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PRESENT IN
YOUR FUTURE:
PATHWAYS
TOWARD A NEW
GENERATION OF
CRIME RESEARCH

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COLOFON

Prof. Dr. Jean-Louis van Gelder (2018)

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PRESENT IN YOUR FUTURE: PATHWAYS TOWARD A NEW GENERATION OF CRIME RESEARCH

On January 16, 1904, a young local mailman in the town of Berkeley, California managed to avoid a potentially lethal collision between a runaway flatcar laden with bricks and an incoming passenger train. Having become something of a local hero, August Vollmer was asked to run for town marshal. He accepted and managed to transform the marshal's office from a small corrupt group of people that collected graft from gambling houses and opium dens into a professional police organization. He was so successful at it that over the course of his life he would be invited to reform several other police forces inside and outside the United States. His lasting influence on policing would earn him the reputation of "father of modern law enforcement" (Oliver, 2017).

Aside from an impressive career with the police, Vollmer also had a remarkable academic career. He was extremely well read and started to apply scientific insights to police work, a revolutionary idea at the time. Even though his own education was limited to a few years of elementary school, he was asked to teach criminal law at the University of Chicago and later also at UC Berkeley, where he would establish the first school of criminology. Soon already the visionary Vollmer realized the possibilities that technology had to offer to police work. He started working with UC Berkeley's engineering department to put radios in police cars. He was also the first chief of police to use fingerprints to identify suspects, initiated a centralized suspect registration system, and pioneered the use of lie detectors to name but a few innovations. Vollmer was not just interested in technological innovation; he was also ahead of his time in terms of his social ideas. He insisted on the humane treatment of prisoners, supported programs for disadvantaged children, and he was among the first to hire African American and female police officers. He was, in a nutshell, a true high-tech, human touch innovator.



Figure 1. August Vollmer at his desk

Taking the great Vollmer as a source of inspiration, I have divided this inaugural lecture into three different acts, dealing with innovation in terms of theory, method, and application respectively. In the first act, I will lay out my views on the current state of theory and research on criminal behavior. This act details how past theorizing on criminal conduct has shaped the current state of the debate. I will propose a new theory of criminal behavior that synthesizes findings of decades of research and integrates existing theoretical perspectives. Subsequently, in the second act, I will discuss methodological innovation and detail how novel technology is paving the way for a new generation of research into crime and public safety. In the third and final act, I will deal with the application of science to practice. I will conclude with how theory, method and application are in fact intimately related in the research program we are developing and that the past indeed is present in the future.

ACT 1 THEORY

DISPOSITIONAL AND SOCIOGENIC PERSPECTIVES

My main topic of study for roughly the past decade has been criminal behavior and related areas of public safety, such as risk and victimization. This field of study is generally regarded as belonging to the domain of criminology, which seeks to understand which individuals engage in crime, why, where and when they do it, and what is and could be done about it. It derives its input for addressing these questions from a variety of scientific disciplines such as law, anthropology, political science, geography, economics, sociology and psychology. Yet, in spite being inherently multidisciplinary, criminology is really the brainchild of two parents, psychology and sociology.

Sociology, traditionally the field's dominant parent, has provided criminology with its ability to understand how social and contextual factors and structural antecedent conditions relate to crime. It also contributed to its understanding of how factors such as social disorganization, differential association, and (sub)cultures exert their influence on criminal behavior and crime rates. Thanks to sociology we have come to learn much about how impoverished backgrounds, unemployment, delinquent peers, exposure to harsh and unpredictable parenting, single-parent families, and coming from a high crime neighborhood are all key factors that increase the likelihood that an individual will turn to delinquency. Sociology also taught us that there is a relation between age and crime that holds over time and space, that crime tends to decline with age after peaking during adolescence and early adulthood (Hirschi and Gottfredson, 1983), and that victims of violence are relatively more likely to commit violent acts themselves and vice versa (Jennings, Piquero, and Reingle, 2012). Thanks to sociology we also know that males commit much more crime than females, that a relatively small percentage of offenders are responsible for a large share of the crime problem (Wolfgang, Figlio & Sellin, 1972), that crime tends to concentrate in specific areas (Weisburd, 2015), and that the traditional correlates of delinquency have not changed significantly over time (Laub, 2004; Hirschi and Rudisill, 1976). I will refer to this parent of criminology as the 'sociogenic view' on crime.

From psychology, criminology's other parent, the field has inherited its ability to identify individual differences related to delinquent and criminal conduct. Psychological research has shown that individuals differ in their propensity to engage in criminal acts, net of sociogenic factors such as opportunity, context or victim (Eysenck, 1996; Joliffe & Farrington, 2010). For example, we know that lacking empathy puts youngsters at risk of crime and that personality traits such as low integrity and agreeableness, and high psychopathy and machiavellianism are related to different types of unethical behavior (Lau & Marsee, 2013; Miller & Lynam, 2003; Van Gelder & De Vries, 2012, 2014, 2016). The most robust correlate of criminal and other types of antisocial behavior this research has yielded is the tendency to disregard the long-term consequences of one's actions (Gottfredson & Hirschi, 1990; Moffitt, 1993; Wilson & Herrnstein, 1985). This disposition is variously referred to as (low) self-control, sensation-seeking, inability to delay of gratification, present-orientation, (low) conscientiousness and impulsivity. We have also come to learn that some of the very same personality traits that are related to criminal behavior are also predictive of a host of other self-defeating and risky behaviors such as gambling, smoking, substance use, overspending and risky sexual behavior (Clarke, 2006; Steinberg et al., 2009; Zimbardo and Boyd, 2008). Furthermore, research in this tradition has shown that impulsive children and adolescents are not only likely to commit crime but also do worse in school and have worse career prospects than those who are not (Tangney, Baumeister & Boone, 2004). I will refer to this psychological parent of criminology as the 'dispositional view' of crime.

