

Innovation and Crime Prevention

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SYNONYMS *Creativity, learning, design, adaptation, arms races, co-evolution*

OVERVIEW

The UK Cox Report on creativity in business (HM Treasury 2005: 2), identifies three key interlinked terms:

'Creativity' is the generation of new ideas – either new ways of looking at existing problems, or of seeing new opportunities, perhaps by exploiting emerging technologies or changes in markets.

'Innovation' is the successful exploitation of new ideas. It is the process that carries them through to new products, new services, new ways of running the business or even new ways of doing business.

'Design' is what links creativity and innovation. It shapes ideas to become practical and attractive propositions for users or customers. Design may be described as creativity deployed to a specific end.

Innovation, creativity and design of course occur not just in the scientific and technological domains but in the social, institutional, economic, environmental, commercial and legal. And the business in question could be a criminal enterprise, whether run by a lone, casual thief or the Camorra. Design is covered in Chapter [Ekblom – design against crime] of this encyclopedia; this chapter focuses on innovation and creativity.

Why should criminologists and crime scientists be interested in these concepts? Simply put, there is a dynamic such that innovation regulates both the quantity and the quality of crime opportunities and crime reduction solutions. Examples are given of obsolescent crimes and the process whereby they become obsolete. The metaphor of co-evolution or arms race between offender and preventer is found helpful in understanding the dynamic. It is noted that the consequence of this insight is the relative unhelpfulness for understanding crime trends of statistics of recorded crime, since the same crime label is attached to crimes whose nature and method has changed with the profile of presenting opportunities. The crime drop experienced throughout the Western world in the last decade of the twentieth century is interpreted in terms of a temporary advantage enjoyed by preventers, notably via

enhanced security of motor vehicles. The integration is advocated of this understanding into the crime reduction enterprise, and into the strategy and tactics that follow.

MAIN TEXT

The scope of this chapter/entry encompasses three strands of thought. First, innovation may be taken to refer to deliberate changes in economic, technological and social arrangements in society. These in turn change the supply of opportunities and wider opportunity structures (Clarke and Newman, 2006) for crime; and/or influence the prevalence of precipitating factors such as prompts and provocations (Wortley, 2008) and [this encyclopedia]. Second, innovation may be taken to refer to changes in offenders' repertoire and application of resources (Ekblom & Tilley, 2000), organisational and business models, tactics and strategies for committing crime and actively *generating* opportunities. Third, it may be taken to refer to counterpart changes in crime reduction. Clearly, the three strands are yoked together, with the first opening avenues in the second and requiring responsive changes in the third, which will in turn reverberate back on the others.

Fundamentals

Obsolescence

Given that criminals have a finite amount of time available to offend, new methods and targets of crime must drive out some of the old. Dermot Walsh, in an early attempt to describe the 'obsolescence of crime forms' (Walsh, 1994), distinguished a number of reasons for crime obsolescence (the classification given here is slightly reworked from the original). They were:

1. Legal abolition: legislative changes in permissible sexual behaviour represent the most obvious examples here, with the decriminalisation of suicide, eavesdropping and challenging to fight affording more arcane examples;
2. Court action: Walsh is properly sceptical that claimed effects of court action were real, with the closest to an example he found persuasive being the decline of garrotting (strangling with cord or wire) following the passage of the Garrotters Act (1863) which enabled exemplary sentences. This instance is of course vulnerable to the criticism that legislators, acting when things are at their worst, are condemned to success by the operation of regression to the mean (Campbell, 1969); (Ekblom & Pease, 1995).
3. Changes in Police and Forensic Science: "Forensic science has been most notably successful in thwarting the crime of poisoning. This has been accomplished through the techniques of small sample identification, and through co-ordinated knowledge, which meant that there ceased to be such a thing as an unknown poison" (p152).
4. Economic change: Walsh identifies the shift in transport from horses to cars as making crimes concerned with the market in horses obsolescent. Because of his focus, he omits to mention the corresponding rise in crimes linked to motor vehicles. Safebreaking was deemed a casualty of control of explosives and increased surveillability. The diminished need for companies to keep cash on the premises to pay wages could also have been mentioned.

