Chapter Two: Theoretical Perspectives of safety and security in transit environments

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Introduction

This chapter discusses the extant theories used to explain safety and security in transit environments, which are set out within the conceptual framework identified in the previous chapter. A number of theoretical perspectives have been developed to explain the prevalence of crime, disorder and associated fear in society. None of these are without criticism, and none have been developed explicitly for the purpose of explaining safety and security on public transport systems. This section examines current security and criminological theories, and ideas and perspectives from other fields and disciplines, to ascertain their utility for explaining safety and security specifically in the context of public transportation. The aim is to translate these theories into an integrated and theory led conceptual framework within which safety and security on public transport systems can readily be examined.

Due to the range of theoretical perspectives evident in the research literature, this text concentrates on those thought as most salient to the major components of the public transport system, namely; *transport nodes and the micro environment*, the stations and stops and their immediate surroundings; *the transport journey*, along transport corridors, lines and routes that connect the *micro* and *meso* environments; and the wider *macro environment* considering the connections between the transport network and the context of the wider neighbourhood and regions that is serves. In addition, it is acknowledged that the transport network receives a range of inputs and outputs throughout the day, including users as possible offenders and targets of crime, and those who may deter crime from happening. Possible victims of crime include people, for example passengers and the peripatetic staff, and infrastructure, both mobile infrastructure such as vehicles, and fixed infrastructure such as stops, stations and

tracks. Therefore the final component of this conceptual framework is to consider this from the *user perspective*.

Theorising safety and security in transit settings

Arguably the criminological perspective most analogous to public transportation systems is crime pattern theory (Brantingham and Brantingham, 1993). This theory consists of three key concepts, nodes, paths and edges. A node is an activity space where people carry out major activities and spend most of their time, for example school, work and leisure. It is suggested that around these activity nodes users will develop awareness spaces, around the settings they become familiar with. On transportation systems the nodes can be considered as the stops, stations and interchanges of the system. The pathways that people take between these nodes, often with a fair degree of regularity are what crime pattern theory terms paths. In the context of transport journeys these are the routes travelled by passengers during a journey, the *en-route* aspects of the transit settings aboard a particular mode of transport, for example a bus, train or tram. The final concept of crime pattern theory is that of edges, beyond which persons are unfamiliar with. On the public transit system the edges can be perceived as the boundaries of the transport environment, where the transport system ends and a different environment begins. However, when considering the whole journey approach these edges may become fuzzy, especially during the walking aspect of any trip.

Around these nodes, paths and edges is an awareness space, a term which applies to both offenders and non-offenders. In terms of explaining crime at nodes, crime pattern theory postulates that offenders will operate within or close to their awareness space. As transport nodes may represent a key component of a person's activity space, it follows that transport nodes may also embody settings with a likely convergence of activities, were potential offenders and targets may meet. A question this raises for public transport is whether offender's activity spaces focus solely on transport nodes and the nearby surroundings, or

whether this extends onto transport routes. Outside of the transit environment the paths taken between nodes by potential victims are, on the whole unrestricted, except perhaps by natural barriers such as rivers, and paths are likely to be walking or driving routes. On a transport system the paths a victim can select are effectively restricted to the layout of the transport network and a number of finite fixed routes. An offender's activity space may therefore extend from activity nodes outwards onto paths, in other words from stops and stations onto buses and trains. Therefore the transit system may itself represent an expansion of awareness space, thus extending possible areas for offending.

Micro transit environments and the transit node

Before the establishment of modern public transportation systems back in 1800, Colquhoun showed how transportation nodes concentrated a large number of crimes triggered by the movement and assemblage of valuable goods in the Port of London. Nowadays, transit environments are no different. They represent the convergence points of the transportation network, and are often highlighted as criminogenic places in the literature. Together with the related consumer services they provide, they create areas of exceptionally high, short-term population turnover, which may create conditions that are particularly rewarding for offenders, as travellers, move through areas they are not familiar with, and thus may be particularly vulnerable to the activities of opportunistic motivated offenders. What makes transit nodes criminogenic, and what the likely explanations for this? However, as with most place based research, not all stations and are high risk, some experience low levels of crime, and hence a fundamental question is why some transit are nodes more susceptible to crime and disorder than others.