Criminology, the prodigious child of a mixed marriage, has made tremendous progress over the course of its relatively short disciplinary history. The field has uncovered numerous risk-factors rendering individuals vulnerable to a life in crime and identified many situational features that make crimes more likely to occur. It discovered what offender characteristics are most predictive of which type of crime, and identified factors rendering it more likely for offenders to abandon a career in crime. Literally hundreds of correlates of criminal behavior, both at the dispositional and sociogenic levels, have reliably been identified. Less progress, however, has been made with advancing our theoretical understanding how these correlates themselves may be patterned, i.e., whether and how they are related, and the pathways through which they operate on crime. One of the main challenges currently facing researchers,

therefore, is how to connect these dots, in order to get better view of the larger picture of the causes and correlates of crime.

THEORETICAL LANDSCAPE

Among the most prominent theories or schools of thought in criminology are strain theories, control theories, social learning perspectives, social disorganization, cultural deviance, perceptual deterrence, rational choice-based perspectives, and life-course theories (see also Kornhauser, 1978). These different schools of thought commonly aim to provide general explanations of crime and most of them have been around for at least several decades, some even for over half a century. Most tend to emphasize the importance of sociogenic factors in crime causation although hybrid forms containing both sociogenic and dispositional elements have also been proposed (e.g., General Strain Theory, Agnew 1992, 2006). It is interesting to observe that empirical tests of criminological theories indicate that the average level of explained variance in studies is just below 40%, with a quarter of all studies explaining less than 20%, and a trend toward less explained variance over time (1968-2005) (Weisburd & Piquero, 2008). These figures, on the one hand, signal substantial empirical overlap between theories. On the other, they reveal that current theories are relatively weak in terms of their ability to account for the phenomena they try to explain. Nonetheless, important exceptions aside, there has been relatively little productive engagement between theories, and empirical research still often progresses within the confines of a single school of thought. Furthermore, even in the absence of convincing empirical support, theoretical perspectives have persisted over time (Cullen, 2011).

In short, although criminology is empirically vibrant and theoretically rich, its greatest strength, diversity, may also be its Achilles heel due to the risk of theoretical and empirical fragmentation (Wikström et al., 2012). The field is in need of an integrated and unifying theoretical framework. This requires bridging the divide between dispositional explanations and sociogenic perspectives, and given the empirical overlap between theories, identifying what underlying characteristics they have in common. In recent times, there has been a trend towards more integrative approaches. Risk-factor and life-course perspectives have been critical in this respect by demonstrating complementarity between dispositional and sociogenic approaches (Farrington, 2010; Laub & Sampson, 2003; Moffitt, 1993).

My objective is to take the next step in theory development. Rooted in my early work together with Reinout de Vries on trait-state models of criminal decision making, I have gradually become convinced that dispositional and sociogenic perspectives may be more than complementary. They may, in fact, be symbiotic, as each offers something that the other needs. As I will explain in more detail later, my own approach to understanding this relation is based on the assumption that sociogenic factors must ultimately operate on criminal behavior via psychological pathways. My theoretical agenda is therefore dedicated to theory building from an interdisciplinary perspective. It will draw from rich traditions in criminology, yet it will extend such perspectives by incorporating insights from other fields, such as evolutionary, developmental and cognitive psychology and behavioral economics, which are still relatively uncommon in crime research.

TIME FRAME THEORY

Over the past years I have been developing a theoretical perspective explaining crime. The theory, which I have come to term Time Frame Theory (TFT) for reasons that will become clear shortly, is premised on the well-established notion that crime generally carries immediate and relatively modest benefits (e.g., thrill, fast cash, excitement), whereas its costs are more remote and tend to outweigh the benefits (e.g., sanctions, getting expelled from school, having a criminal record) (e.g., Gottfredson & Hirschi, 1990). Consequently, those who engage in criminal behavior tend to be notoriously shortsighted individuals opting for immediate gratification to the neglect of the more distal consequences of their behavior.

Although recognized as a fundamental dispositional predictor of criminal behavior and comprising the essence of two of the most influential theories in criminology (Gottfredson & Hirschi, 1990; Wilson & Herrnstein, 1985), I think the nature of shortsightedness i.e., the inability or unwillingness to consider the long-term consequences of one's actions, is yet to be fully understood. Dispositional perspectives, like Gottfredson and Hirschi's self-control theory, perceive shortsightedness as a stable individual trait that is relatively impervious to change after childhood or early adolescence. TFT, in contrast, posits that shortsightedness can vary over time and fluctuates as a function of exposure to social environments (e.g., rough neighborhoods, delinquent peers), events (e.g., school expulsion, incarceration), and specific experiences (e.g., alcohol intoxication, sexual arousal, and intense emotions such as anger or rage). Specifically, TFT

postulates that short-term mindsets are the principal conduits through which such criminogenic environments, events and experiences identified by sociogenic perspectives operate on criminal behavior.¹ Furthermore, and also contradicting dispositional perspectives, TFT argues that the relation between shortsightedness and criminal conduct may be reciprocal rather than unidirectional in nature. That is, short-term mindsets may not only lead to criminal conduct, but engaging in crime and living a criminal lifestyle can also further reinforce such mindsets, resulting in a vicious cycle that keeps delinquents locked in a life of crime (Figure 2).