5. Social change: A less censorious attitude to sexual proclivities and adventures was taken to reduce the scope for offences like blackmail, as well as to the decriminalisation of some sexual acts, as mentioned above.

6. Population density: More contentiously, Walsh claims that increased population density “unfavourably affects the prospects for the commission of some crimes, for example bribery of voters or nomad-related crimes” (p154).

While one may not agree with all Walsh’s conclusions, his work is a useful first review of the association between innovation, social change and crime.

Innovation and crime statistics

The dynamic of innovation and desuetude has, as a little-acknowledged consequence, the relative meaninglessness of some aspects of aggregated crime statistics. This is because the practical actions which constitute offences with the same legal label have changed. At the simplest level the targets of ‘theft’ have changed from, say, pocket watches in the 19th Century to mobile phones in the 20th. More subtly, for example, at one point in time the offence of ‘unlawful abstraction of electricity’, originally associated with consumers getting free energy by bypassing the point at which the electricity supply was metered, had to be used to prosecute some early instances of computer hacking. This thereby illustrates innovation not only by criminals but also by the crime control authorities, faced as they were with agile offenders on the one hand and arthritic legislative responsiveness on the other. The recorded crime landscape likewise changed with the advent of one-to-very-many digital communication, where the techniques of fraud and paedophilic grooming are adjusted almost beyond recognition. With these changes have come huge increases in the number of potential victims (which of us has not received online invitations to profit in exchange for helping to release a bequest held in a foreign bank?), and the scope for joint offending, with illegal encounters being arranged from the comfort of one’s home.

Innovation and criminal opportunity

While ‘criminal opportunity’ is normally considered solely as a property of the *situation*, in reality (Ekblom, 2011) it is an ecological concept, co-generated by the resources of the *offender* to exploit the vulnerabilities, gain the rewards and handle crime preventers. An open window three floors up is only an opportunity to an offender equipped with courage, agility and a ladder. One important kind of resource for innovation is J.J.Gibson’s concept of *affordance* (Gibson, 1979), the ability of some offender (say) to perceive opportunity and utility as they go about their environment (in a terrorist context see Taylor and Currie, 2012)).

To take things further, Clarke and Harris (1992) distinguish between criminals who are opportunity *takers* and those who are opportunity *makers*. This concept is best described graphically in Figure 1, which schematically shows a range of opportunities. At the left end is the perceptually obvious and logistically simple – an easy chance to steal an unattended laptop from a library desk, say. Moving towards the right, the shape of the opportunity becomes progressively less distinct, and progressively more causal preconditions for success have to be actively created by the offender (copy the key, time the guard patrols, prepare an excuse for being in the factory at the weekend...). Here, ingenuity is required to thread the crime technique between tricky multiple constraints and manufacture/exploit numerous

simultaneous or sequential opportunity factors. At the far right, it's not even clear *which* if anything is the opportunity in question – what possible desired criminal event can be made to happen from what manipulable causes. Quite easy opportunities could be hidden in this tangle of possible conjunctions, if only they could be discerned. One can think of talented entrepreneurs spotting a gap in the market that nobody else has. And the difference can also be noted between 'regular earners' – criminal techniques that once invented continue to deliver for some time – versus spectacular 'silver bullets' that can only ever be used once, as with the 9/11 terror attack, where retrospective preventive action ensures opportunities are never the same again.

[Figure 1 about here]

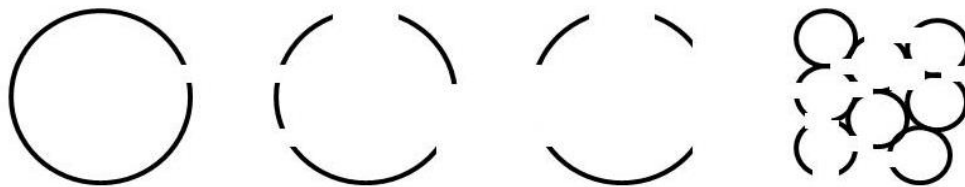


Figure 1 Schematic representation of opportunities in terms of obviousness and effort

One presumes that, as in honest walks of life, there are more creative and less creative criminals. Studies of the former are rare although the issue is dealt with (Cropley, Cropley, Kaufman, & Runco, 2010) (Gamman & Raein, 2010), who draw interesting psychological parallels between criminals, designers and artists (in terms for example of dyslexia). Whatever the proportion of creatives, the dissemination tools of the modern age enable the less well-endowed to pick their brains (and indeed their locks – a quick check on Google reveals many lock-picking sites, and even a lock-pickers' T-shirt!).