Routine activity theory (Cohen and Felson, 1979) is closely tied with crime pattern theory and suggests that the occurrence of a crime requires the convergence of three factors in time

and space; a motivated offender, a suitable target, and the absence of a capable guardian. Within a rapidly moving transport system, there is a constant interchange of potential offenders, possible targets (infrastructure, passengers or staff), and potential guardians. These guardians could include ticket inspectors, police or other security, CCTV, general peripatetic staff, or even passengers. However, due to the dynamic nature of the transit system and the high volume of passengers moving through confined spaces in a relatively short space of time, there may be several favourable opportunities for an offender to come into contact with a potential victim. There is also perhaps a reduced timeframe for a suitable guardian to be present compared with situations outside a transport system, due to the volume and flux of passengers across the network. Passengers may be tired, less on their guard, or unfamiliar with the possible risk of crime on a transport system, and hence a number of potential targets may be present at transport nodes. Therefore, together crime pattern theory and routine activities theory provide some potential insight as to why public transportation nodes may be criminogenic, as they are activity spaces that bring together a convergence of potential offenders, suitable targets and lack of capable guardians, and thus suitable opportunities for crime.

A key feature of many transit nodes, be it stops or stations, is that they have been designed, or redesigned, to incorporate a number of the principles of designing out crime (La Vigne 1997, Cozens 2004, Liggett et al, 2004). Many rail stations in the UK for example, aim to conform to the Secure Stations Scheme, based on the Secured by Design award principles, and managed by the Department for Transport (DfT) and British Transport Police (BTP). Similar efforts have also been made to designing the security of bus stations (DfT, 2002). Examples of design features introduced include sightlines and transparency with no obstacles, natural boundaries and illumination, and removing dark, hidden places and large obstacles that obstruct sightlines and transparency.

Within architecture, planning and urban design, there has been a substantial volume of work into how crime can be effectively designed out of environments. Some of the early origins of this are found in the work of Jane Jacobs and Oscar Newman. Jacobs research into the eyes on the street, later developed by others into what is now termed *natural surveillance*, and Newman's work on *defensible space* were both key to the development of Crime Prevention though Environmental Design (CPTED) and Situational Crime Prevention (SCP). More recently efforts have been made to developing a more theoretical and holistic approach to designing out crime (Armitage and Monchuk, 2011; Armitage, 2013).

Whilst many of the designing out crime principles hold for transport nodes, there are some limitations to be considered. It can be questioned to what extent some of the original ideas of Jacobs and Newman are applicable to transport nodes. For example, Jacobs identified three attributes as necessary to make a place safe: a clear demarcation of private and public space; diversity of use; and a high level of pedestrian use of the sidewalks. There is debate as to whether the high pedestrian usage is indeed conducive to better security at transit stations. Angel's 1968 second level density hypothesis suggests that, once a place becomes too crowded, certain low level crimes such as pickpocketing may occur (Newton, 2014). Newman developed these ideas and suggested urban designers should encourage defensible space, areas within which inhabitants play a primary role in ensuring its security. This is perhaps difficult to achieve in a train station or bus stop environment with a transient population. A further general principle is that boundaries need to be created between public, semi-public, semi-private, and private space. It can be questioned to what extent these distinct boundaries are present or can be created in public transit systems. Therefore perhaps some of these issues of natural surveillance and defensible space should be reconsidered in the dynamics of rapidly changing transit environments. These are key questions that should be

asked by proponents of CPTED, SCP and secured by design prevention measures, when considering the nature of transit settings, and these issues are explored further in Part Two of this book.