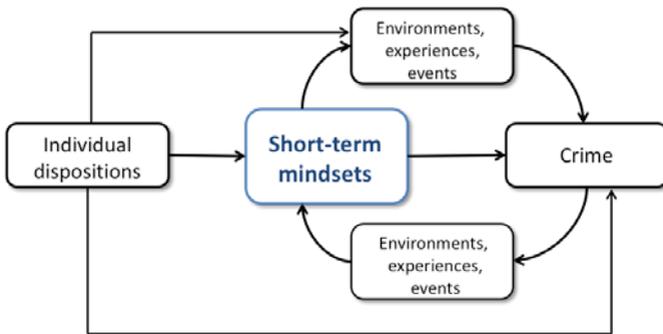


Figure 2. Graphical representation of Time Frame Theory

In other words, whereas dispositional perspectives have drawn attention to the importance of short-term mindsets in the explanation of criminal behavior, they have not fully incorporated the extent to which such mindsets may also be affected by criminogenic environments, events and experiences. Sociogenic views, in contrast, have overlooked the possibility that such contextual factors may influence crime precisely because they encourage short-term mindsets. Thus, according to TFT, the dispositional and sociogenic view on criminal behavior share a similar underlying mechanism: short-term mindsets. Such mindsets provide the principal explanatory dynamic of the person-environment interaction in crime causation, i.e., the axis around which it revolves. As such, if it holds up to empirical scrutiny, Time Frame Theory could form the basis for a unifying paradigm in criminology, the connective tissue linking the sociogenic with the dispositional view.

¹ Note that I deliberately use the term *short-term mindsets* to avoid connotations that other more often used constructs, such as *self-control* and *impulsivity*, carry and to emphasize the temporal nature of the construct.

By way of illustration, consider how TFT can both link and extend two dominant paradigms in criminology: life-course perspectives and self-control theory. In line with life-course approaches, TFT argues that delinquent development is for a substantial part shaped by an individual's social context and that the potential for change is not limited to a "sensitive period" early in life but can occur throughout the life span (Blokland & Nieuwbeerta, 2010; Farrington, 2010). However, extending such approaches, TFT explains not only that certain contextual factors lead to crime but also why this is the case by specifying the mechanism through which they operate. Congruent with self-control theory (Gottfredson & Hirschi, 1990), TFT argues that shortsighted individuals select themselves into environments that match this characteristic. However, whereas self-control theory argues the relation between context and crime is spurious as a common characteristic, self-control, underlies both, TFT assigns causal properties to both disposition and context.

Time Frame Theory can be summed up in a series of testable hypotheses that can explain crime onset, persistence and desistance. First, in terms onset, TFT posits that both dispositional and contextual variables can lie at the basis of short-term mindsets. With respect to contextual variables, short-term mindsets are hypothesized to mediate the relation between contextual factors and crime. More specifically, factors such as rough neighborhoods, harsh and erratic parenting, and delinquent peers are hypothesized to predict crime at least in part because they encourage short-term mindsets. Shortsightedness can even vary on very short timescales. Alcohol intoxication, sexual arousal and intense emotions, all of which are related to crime in important ways, are known to sap the brain's executive function, impair self-regulation, and confine attentional capacity to the immediate present (Hofmann, Friese and Strack, 2009; Loewenstein, 1996; Steele & Josephs, 1990; Van Gelder, 2013). All three factors, in other words, are prime triggers of short-term thinking and impede taking the long-term view.

TFT explains the persistence of crime in terms of the tendency of shortsighted individuals to be selected into environments that impede long-term thinking. This plays out in two fundamental ways. First, short-term mindsets are hypothesized to increase engagement in activities such as substance use and associations with delinquent peers, which, in turn, reinforce such mindsets. As borne out by ethnographic work on persistent

offenders, these individuals lead a lifestyle that gets them involved in situations conducive to law breaking and thereby create 'an environment of pressures' that perpetually guides them back to crime (e.g., Lofland, 1969; Topalli & Wright, 2013). Second, formal responses to criminal conduct, such as expulsion from school, public labeling of deviants, and the imposition of (prison) sentences, also reinforce short-term mindsets. That is, congruent with several established theories of crime, such as social control theories (e.g., Hirschi, 1969), labeling perspectives (e.g., Becker, 1963) and life-course frameworks (e.g., Laub & Sampson, 2003), expulsion, labeling and incarceration are assumed to increase the probability of future crime because such interventions inadvertently increase self-organization into delinquent peer groups, weaken social ties that could have provided restraint, and cut off access to legitimate jobs and education. Different from these perspectives, however, TFT explains these findings in terms of the tendency of such factors to impede long-term thinking.