In the Industrial Revolution, the advent of machine tools was a bellwether of the 'evolution of evolvability'. A possible machine tool for the next generation of skilled offenders is the 3D printer which can manufacture realistic and effective scanning ports to attach to the card slots of cash machines, or reproduce high security handcuff keys. Another is the 'script kiddie' – computer virus-making kits readily available to empower internet criminals lacking their own expert knowledge to write the source code themselves. In today's open-source, open innovation (Chesbrough, 2003) society, turning the clock back to an era of tools restricted to expert use or confined to professional guilds cannot be envisaged. Preventive interventions have to be put together which have a reasonably long effective life despite criminals' knowledge of their limitations and vulnerabilities, and despite attempts to create countermeasures. The key strategic question then becomes one of how it might be possible to reduce the innovative capacity of offenders whilst building it up with preventers and/or designers.

A consideration of what is truly innovative serves as a counterpoint to the above comments on the flux-concealing nature of crime statistics. The UK government Foresight project

'Cyber Trust and Crime Prevention' (Collins & Mansell, 2004) wrestled with the issue of whether there were ever truly novel kinds of crimes – introduced in that case due to the arrival of the cyber world – or merely familiar techniques in new guises. Was online 'phishing', for example, something entirely novel or merely the latest variant of a familiar 'social engineering' con trick designed to extract personal details from an unsuspecting victim? In most cases the novelty is at the level of technical detail; but at a certain level of abstraction, the 'crime script' (Cornish, 1994)– the organised sequence of actions necessary to prepare, undertake the crime, cover tracks and handle the proceeds is similar. Following on from this, it may be helpful to systematically document changes in the nature and volume of Modus Operandi or perpetrator techniques over time to complement the numbers falling into given legal offence categories.

Offender versus preventer: co-evolution and arms races

Change always presents new crime opportunities, which in turn call forth new preventive responses. There are usually three stages linking new products, and new ways of doing things, with crime. They are

1. Innovation without considering the crime consequences;
2. Reaping the crime harvest;
3. Retro-fitting a solution, usually partial.

This sequence has been common. The Penny Black postage stamp was introduced in 1840 and withdrawn in 1841. This is because it was cancelled by red franking ink, which in 1840 was water-soluble, leading people to wash the franking ink off and re-use the stamp. The Penny Black was replaced by the Penny Red, cancelled by black ink, which could not be washed off. Similar sequences are universally evident, most recently seen in mobile phones and laptop computers, where the mass manufacture of small, anonymous, valuable items, and the complexities surrounding numbers used for their unique identification, meant that they became a target for robbers and in thefts from cars. The magnetic stripe on credit cards was secure until thieves discovered techniques for 'skimming', where data from the stripe on one card is copied without the cardholder's knowledge and placed on another card (to be combined with the cardholder's PIN number, obtained e.g. by 'shoulder-surfing' in the cash machine queue). When silver mining opened up in California, silver was cast into conveniently-sized ingots for transport to the East. These were stolen en route, despite protection by guards. The thefts ceased when the metal was cast in the largest available cannon ball mould. This was conveyed East on unprotected wagons without further problem (Lingenfelter, 1986). Pocket watches were fastened to one's waistcoat by a rigid circular eye around the winder. This was a boon for cutpurses, who could simply snap the rigid eye and make off with the watch. The design response to this involved making the circular eye swivel, rendering it extremely difficult to steal and providing an interesting example of 'target softening'. Daguerrotype photographs can apparently be dated by this change.