A clear finding from the research literature is that a small proportion of all nodes on a public transport system experience a large percentage of all the crimes at stops and stations (Pearlstein and Wachs, 1982; Levine et al, 1986; Loukaitou-Sideris, 1999). This is consistent with the literature on risky facilities (Eck et al, 2007); the majority of crimes at bars, hospitals, schools, and parks for example, are concentrated at only a minority of these facilities. Crime pattern theory and routine activities theory provide some explanations for this, as during their day to day routines, offenders develop particular awareness spaces that they favour, and some stations will be close to these and others not. Thus certain activity spaces are more likely to experience crime than others. Indeed, Brantingham and Brantingham (2005) developed the ideas of crime attractors and crime generators which are also particularly apt to transit nodes. A *crime attractor* is a place affording many criminal opportunities that are well known to offenders. Criminally motivated people are drawn to such locales, thus increasing the number of crime and disorder events. *Crime generators* are places were large numbers of people are present, for reasons unrelated to criminal motivation. As a result of this convergence, new unexpected criminal opportunities are created, which an offender who is present, by chance or routine, may then act upon. It is evident in the literature that transport nodes may act as crime attractors and or crime generators ((Ceccato, Uittenbogaard, & Bamzar, 2013).

What is less clear is whether it is the transport node itself, or what is around the transit station, or a combination of the two, that drives crime at risky facilities. Bowers (2014) hypothesised that risky facilities may act as radiators of crime, the primary driver of risk

radiating risk to the nearby surroundings; or as absorbers of crime, soaking up crime from the surrounding environment. Whilst the study did not consider transport nodes both hypotheses are possible, they key notion is that of an interaction between the transport node and the land uses surrounding it. Block and Davis (1996) found that it is the environs of transit stations that are most at risk for robbery, the areas in the vicinity of transit stations. Transit nodes cannot be considered in isolation from their surrounding environment, particularly considering the importance of the whole journey approach to public transport.

Research has demonstrated that the layout and design of a transport node, and conditions of the nearby surrounding environment, can both influence levels of crime at a transport node. Crime is a result of two dimensions: the environment of the transport node itself (for example, design of platforms, CCTVs, dark corners, hiding places) and social interactions that take place in these environments (for example, poor guardianship, crowdedness) (Ceccato, et al., 2013). Such vulnerability can also be associated with the context in which transport nodes may be embedded (for example, Loukaitou-Sideris et al, 2002). There is conflicting evidence as to whether mixed land use around a station (as proposed by Jacobs) does actually reduce levels of crime, by increasing eyes on the street. An alternative hypothesis is that mixed land use may actually increase levels of crime, a territorial impact that results from a reduction in informal levels of social control (Browning et al, 2010). Therefore the next sections of this chapter consider the wider aspects of the transportation system, beyond the transport node.

The Journey

Safety and security on transport journeys has received limited research compared to studies of transport nodes, not least due to the added theoretical complexities and analytical challenges presented when examining a moving vehicle (Newton, 2004). Whilst transport

nodes are fixed in place, and receive a transient user population throughout the course of the day, a transport journey moves persons and vehicles around a complex system, and rapidly changes in terms of the environments a vehicle passes through, and the users it transports between nodes. Parallels here can be drawn with the research in crime and place in general; there is a wealth of research into the place of crime (Sherman *et al*, 1989; Weisburd *et al*, 2012), but much less attention afforded to the combined spatiotemporal dimensions of crime. There is perhaps no other setting outside of transit systems that experience such rapid change of people and place, thus on transit systems the combined influence of both time and place should feature prominently in any theoretical explanation of safety and security on transit systems.

Hägerstrand's research into time geography offers a potential framework to consider transit journeys, as this incorporates movement in both time and space. The discrete activities of individuals are mapped in sequential order over both time and space, by constraining each activity by a discrete unit of time and place. Therefore, it is possible to segment a transport journey into sections, modelling this into a series of discrete journeys defined by start and end times and a linear space. There has been limited research into hot routes (Tompson et al 2009) and hot segments (Newton, 2004; 2008; 2014). Part Three of this book seeks to explore these issues in further detail.