Finally, TFT can explain the effect of factors associated with desistance from crime identified by life-course theorists, e.g., satisfying work, stable relationships and having children. The shared characteristic of these different factors is the ability to instill a future orientation in individuals. In sum, the contexts delinquents grow up in, the formal responses to their conduct, their own risky behavior, the friends they choose, all tend to have one thing in common, the tendency to think in short-term time frames. The events that lead to desistance, in contrast, do exactly the opposite by promoting taking the future (consequences) into account.

Importantly, because short-term mindsets are not only predictive of delinquency but also undergird a variety of other risky and self-defeating behaviors, including alcohol and drug abuse, gambling, risky sexual behavior, and overspending, TFT offers relevant input for understanding these behaviors as well. Furthermore, improving the ability to instill a long-term orientation may be crucial in the context of a variety of institutional and societal challenges. For example, there are indications that short-term thinking also underlies banking scandals, rogue trading and corporate fraud, macro-level corruption, unemployment rates, and country-level aggression and violence. Conversely, long-term thinking and the ability to exercise self-restraint have been associated with a range of positive outcomes and behaviors, such as pro-environmental attitudes and conservation efforts, personal well-being, academic success, better

relationships and reduced pathology, most if not all of which are negatively related to criminal conduct.

TESTING THE THEORY

Recently, I was awarded an ERC Consolidator Grant to test TFT. Together with postdoc Ivy Defoe and PhD student Jeanette Hadaschik, I will empirically test the theory using data from the z-proso project, an ongoing longitudinal study that follows a large sample of Swiss urban youth, continuing work I have started several years ago together with Margit Averdijk (e.g., Van Gelder, Averdijk, Ribeaud & Eisner, 2018a, 2018b). We will aim to identify the extent to which short-term mindsets can account for the relation between specific criminogenic environments, experiences and events, and crime and how they develop over time. Besides a series of measures of short-term mindsets including future school orientation, self-control and impulsivity, the z-proso dataset contains a large variety of sociogenic variables, including socio-economic status (SES), neighborhood characteristics, negative life events, harsh parenting, substance use, delinquent peers, and victimization, which make it optimally suited for testing TFT. Furthermore, insofar as one or more of the different manifestations of short-term mindsets are a major cause of crime and not fixed after childhood or early adolescence, changes in short-term mindsets can be expected to produce changes in offending. Capitalizing on the multi-wave design of z-proso, we will address the reciprocal nature of exposure to contextual risk factors, short-term mindsets, and delinquency. This will establish the extent to which observed changes in (the different types of) short-term mindsets are consequential for offending and what factors influence these changes (over and above age trends).

ACT II

METHOD

Carefully constructed questionnaires, cleverly designed observation and interview schemes, large-scale registration data, and rich longitudinal datasets have long been the commanding approaches in the field. Tremendous progress has been made in improving our understanding of criminal conduct through the use of such methods, which have reached an impressive degree of sophistication. They will undoubtedly continue to be important in the future. Yet, they have typically examined characteristics of offenders rather than the offending process as their ability to gain insight into the latter is limited by design. Mainstream crime research has also largely failed to capitalize on the possibilities novel technologies have to offer to address a series of relevant phenomena. Crucial areas of interest in the domain of public safety and criminal behavior have therefore remained understudied. Think, for example, of the prediction of public disorder through the analysis of social media activity such as Twitter and Facebook, tracing the causes of victimization to how and where people spend their time using smartphones, the integration of eye-tracking software and motion capture in virtual environments to analyze the behavior of offenders, the use of virtual courtrooms to train law students, experimenting with biosensors that can predict aggressive behavior, or the application of serious gaming for purposes of offender rehabilitation, to name but a few of the possibilities.

The limited ability of traditional methods to gain insight into behavioral processes has led to a fundamentally skewed knowledge distribution in the discipline. As I argued earlier, we have accumulated an impressive amount of knowledge about criminality but we know surprisingly little about the criminal process itself, that is about what offenders actually do when they are 'on the job'. At this point, realizing progress may not require more of the same but the exploration of new approaches. To fill the current hiatus in the field, the second part of my research agenda is dedicated to the application of novel technologies and innovative methods. Below I will focus on two research projects that I have set up with my collaborators in the past years that have made use of virtual reality (VR) technology.

Before outlining these projects, I will briefly elaborate on why VR holds particular promise for research on crime and public safety.

THE POTENTIAL OF VIRTUAL REALITY FOR CRIME RESEARCH

One of the critical features of VR for social science research purposes is that it allows for creating lifelike experimental situations while maintaining researcher control, thus maximizing both the ecological and internal validity of research designs (Fox et al., 2009). Furthermore, the ability to create virtual environments that are not constrained by the limitations of the real world opens up new possibilities for powerful manipulations targeting behavioral change. Additionally, VR has the ability to create realistic virtual environments that resemble their real world counterparts, which allows for the study of phenomena that are difficult, costly, or simply impossible, to study in the real world (Van Gelder, Otte & Luciano, 2014). These features make VR uniquely positioned for the study of criminal and delinquent behavior.