The coin clipping example is particularly interesting because of its historical associations, namely that Sir Isaac Newton was Warden of the Royal Mint when recoinage occurred. So the sequence was as above,

first with smooth-edged (hammered) coins susceptible to clipping, the inevitable clipping problems, and replacement by milled edge coins whose well-defined perimeter apparently solved the initial problem. On his first morning at the Mint Newton had to take an oath that

“You shall swear that you will not reveal or discover to any person or persons whatsoever the new invention of rounding the money and making the edges of them with letters or graining or either of them directly or indirectly, so help you God”. (White, 1998 [229])

Unfortunately, the replacement coins were melted down and sold abroad as bullion because the metal commanded a higher price than the value of the coin set by the Treasury. Thieves were also inducing people to give up their old coins at unfavourable rates, then exchanging the old coins for new. Newton instituted official exchange mechanisms and the recoinage eventually succeeded, but it illustrates that solutions to one crime are themselves untested innovations and can reap crime harvests of their own if not well thought through. It also illustrates the iterative nature of innovation, whether by criminals or crime preventers, because human ingenuity and social complexity (Chapman, 2004) hinder getting things right first time and usually engender unforeseen consequences in what may be a ‘complex adaptive system’ of diverse agents each pursuing their own agendas in response to, or in anticipation of, the actions of the others.

A recent example of the neglect-harvest-retrofit sequence is the story of the Europrofile lock. This form of lock is almost ubiquitous in more recently built homes (or older homes with replacement doors) in Western Europe. In time, burglars realised that it could be easily overcome by the use of a wrench or a hammer and screwdriver. Once the protruding elliptical face of the lock is removed, the door will open. This form of attack is depicted through YouTube (another innovation making for communication with the effect of reducing the period between design and crime harvest). The increasing use of the technique in burglary led to the design of hardware devices to make disabling Europrofile locks more difficult.

Arguably the best metaphor for the dynamic linking innovation of crime is that of an arms race, or the process of co-evolution (Ekblom, 1997, 1999). Offenders, over shorter or longer timescales, adapt their methods of attack to circumvent current preventive measures. They do so in several ways:

- Making tactical countermoves in situ – spraying quick-setting foam in car alarm speakers to deaden the sound.
- Turning crime prevention devices to their own advantage – anti shoplifting mirrors work both ways; communal CCTV in blocks of flats has been misused by residents to spot which neighbours are going out, prior to burgling their flat.
- Turning designer themselves and developing tools; perhaps doing sophisticated reverse engineering of locks to understand and defeat the mechanisms of protection.

Preventers in their turn readjust by creating new devices or employing new methods of defence. The offenders then make further countermoves and the process spirals on indefinitely. Safebreaking was one of the examples used by Dermot Walsh to illustrate obsolescent crime. The evolutionary struggle between safe manufacturer and safebreaker was described in more detail by Neil Shover (Shover, 1996). The safebreaker, erstwhile skilled artisan of the crime business, is now an endangered species, if not extinct.

Shover's story of the safe design and breaking 'arms race' can be taken up in the mid 19th century. By the turn of that century, safe cracker skills had required safe designers to turn to manganese steel in safe manufacture by dint of its resistance to drilling and fire. The spread of the oxyacetylene torch left even safes so constructed vulnerable to attack. The next counter-move involved the development of laminated safes with alternate layers of manganese steel and copper, the better to conduct heat away from the point of attack. With safe-cracking by torches effectively rendered obsolete, offender attention switched to the locks, developing techniques to exploit vulnerabilities (sometimes analysed by 'reverse engineering' – careful dismantling of legitimately purchased mechanisms to see how they worked and how to overcome them). In some cases specialist tools to extract an entire lock became favoured. After World War II, carbide and diamond-tipped drill bits briefly rendered the safe walls vulnerable again, forcing manufacturers to develop new laminates, on which most drill bits shatter. The production of ever-more sophisticated intrusion alarm systems placed time pressure on the safe-breaker. Thieves who were unable to acquire expensive electronic equipment and specialist expertise to defeat the alarms had to give up safecracking. In a parallel development, electronic banking meant that many companies kept little in safes, so there were usually slim pickings for the endangered safe-breaker species who had recently invested heavily in specialist equipment (over-specialisation to best exploit what turns out to be a temporary niche or opportunity is a classic route to biological extinction).