Crime pattern theory and routine activities also provide a useful perspective for examining crime on transport journeys. As discussed previously, the fixed nature of transport journeys may extend the activity space of offenders from outside their usual nodes onto transport routes that radiate out from, or move back to activity nodes. The transport network has the potential to shape activity spaces, and therefore it is perhaps not surprising that concentrations of crime are evident on the network at particular locations, especially during

peak travel times. An individual's knowledge and awareness space is developed during their daily and weekly routines. Taking this further, there may be particular routes and journeys regularly frequented by a passenger and or an offender, and thus these sections of the transit network would form their awareness space, particularly for commuters. However, by its nature transit systems may also carry persons to unfamiliar places, thus whilst they may begin in a familiar transit setting, they may be exported through less familiar locations during the transit journey.

Tobler's first law of Geography states "*everything is related to everything else, but near things are more related than distant things*". When considering this temporally, this may imply that what is closer in time is more important than what is further away in time. Applying this to crime on transport journeys using time geography, near can be represented both in time and space, and the environment a vehicle has most recently passed through, the environment it is currently in, and the environment it is travelling to next, are likely to be most relevant to crime risk, rather than earlier or later stages of a journey.

The absence of a capable guardian has been shown as influential in the occurrence of crime. Recent work by Reynald (2010) suggests a key factor for capable guardianship is a willingness to intervene. Persons are more likely to be willing to intervene and prevent a crime when they are in a place they know well, and are familiar with who is there and the context of that place. On a dynamic and moving transport system it can be argued potential guardians are less likely to intervene than if they were in their own residential neighbourhood. Even regular commuters who travel a journey frequently and know it well, are susceptible to unfamiliar elements, in that many other passengers who travel will not be known to them, and there is no control over who may board a vehicle at the next stop or station. Both of these factors reduce the likelihood of a guardian acting to prevent a crime on public transport.

There has been limited research into the extent to which offenders use transport routes as part of their journey to crime, or to actually offend on transport routes. A fundamental question here is whether, and, if so, how and to what extent do offenders use public transport as part of their journey to crime, or as a place for committing crime. If offenders do use transit systems as part of their journey to crime, are they: attracted to particular locations where they expect there will be good opportunities for crime (crime attractors); or do transit systems form part of their routine activities, and simply though this movement they come into contact with potential targets in what are deemed profitable yet unplanned crime opportunities (crime generators). There has been some limited research into an offender's use of transit systems; Belanger (1997) found more offenders travel within their own borough to commit crimes; Smith and Clarke (2000) found that offenders use transit systems to commit crime in central business districts and rarely travel to suburban areas outside of their own localities. Both of these are consistent with the literature on journey to crime and crime pattern theory. Offenders tend to commit offences near to their activity nodes, and there is a distance decay effect, as you move further away from these nodes the less crime there is (Clark and Eck, 2005).

The meso and macro settings

A natural function of public transport systems is that there is an interaction between the transport nodes and their surrounding environs. This relationship between the micro environments of a transit node and their nearby environs, can also extended by considering the interaction between a transit system network and its macro setting, in other words the wider neighbourhood, city or region that it serves. Whilst this is not something explicitly examined by any current theoretical perspective, there are a range of ecological studies that can perhaps help to explain these interactions.

A large body of work into the ecology of crime originated from the Chicago School, and a number of theoretical models of crime have been developed that examine the relationship between crime, society and the environment. An early proponent of this was the Burgess concentric model developed by Park and Burgess in 1925 (Byrne and Sampson, 1986) which divided cities into a number of zones based on ecological niches of similar characteristics and ecological pressures. Starting with the central area, the central business district (CBD), and moved, the zones are the industrial zone, the working class residential, the residential, and the commuter zone. This model was viewed as evolving, as people became more affluent they moved out from the city centre and lived more on the periphery. Interestingly the second zone, in which it was suggested most crime and disorder problems occurred, was also named the zone of transition, or the interstitial zone. Whilst this model did not incorporate transport networks, there are two points worthy of note. The first is that the zone of transition was identified as the most problematic for crime and disorder. The second feature of this model is that although public transport networks are not included, it is conceivable in this model that transport networks could carry passengers between the different zones, and quite possibly into zones outside of their usual activity spaces, into zones and areas they are less familiar with.