In contrast to normative behaviors, criminal behavior almost by definition occurs out of public view, and hence it can rarely be observed 'in the wild', let alone in a way that allows for systematic empirical study (Van Gelder & Van Daele, 2014). To study criminal decision processes, researchers have therefore been forced to rely on indirect and/or retrospective evidence derived from interviews and survey methods, which are prone to various well-established limitations (see e.g., Van Gelder et al., 2017). Participants are, for example, known to intentionally exaggerate or downplay actions rather than recounting facts as they occurred (Elffers, 2010). Even if participants are committed to reporting truthfully, memory limitations may lead to events to be forgotten, sequences reversed, and timing distorted (Bradburn, Rips & Shevell, 1987). Furthermore, methods such as interviews and surveys do not provide access to the automatic and unconscious cognitive processes that have shown to be fundamental in guiding human behavior (e.g., Kahneman, 2011).

Whereas interviews and surveys tend to take place after the criminal event has occurred, sometimes months or even years later, VR allows for the *real time* study of behavior. Additionally, interviews can be held immediately after the commission of a virtual crime, which avoids memory issues. PhD student Amy Meenaghan has even shown the viability of having offenders

provide a running commentary about their choices while they commit a crime in virtual reality (Meenaghan et al., 2018). Yet, the potential of VR extends far beyond overcoming the fallibility of human memory due to the amount and type of data that can be collected with it. As VR pioneer Jeremy Bailenson (2018:240) points out, in social science research, there has never been a tool that measures human behavior as accurately, as often, and as unobtrusively as VR. VR offers a direct pipeline to our mental states, emotions, and identities. Although people can watch what information they disclose verbally, it is much more complicated to regulate subtle movements and gestures. Through its ability to create realistic virtual environments that mimic the real world, VR allows for reinstating the context of crime and immersing participants in it to observe their behavior. That is, VR allows for bringing the scene of the crime to the offender in a safe, ethical and controlled way (Nee et al., 2018). This implies that criminal events can now be studied as they unfold. This is well illustrated by the Virtual Burglary Project.

THE VIRTUAL BURGLARY PROJECT

The Virtual Burglary Project is a collaboration led by Dr. Claire Nee from the University of Portsmouth and myself, and involves researchers from the University of Twente, the University of Portsmouth, and VU University Amsterdam.² The Virtual Burglary Project uses virtual reality versions of residential neighborhoods to study the behavior of burglars (Figure 3). Incarcerated burglars are invited to scope a residential neighborhood for opportunities, select a target to burglarize and commit a burglary in VR, and to go about it as they would do in the real world.

² Besides Claire Nee and myself, members of the project team are Marco Otte, Iris van Sintemaartensdijk, Jan Willem van Prooijen, Paul van Lange, Andrew Demetriou, Matthew Talbot, Amy Meenaghan and Zarah Vernham.



Figure 3. Images of the virtual environment used in Van Gelder et al. (2017)

The VR system tracks all their behavior in real time, such as where they look, how they walk around, which target they select, where they enter it, and how they go about doing the burglary once inside. Our studies have provided us with a hitherto unprecedented level of detail regarding burglary behavior. This has not only led us to develop specific insights for policy and crime prevention (e.g., by uncovering burglar routines we know it is best to hide valuable items in children's rooms or the bathroom, as these areas are least frequently visited by burglars), but also key theoretical insights. In a recent study executed in prisons in the UK, we came to learn that burglars accumulate expertise in ways similar to how expertise is acquired in normative professions and activities (e.g., learning to play the piano, or how to drive a car)(Nee et al., 2018). Their training on the job tremendously increased their effectiveness compared to other (control) groups and sheds alternative light on the widely held view of crime that requires very little skill and knowledge (e.g., Farrington and Welsh, 2007; Gottfredson and Hirschi, 1990). Experienced burglars significantly outperform control groups, both those matched in terms of background characteristics as well as university students (Nee et al., 2015).

Currently, capitalizing on the possibility of using experimental research designs with VR, PhD student Iris van Sintemaartensdijk is testing the effects of different levels of guardianship and signage in preventing burglary. Soon we will be able to answer the question whether the common neighborhood watch signs ("WhatsApp Buurtpreventie") in your neighborhood exert any effect in deterring burglars and what type of behavior you as a resident need to perform to make would-be burglars change their minds. VR can also be used to improve public safety by increasing householder awareness. At the University of Portsmouth, PhD student Matt Talbott is currently setting up a study in which householders are nudged into better protecting their homes using VR as a tool to help them to 'think like a burglar'. Currently, our team is in the process of adapting our virtual environments to study the behavior of predatory sex offenders. In sum, the Virtual Burglary Project illustrates some of the applied and theoretical potential of VR to contribute to crime prevention and increasing public safety. The Virtual Burglary Project also discloses another useful feature of VR for research purposes, which regards the possibility to collect data in the field, such as in prisons, instead of being restricted to sterile university laboratories. The next example of a VR application is another illustration of the possibility of setting up a mobile VR lab, this time at a music festival.

BARFIGHTS IN VR

Another VR-based research line I have been developing in recent years is what we have come to term the Virtual Scenario Method, which aims to remedy some of the limitations of the traditional scenario –or ‘vignette’– method (Van Gelder, De Vries, Demetriou, Van Sintemaartensdijk & Donker, 2018c). Scenarios are a common method for studying decision making in a range of disciplines, such as communication science, psychology, behavioral economics, sociology, and also criminology. Scenarios are short written descriptions of hypothetical situations. Research participants are asked to imagine themselves in the situation or to identify with it, and subsequently to respond to a number of questions (Van Gelder et al., 2018d). The scenario method is a versatile, effective, low-cost, and efficient method of data collection about how people would act in situations that are outside of the purview of other methods, for example because of their sensitive nature, prohibitive cost, or infrequent occurrence (Collett & Childs 2011).

