siting of different facilities, and good management practices, may enable both parties to be kept happy. There is also a civil-conflict dimension to prevention: clarification of boundaries for example can reduce neighbour conflict. But on the negative side, one household's burglar- or car-alarm can be the neighbours' disturbed nights. Just as problematic, the wealthy in buying security may displace crime onto those less able to protect themselves.[xlvii]]]

Planning crime prevention within a large agency such as the London Underground can be complex: design proposals (say for the prevention of pickpocketing by reshaping platform entrances to reduce congestion) have to be agreed by a range of departments including marketing, tracks, signalling, and railway operating. Where multi-agency collaboration is required to design and implement a scheme (an increasing trend in prevention because the causes of crime and the solutions know no institutional boundaries), the problems can be compounded by differing perspectives, priorities and ways of operating.[xlviii]

A final aspect of the design process worth mentioning is the importance of involving local residents, workers or users in designing preventive measures. Apart from conferring ownership (and hence securing commitment to using the security system installed, and not damaging it), ground-level people often have a local wisdom on the nature of the problem and ways of dealing with it. Locals will also, with some professional help, clarify design requirements and constraints; setting up residents' associations may serve to articulate conflicts of interest that cut across design considerations.

DESIGN IN A WIDER CONTEXT: AN ECOLOGICAL PERSPECTIVE

In the discussion of the design process, examples were given of offenders and preventers engaged in move and countermove in a ceaseless struggle for temporary advantage, with the design of the automobile, or whatever, continually evolving as a result. This resembles other struggles: military (eg the arms race), espionage and counterespionage, the control of disease and pests, and even completely 'natural' struggles such as microbes versus immune system, predator versus prey. Common to these struggles is **protracted conflict between adaptive agencies**. All the struggles (whether they are mediated by rational thought or some other problem-solving process such as natural selection) are pursued through tactics, strategy, and evolution of design. Ecology offers a useful framework[xlix] - the more recent ecology of predator-prey relationships and survival strategies, rather than the ecology of zones used by earlier criminologists.[l]

At some oversimplification, an equilibrium can be approached in which a certain level of crime (or disease, or predation) is the lowest that preventers can achieve when set against increasing cost and other requirements such as freedom and privacy; and the highest that offenders can achieve when set against risk and effort.[li]

In biological evolution such stand-offs can hold for very long periods of time, with predators and prey ceasing to evolve significantly. Only external perturbations such as climate change or

invasion of a new species will tip such equilibria off-balance. In human struggles, however, we are nowadays constantly living on self-disturbed ground. Technological, social and economic change disrupt equilibria or prevent them from ever forming. The classic example, perhaps is the shop.

The evolution of the enclosed, small, well-staffed counter-shop from the open market stall was, for some decades, the culmination of nearly perfect crime-prevention. This near-equilibrium was then completely swept aside by the arrival of the supermarket, which rapidly out-competed the counter-shop except in restricted niches, but which provided much more opportunity for crime.[lii] Owners were able to sustain the consequent high levels of crime for a while because of the **very** high level of sales, - but eventually the security struggle resumed in earnest, albeit in a very different kind of game with store detectives, electronic theft detectors and so forth.

New targets for crime are continually emerging - initial theft rates of mobile phones are extremely high. New tools become available - the cordless drill is a boon to phone-box cash thieves. And new crime environments appear - such as the Automatic Teller Machine.

Crime prevention design can learn from these connections; space allows only a couple of examples. The use of a range of antibiotics is a strategy that doctors employ to slow down the adaptation of pathogens; in crime prevention, the 'design freedom/performance standards' approach mentioned earlier can foster similar variety in preventive measures. Insects adopt warning coloration to speed up the learning process of birds - who rapidly come to avoid the foul-tasting or stinging prey; in crime prevention, increasing actual resistance of targets should be accompanied by signalling to this effect (whether using stickers or publicity campaigns), to reduce the damage from failed attempts. Some harmless insects cheat, by adopting other species' warning colors; in crime prevention, cost savings can be made by restrained use of dummy alarms or speed cameras.

Evolution has been described[liii] as a 'Red Queen's game' (from Alice through the Looking Glass), in which you have to keep running merely to keep in the same place. How, then, to keep up with the adaptive criminal? Several possibilities may help - some have already been covered in the 'process section'. They include: a systematic study of the offender's abilities and resources, incorporating as thorough an understanding as possible within the initial design attempt, thinking several moves ahead; conducting 'crime impact statements' for proposed new tools, trading practices and so on; setting up fast learning paths to remedial design; and building in the possibility for remedy - the information technology upgrade in mobile phones or computers is the model, rather than the slow changes possible in the next generation of houses or cars (the half-life for replacement of the British car stock is 10 years). An example of the initial failure to 'think thief' and the subsequent rapid recovery through remedial design can be found in London Underground's experience of defrauding of ticket machines by 'slugs'.[liv]

CONCLUSION: ACKNOWLEDGING THE LIMITS TO DESIGN

Despite these strategies, the best we can aspire to through situational prevention and the design process is attaining a tolerable, if temporary, equilibrium in which the requirements and constraints of crime prevention are sensibly balanced against those of safety, privacy, convenience and so forth, creatively maximising the scope for having all these desirables simultaneously. This is a worthwhile aim, whereas seeking the permanent elimination of crime

by design whilst ignoring other considerations is a hopeless and distorting goal. Attempts to reduce crime further, particularly in locations where people strongly predisposed to crime reside or visit, are likely to require major efforts on the offender-oriented side, although these may be difficult to achieve.

Most of the examples given in this paper illustrate the role of design in preventing theft, burglary or damage, although some have concerned disorder, nuisance and violence in the street and the workplace. However some crimes, such as domestic violence, are unlikely to be susceptible to design.

Designers against crime should also not lose sight of people - whether participating as users in the design process, or as the material on which the design products are supposed to exert their influence. Natural social controls against crime should be facilitated by design, not supplanted by artificial means which then have to be maintained with continual expense and effort. Design and management-based approaches should be mutually-reinforcing: design making it easier for managers of crime environments (such as shopping malls, public housing blocks or rail stations) to shape situations, to intervene and to react, whether tactically (such as exercising surveillance) or strategically (establishing a learning path to collect incident information, altering the layout of the mall, or commissioning a redesigned ticket machine).

This paper noted earlier that the design against crime field was more craft than scientific criminology. It is worth bearing in mind that some of the most productive developments in the last two centuries have come about through the fusion of technological crafts and academic science, with the practical craftspeople often taking the lead. Provided that dialogue between the two continues to take place, provided that design against crime pursues sensibly limited goals by means which include people and social processes rather than exclude them, and provided that designers adopt a disciplined approach to creation, implementation and evaluation, the future looks promising.

Notes

i. P-O. Wikstrom, "Delinquency and the Urban Structure," in Crime and Measures against Crime in the City, ed. P-O. Wikstrom (Stockholm:National Council for Crime
Prevention, 1990), pp. 7-30.

ii. R.V. Clarke and J.M. Hough, Crime and Police Effectiveness (Home Office Research Study 79, London: HMSO, 1984).

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