But any such 'victory' by one or other side remains forever provisional and precarious. Some new technology, for example, could appear which again tips the scales the other way. Like the frog which has evolved an enzyme which currently manages to protect its skin against fungal attack, society's currently functioning security measures may be just one or two 'mutations' of criminal ideas away from susceptibility. And there are some grounds for pessimism here. To continue with a biological parallel, co-evolution between pathogen and host, or predator and prey, has been likened to the Red Queen's Game, from *Alice through the Looking Glass* – you have to keep running just to stay on the same spot (Ekblom, 2005a; Schneier, 2012). Worse, Schneier maintains that criminals have a natural advantage because they can usually come up with innovations faster than society can invent and deploy theirs; he also refers (p229) to von Clausewitz' 19th century military concept of the 'position of the interior', wherein defenders have to protect against every possible attack, while the attackers just have to find one vulnerability in the defences.

The rate of obsolescence will depend on the kinds of offenders involved and their resources, and the kinds of social and technological changes that occur. And the rate of change is constantly accelerating. This means that the 'breathing space', which society gets from a new preventive method before it is bypassed, is tending to diminish. In the face of this, Cohen, Vila, & Machalek wrote in 1995 that 'contemporary crime control policies are hopelessly static' (p216).

Implications for crime control

If the arms race/co-evolution characterisation of the relationship between innovation and crime is accepted, there are a number of implications for how would-be crime preventers

should act. The first thing is to address the pessimist position just stated. One could take the arms race to mean that coming up with new preventive measures is ultimately futile because, in time, criminals will inevitably find a way to defeat them. At the *tactical* level many crime prevention approaches are undoubtedly a wasting asset (although this applies over a rather longer timescale than conventional displacement, as reviewed in [Chapter X in this encyclopedia]). Nevertheless, they cannot be abandoned. The long term can only ever be influenced via a succession of actions in the short term provided they are intelligently concerted. Led by responses to the rapidity of changes in criminal targets and techniques within the information and communications technology (ICT) world, it is fair to say that the 'hopelessly static' critique of 1995 no longer fully applies, though there is still far to go.

Viewed *strategically*, it must be accepted that crime reduction is *not* about individual innovations and their sometimes limited shelf life; it *is* about maintaining a dynamic imbalance between creativity and innovation by preventers and that by offenders.

In an earlier paper (Ekblom, 1997) it was argued that those responsible for developing crime prevention policy and practice have to recognise the time-limited nature of security products and procedures and learn to cope with innovative, adaptive offenders, changing opportunities for crime and arms races, by *gearing up* to become innovative and adaptive ourselves. (The concept of developing and building innovative capacity among preventive designers and crime prevention practitioners more generally is further considered in Chapter [X Ekblom – Design Against Crime] in this encyclopedia.) Strategies for gearing up include:

- Exploiting new technology for prevention (Ekblom, 2005);
- Avoiding rigidity – where crime changes but the installed security system can't;
- Encouraging variety (in contrast to the 'Europrofile' lock – crack one, crack all);
- Basing the generation of *plausible* variety (ie that which has a good chance of working) on some combination of tested theoretical principles, research into what works at the level of detailed practical methods, and 'think thief' imagination; here, integrated theoretical models such as the Conjunction of Criminal Opportunity Framework (Ekblom, 2010, 2011) and design frameworks such as the Security Function Framework (Ekblom, 2012) can help, where simple slogan-type frameworks hinder the creativity and innovation needed to customise specific interventions to crime problem, evidence of what works, and context;
- More generally getting crime prevention practitioners of all backgrounds and responsibilities to 'draw on design' in generating good quality interventions with a strong chance of being cost-effective, practically implementable and acceptable, durable and devoid of undesirable side-effects; interventions which address the messy and complex nature of the constraints and requirements in crime prevention, and the not-unrelated prevalence of 'implementation failure' in rolling out mass crime prevention programmes;
- Designing products, places, procedures and systems to performance standards rather than fixed technical specifications – enhancing 'design freedom';
- Studying offender resources (Ekblom and Tilley, 2000), current and future, to aid anticipation of what the product and its owner or guardian is up against (resources may be tools, as with a bolt-cutter for defeating a bike chain; skills, such as deft

movements for pickpocketing a music player, or more cognitive and social ones, such as intimidation or distraction techniques; more systematically professional preventers can consult or prepare 'technology roadmaps' to get an idea of upcoming tools for attack);