We developed a VR-based scenario method under the assumption that written scenarios are unlikely to capture the more visceral and emotional aspects involved in real-world offending, which commonly occurs during ‘hot’ and altered states-of-mind. Additionally, the 10-15 line narrative of the standard scenario is unlikely to adequately capture the complex reality of real-life decision making situations, and to realistically incorporate important nuances of social experience. This raises the question as to how well behavioral intentions reported on written scenarios predict real-world behavior. Rather than asking participants to imagine themselves in a situation on the basis of a short narrative, a VR scenario perceptually immerses them in it. As Bailenson (2018) argues, because users’ brains are treating the experience they are having as psychologically real, they are physiologically aroused in a way that is similar to what occurs during a real experience. As the human mind cannot be in two places at once, feeling present in the virtual world leads to psychological absence in the real world. As such the VR scenario method brings the fictitious situation a step closer to reality and, we assume, reported behavioral intentions a step closer to actual behavior.



Figure 4. Head-mounted 360° video rig with director and point-of-view actor Malte Huthoff

To provide evidence for our approach, we took a commonly used ‘barfight’ scenario describing a conflict between two individuals in a bar, and used 360° video to generate a faithful reproduction of the situation (Figure 4). Instead of being read, the scenario is experienced through VR goggles from a first-person perspective to create an immersive experience. We had the opportunity to test our scenario at the Lowlands Festival in 2015. About 150 festivalgoers were assigned to either the written version of the scenario or the virtual version. As expected, we found that the VR scenario increases people’s sense of being in the situation, i.e., their feelings of ‘presence’, as well as perceived realism. The heightened presence and perceived realism, in turn, increased people’s anger, which increased the probability that they would behave aggressively. The Virtual Scenario Method, in short, appears to be a promising alternative for traditional written scenarios.

The Virtual Burglary Project and the Virtual Scenario Method are two quite different examples demonstrating some of the potential of VR for research purposes and overcoming limitations of more traditional methods. As mentioned before, the power of VR in this context is its ability to (re)create situations that resemble the real world and observe behavior. In the third and final act of this lecture, I will elaborate on how novel methods like VR, in combination with the theory I outlined in the first act, can contribute not just to our understanding of crime but also have potential for practical application. This act also provides an illustration of another strength of VR, i.e., not in mimicking reality, but in generating situations that are simply impossible to create in the real world.

ACT 3

APPLICATION

In Act 1 of this lecture, I have outlined a brief historical overview of my field culminating in a theoretical perspective, Time Frame Theory, that revealed the mechanism around which the onset, persistence and desistence of delinquent behavior may, at least in part, revolve. The core idea underpinning the theory was that short-term mindsets, rather than being stable individual dispositions, may show variability over time as a consequence of exposure to specific external events, environments and experiences. In Act 2, I have discussed the new tools for data collection that we as researchers have at our disposition today. These tools, I argued, carry tremendous potential for improving our understanding of crime. In this third and final act, I will merge the two and link theory and technology to practice to demonstrate how offenders can be rehabilitated in the future. Financed by a recently awarded ERC Consolidator Grant and the Ministry of Justice, and collaborating with the Probation Service and game developers to design it, FutureU is a novel and scalable behavioral intervention aiming to increase future-orientation by connecting delinquents to their future self.

FUTUREU

If short-term mindsets lead to crime, as Time Frame Theory predicts, it follows that extending people's mental time frame towards the future should reduce it. However, many factors that drive crime and trigger short-term mindsets, such as having a criminal record, negative childhood experiences, and low education, and factors contributing to desistance, such as stable relationships and satisfactory employment, are difficult, costly, or simply impossible to "treat" or "correct" by rehabilitation programs (Maruna, 2001). An alternative and more feasible approach to induce a future-orientation is grounded in a view of individual identity that distinguishes between temporally distinct selves (Parfit, 1987). Applying this view to the context of crime, its immediate benefits can be said to accrue to the present self, whereas its costs come at the expense of a future self. A lack of connectedness to this future self will therefore make the temptation to engage in crime hard to resist. Conversely, an intimate connection to the self in the future renders likely that its interests will be taken into account.



Figure 5. Images of a present and future (age-progressed) self

In prior research using virtual reality and social media (Van Gelder, Hershfield & Nordgren, 2013; Van Gelder et al., 2015), my collaborators and I have shown that future-orientation can be increased, and delinquent involvement decreased, through interventions that provide vivid representations of the self in the future. In one study (Van Gelder et al., 2013), university students ‘met’ their future self in a VR environment. They walked around in a virtual room with a mirror hanging on one of its walls. In the experimental condition, instead of seeing their contemporary selves in the mirror, participants faced their age-progressed selves. In comparison to controls, who had seen their present self in the virtual mirror, participants who had seen their future self were significantly less likely to steal money from the experimenters. The second study involved a longitudinal field experiment using the social network website Facebook (Van Gelder et al., 2015). In this study, high-school youth ‘befriended’ an avatar representing their future self on Facebook. For seven consecutive days, participants replied to messages from their future self. Participants in the control condition befriended an avatar representing their present self and responded to messages situated in the present. Self-reported delinquent activity was measured prior to and after the seven day period. The results showed that participants who had befriended their future self showed reduced delinquency, whereas controls did not. Additionally, this effect was mediated by changes in vividness of the future self, such that increases in vividness led to reduced delinquency. In short, this research shows that by connecting people to their future selves they reduce their rule violating behavior.