Shaw and McKay, in 1942, used maps to examine spatial variations crime and delinquency, and building on the work of Park, Burgess and others at the Chicago school they developed social disorganisation theory (Byrne and Sampson, 1986). This argues that neighbourhoods that are socially disorganised are more likely to experience crime, and that despite the growth and development of cities it was zone two, the transition zone that tended to remain problematic. They identified three primary features present in this zone that increased the risk of delinquency; high rates of residential turnover, a heterogeneous population, and high levels of poverty. It can be argued that these characteristics are also found on public transportation

systems. The ridership (user population) of many urban transit systems and nearby surroundings experiences a constant turnover, users are extremely heterogeneous, and, in many cities users are those with low incomes.

Sampson, Wikström and colleagues have conducted detailed studies into crime at the neighbourhood level, and their research focussed on what they term social cohesion and collective efficacy (Sampson and Wikström, 2006). They argue that neighbourhoods that lack social cohesion and collective efficacy are more susceptible to crime, and particular risk factors they identify include lack of community involvement, lack of supervision, and a reduced level of friendship, trust and social networks in a community or neighbourhood. Again many of these factors can readily be transferred onto public transit settings. Situational action theory, proposed by Wikström (2005) also seeks to explain the link between individuals and their environment, through a single explanatory framework. This general theory of crime is a framework comprised of four features, a person, a setting, a situation, and an action. This was developed through a large-scale extensive longitudinal study of young people called PADS, although the research findings do not explicitly refer to public transport systems. It contends that that all actions may be seen as the outcome of; any alternative actions a person perceives in a situation; and, the actual action choice that they make. As this research was based on an extensive study of young people, two questions arise. Firstly, will the situational actions of different users of public transport such as the elderly or those on low income or those with disabilities be different to those of young people. Secondly, does public transport present a distinct set of situations unique from other non-transport environments?

Evolutionary psychology is an alternative and direct study of the relationship between an environment and how that environment affects its inhabitants. Within this field behaviour, criminal or otherwise, is a product of psychological mechanisms combined with environmental inputs that activate or inhibits actions. This is flagged here as it is currently a

process that is becoming more active within safety and security research and provides a heuristic framework to examine both individuals and environments. However, at present the authors are not aware of any studies that use this technique to study transit settings.

The user perspective

In addition to understanding crime prevalence on the different components of the transport journey, it is also important to consider the perspective of the user when examining crime, disorder and associated fears. Therefore this section focusses on individuals rather than the transport system itself. An important aspect of crime on public transportation is that of fear crime has been shown as a possible limiting factor to travel. Whilst there has been a large volume of research into both perception and fear of crime in general, there is a paucity of studies that apply this research specifically to transport systems. Some noticeable exceptions include Atkins, 1990; Cozens, 2004; and Smith 2008. These are explored in more detail in Part Five of this book.

From the perspective of the offender, two useful theoretical standpoints are situational precipitators of crime (Wortley, 2008) and rational choice perspective (Cornish and Clarke, 1986). Both of these link to crime opportunity, but they separate two distinct stages of committing a crime. Situational precipitators are forces that ready an offender to commit a crime, and these happen temporally in a sequence. They are the precursors for rational choice, which then translates this readiness to commit a crime into actually deciding to carry out an offence. It is suggested that crime prevention should focus equally on both situational precipitators of crime and on the determinants of rational choice. On a transit journey there are a number of stresses and pressures an offender may experience, which are all precursors to a crime, and place the offender in a state whereby they are willing to commit and offence. The secondary stage here is to make a rational choice to commit an offence. Rational choice perspective suggests that an offender will weigh up the risk and potential rewards of a crime

opportunity, before deciding whether to commit an offence. This theory has been used within crime prevention literature as a mechanism for reducing crime opportunity by increasing the effort, increasing the risk, reducing the reward, removing provocations and removing excuses.