- Making 'attack testing' the default position in relation to the security of new products;
- Undertaking future proofing – whether of products (Armitage, 2012) or even of laws (as with new drugs designed to circumvent too-specific proscriptions in law, by alteration of some non-functional part of the molecule – the answer here being to describe such drugs generically or even by their mechanism);
- Creating 'pipelines' of new security arrangements to deploy as soon as current ones fail (as with satellite TV revenue-protection encoders, which have the rare advantage of immediate, 'broadcastable' transmission of security upgrades to all users; with the increasing tendency to pervasive computing and networking, or 'chips and wifi with everything', this strategy may become progressively more available to protect all kinds of property, though one can expect offenders to find ways to misuse the facility).

The above strategies centre on crime preventers outracing offenders by innovation of their own, or heading them off by anticipation. But, like Dick Dastardly in the *Wacky Races* cartoons covertly tying an anchor behind competitors' vehicles, it may be possible to thwart offenders by actively disrupting their innovative capacity. In effect, this could be done by turning all that is known about supporting legitimate enterprise and innovation into reverse; or sowing uncertainty and distrust to reduce the level of networking that enables open innovation-type sharing of knowledge and other resources among offenders. Needless to say, this can only be done by subtle design and continuous response to feedback, because it is simultaneously necessary to avoid disrupting legitimate business.

Innovation and the Crime Drop: A Key Issue

The image of the crime/crime prevention struggle as a process of co-evolution is consistent with one account of the crime drop which has characterised the Western world in the last decade of the twentieth and the first decade of the twenty-first centuries. Because the trend is common across nations, it cannot be the result of (divergent) national policies. The account with which it is consistent is the security hypothesis, still modestly characterised as an hypothesis despite its greater plausibility than its rival accounts. The hypothesis (Clarke & Newman, 2006) is that change in the quantity and quality of security was a key driver of the crime drop:

"the one thing in common amongst all these countries, including the United States, is that they have all made a huge investment in security during the past 25 years, affecting almost every aspect of everyday life"(p220).

Jan van Dijk and colleagues (van Dijk, Manchin, Nevala, & Hideg, 2007) independently reached the same conclusion:

“Perhaps a more significant factor inhibiting crime across the Western world is the universal growth in the possession and use of private security measures by households and companies over the past few decades. ICVS [International Crime Victimization Survey] -based trend data on the use of precautionary measures confirm that in all Western countries, without exception, the use of measures to prevent property crimes such as car thefts and household burglaries has risen drastically over the past 15 years.” (p23).

From evidence relating to vehicle theft in two countries, it was concluded that electronic immobilizers and central locking were particularly effective. It is suggested that reduced car theft may have induced drops in other crime including violence. Rival accounts, including demographic or economic change, better policing, gun legislation, the death penalty, lead levels in blood, crack cocaine use, have all been subject to doubt after empirical analysis (Farrell, Tilley, Tseloni, & Mailley, 2008; Farrell, Tseloni, Mailley, & Tilley, 2011). These authors point out that previous analyses focused on crimes of violence. They thereby failed the “phone theft test.” They cannot therefore parsimoniously explain why many crime types fell in the 1990s while others including phone theft and e-crimes increased. They note the (inverse) coincidence of vehicle theft and security measures. Other trends, for example in temporary relative to permanent theft, age of vehicle taken and method of entry yielded a ‘signature’ consistent with the security hypothesis. Graham Farrell and his colleagues plausibly extend their vehicle crime analysis to other crime types, seeing car theft as a debut crime for young offenders, and vehicle availability being the facilitator for many other crime types.

RELATED ENTRIES

Change and desistance, Crime science, Design against Crime, Green criminology, Crime displacement

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