With FutureU, Liza Cornet, PhD student Benjamin Ganschow and myself intend to take this research to the next level and apply it directly among the target group of convicted offenders placed under supervision of the Probation Service. Currently, together with postdoc Liza Cornet, we are developing the concept for a gamified intervention in which these offenders over the course of a four-week period meet and interact with persuasive 3-dimensional models, 'avatars', of their future self (Figure 5). During this time travel game, which is partly played on participants' own smartphone and partly on site using immersive VR, they tackle various challenges. These challenges are intended to stimulate real-world self-management skills and designed to trigger thinking about the future (self), stimulate impulse control and empathy. For example, they teach participants to identify decision making situations with potential long-term consequences and to use simple mental rules for productively dealing with them, such as "Stop, think of your future self, then act". Through repeated interactions, an increasingly vivid mental image of the future self is instilled, which is expected to strengthen the ability and motivation to think and act future oriented.

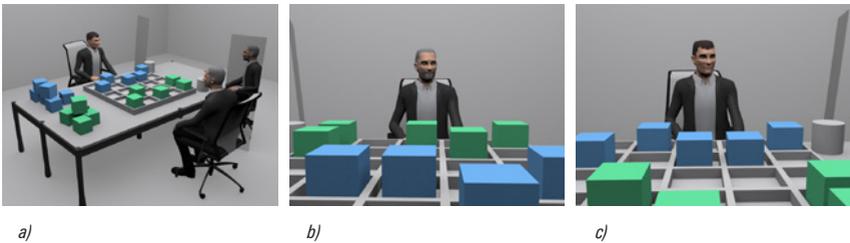


Figure 6. Possible FutureU VR setup with
a) future and present self facing each other with mirrors next to them,
b) point-of-view perspective of present self facing future self and,
c) point-of-view perspective of future self facing present self.

Perhaps the most exciting and powerful element of our approach regards the idea of becoming the future self. In the VR setup, participants will not only face their future self in an immersive virtual environment, but they will also enter its avatar body and sit opposite of (an avatar representing) their current self (Figure 6). Research has shown people to infer their expected behaviors and attitudes from observing their avatar's appearance, a phenomenon known as the Proteus effect (Yee & Bailenson, 2007).

This effect has also been shown to transfer from the virtual to the real world (Yee, Bailenson & Ducheneaut, 2009). When people enter a body with properties that differ from their own natural properties (e.g., a male in a female virtual body), a process also referred to as virtual embodiment, they tend to take over the properties belonging to that other body, including attitudinal, perceptual, cognitive and behavioral changes. For example, in one study, participants embodied as an avatar resembling Einstein (Banakou, Kishore & Slater, 2018) performed better on a subsequent cognitive task compared to a control group embodied in a virtual body of a similar age of their own. In another study, participants switched between a virtual body resembling themselves where they described a personal problem and a virtual body representing Sigmund Freud, from which they offered themselves counseling (Osimo, Pizarro, Spanlang & Slater, 2015). Compared to a control group where the counselor was a self-representation, participants in the experimental condition reported stronger mood improvement. In our studies, we will examine to what extent virtually embodying the future self results in appropriating the properties of an older, and presumably less shortsighted and more responsible, avatar and to what extent this translates into changes in real world delinquent behavior. Ultimately, the future self will provide advice to his present self regarding behavior that will affect the future self.

There have of course been previous attempts to decrease impulsivity in youngsters and to stimulate future-oriented thinking to better consider the negative consequences of behavior. Generally these efforts have met with limited success. Several key differences distinguish our approach from preceding attempts, the first being the use of virtual embodiment. Second, in FutureU, the future is directly linked to the individual identity. It is this link, I think, which is so powerful. By connecting them to their future self, participants will come to realize that they themselves will ultimately get to suffer from the negative consequences of their choices in the now. In other words, that the damage is self-inflicted. Rather than warning delinquents to think ahead and consider the consequences of their behavior or to present such consequences in an abstract fashion, our approach envisions the future in terms of a life-like aged representation of the participant. Additionally, an individual's narrative identity, unlike his dispositions, can change over the life course in light of new experiences and information (McAdams, 1993; Maruna, 2001). A third aspect in which our approach differs from existing interventions is that instead of being

text-based, FutureU capitalizes on the potential of gamification to instill behavioral change among the target group. This group consists of visually oriented thrill seekers with short concentration spans. Applied gaming approaches like FutureU cater to the needs of this group as they are visual, involve excitement, and offer rewards (McGonigal, 2011). Research in health and education has shown game-based interventions to be effective tools in encouraging specific types of behavior and discouraging others, improving skills, such as planning and patience, and increasing knowledge (Orji et al., 2013, 2014; Ritterfeld et al., 2009). Finally, using gamification in interventions is known to mitigate the risk of sample attrition while simultaneously boosting intervention effectiveness (Granic et al., 2014).