Outside of the transport system, two of the clearest findings from current crime surveys and research are that more people feel at risk than are likely to fall victim to crime and fear is only weakly correlated with personal experience of victimisation and actual crime rates (Jackson and Gray, 2010). As a result of this a number of studies have looked for alternative theoretical explanations of fear. The strongest relationships identified for fear are with concerns over neighbourhood disorder, social cohesion and collective efficacy (Wyant, 2008). Social stability, collective informal control, and other day to day concerns such as poor community spirit, low levels of cohesion and trust for example, have become synonymous in the public mind with issues of risk of crime and the breakdown of neighbourhoods. A complimentary theoretical standpoint is that personal vulnerability is also important; an individual's perception of the likelihood, control over, and consequence of victimisation will operate in conjunction with social and environmental influences. Indeed, there is a multi-dimensional assessment of risk; whilst an offender may make a rational choice about the likelihood of success in commissioning a crime, a victim may make an assessment of perceived susceptibility (Farrall et al., 2007).

These three perceived risks, a belief that certain individuals or groups of individuals are more likely to be identified and targeted by criminals, that they are less likely to have control over situations, and that might have more serious consequences, will affect certain groups more than others. Indeed, Hale (1996) suggests three vulnerable groups here are those on low income, females, and the elderly. As these three groups are all often reliant on public transit systems, this suggests that these individuals may feel a sense of heightened risk from both an

individual assessment and an environmental influence. Therefore measures to reduce fear should attempt to address fears and negative perceptions shaped by both individual risk factors (likelihood, control and consequences of victimisation) and the environmental cues present within transport systems.

A recent consideration for users of transit systems is the increasing role that technological innovation plays in transit journeys. There have been significant improvements to travel information in real time recently, assisting a traveller to negotiate their way through a sometimes complex transit system. However, there has been little attention afforded to whether this increased information also reduces passengers concerns over safety and security (Beecroft and Pangborne, 2014). Moreover, as this information becomes more mobile, there may be new opportunities for crime, such as the increased use of mobile phones on transit systems, the potential to utilise other forms of smart payment to travel fraudulently and perhaps even the impact of social media on perceptions of risk.

There are two theoretical areas that may be useful here. The first of these if the use of crime forecasting, tied into the literature on secured by design. As new technology is introduced consideration of safety and security should be included in the design phase of new product development, not added on afterwards as an afterthought once criminals have exploited this new technology. A second dimension is one used in the research literature for cybercrime, an exponentially growing crime problem. A useful distinction drawn here is the difference between *cyber-enabled* crime and *cyber-dependent* crime. The first are traditional crimes which can be committed without the use of ICT, but have become enhanced through the rapid exponential growth of ICT, such as fraud. The latter are crimes which can only be committed using ICT. This way of thinking, of transit enabled and transit dependent crimes, could potentially be adapted as a possible categorisation of transit safety and security.

Crime Science (Junger et al, 2012) is a relatively recent concept, and can be said to contain three distinctive elements, it is multidisciplinary, it uses scientific methodology rather than social theory, and it focuses on crime rather than criminality. A question here is what does a crime science of transit safety and security look like? Perhaps a more critical question is can the social aspects of transit settings be incorporated as part of this science, as transit systems contain an inherent interaction between individuals and environments, of rapidly changing settings, of potentially vulnerable users, of a low rate of capable guardians per passenger, and a system were traditional analytical techniques such as the spatial analysis methods used to examine crime in street and grid based settings may actually not be so applicable to transport networks.

This chapter has examined theoretical explanations of safety and security, to examine their potential application for understanding public transit environments. This was investigated using the conceptual framework and structure of the book, as was set out in Chapter One, namely: (2) transport nodes; (3) transport journeys; (4) transit settings in relation to their wider environment; and (5) the perspective of the user. Each of these is now explored in more detail through empirical studies, in sections two to five of this book.

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