Finally, as mentioned earlier, given that the inability to make informed tradeoffs underlies not only delinquent conduct but runs the full gamut of self-defeating behavior (e.g., overspending, gambling, substance use, smoking and risky sexual behavior), the potential of FutureU for interventions also targeting behaviors such as these is evident. Not only can negative behavior be discouraged, positive behavior, e.g., studying for an exam, saving money for a rainy day, healthy eating, may be encouraged using a similar approach.

EPILOGUE: PRESENT IN YOUR FUTURE

I believe that for an applied science like criminology, theoretical and methodological innovation should always occur in the service of addressing the underlying real-world issue rather than to remain an abstract scientific exercise. I have come to realize, however, that we seem to have forgotten the important lessons that August Vollmer has taught us. An important disconnect has grown between theory and practice. Crime research and theorizing regularly proceed without taking much notice of what happens 'on the ground'. Criminal justice and rehabilitation practices, in turn, often pay little heed to evidence-based interventions or theory. Yet, truth be told, the pathways historically chosen by the discipline, with its sociological emphasis on delinquents and self-report delinquency data, have made it ill-equipped to provide policy relevant knowledge (Cullen, 2011). As observed by Matthews (2010:195): "the steady growth of a criminology lacking policy relevance has created an expanding criminological industry that has become obese and is, as they say nowadays in official circles, 'unfit for purpose.'"

There is, in other words, work to be done. Developing new theoretical pathways and exploring the use of novel methods and technologies will prove fundamental in pushing the field forward. This should also result in concrete input for crime prevention and rehabilitation efforts. August Vollmer can serve as guiding example for contemporary criminologists in this respect. In my view, Vollmer's genius does not so much stem from the fact that he excelled in seemingly every field he ventured into, but in his unique ability to connect social science, technology and practice. As Oliver (2017) observes, most innovations Vollmer did not develop himself, his strength was that he realized their potential, built on them, and improved them, and then got others interested in his projects. I see this as one of my principal tasks for the foreseeable future.

It has always been my ambition to work in multidisciplinary teams with researchers from diverse scientific backgrounds and other experts with domain-specific knowledge to develop groundbreaking solutions to address crime-related problems and have real-world impact. The Faculty of Behavioral, Management and Social Sciences provides a very enabling environment for realizing this ambition. In combination with technologies and methods such as virtual reality, eye-tracking, and serious gaming, I think the research potential is present to stimulate the development a new generation of research. I look forward to exploring the possibilities with my colleagues from PCRS as well as with colleagues from other departments here at the University of Twente. Getting settled and starting up three different research projects simultaneously has precluded me from reaching out to other researchers as much as I would have liked to but I have no doubt that this will happen soon enough.

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In closing, I'd like to thank the people who have played crucial roles during my academic career. Mentioning all who deserve credit is futile so I will not even make the attempt, but at least a few people need to be mentioned.

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Now to revert to the past, I'd like to extend my gratitude to several people who have been of fundamental importance. Joep van der Vliet, my mentor, Arthur Salomons, my first promotor, and Henk Elffers, my second promotor, have all left a clear imprint on my academic development. Another former supervisor who became a close friend is Reinout de Vries. For reasons unknown, I think to both of us, I ended up following him around the world over the past two decades, from Amsterdam to Fiji and back, and now to Enschede. I am very much looking forward to continuing our collaboration on personality, emotions and crime in all its manifestations.

I'd also like to mention several collaborators that I have come to value a lot over the years. With Margit Averdijk from the University of Zurich I have been working for a number of years now, a collaboration I find both inspiring and enjoyable. I hope we get to continue what we have come to view as our mission to "disrupt" the field of criminology. Furthermore, Claire Nee at the University of Portsmouth is another researcher that I have developed a close and enjoyable collaboration with that evolved from modest beginnings into an extensive and exciting research program, mainly thanks to Claire's tremendous efforts. I'd also like to thank Bruno de Vos and Marco Otte for teaching me the ropes of virtual reality and serious gaming. It has been a pleasure working with both of you.

I have been vocal about the necessity of applying scientific knowledge to practice. This requires people on the ground willing to work with maverick scientists like myself. I therefore extend my sincere gratitude to Jolanda Mooij at Reclassering Nederland who has shown a lot of guts trying something new. I look forward to working together with you and the team at RN the coming years to turn FutureU into a big and, most importantly, evidence-based success.

To my colleagues at PCRS I'd like to say that from the day I started at the department I felt right at home and working among you has been a great joy. Another big shout out goes to the people from BMS Lab. I am looking forward to work together with you and making a lot of cool VR stuff.

In the more recent past, the present, and hopefully the long-term future, I'd like to mention my colleague Liza Cornet with whom I have been collaborating for half a year now. It really has been a lot a fun working together and your support to our projects has been invaluable. Another word of thanks goes out to Iris van Sintemaartensdijk, who has been two years on the job, almost half of which she spent in prisons. You have been doing great work.

I am immensely grateful to my parents for their unwavering support of my academic endeavors throughout the years. Finally, I'd like to thank the two ladies in my life, Tara and Louise, for their patience, continuous support and understanding. I am extremely grateful for your presence in my life.

Ik heb gezegd.

Enschede, 13 September 2018

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