

Analysing forensic processes: Taking time into account

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Abstract

A great deal of forensic psychology concerns sequences of behaviours or events. In this paper, we review some recent efforts to examine forensic issues as sequences, discuss some of the contemporary methodologies involved, and highlight some of the lessons that emerge from this research. Specifically, we show: (i) how research on public violence has benefited from studying incidents as patterns of cues and responses among perpetrators and bystanders; (ii) how regularities in the histories of those who undertake suicide terrorism may be identified by mapping their life events on a graphical timeline; and (iii) how sequence-based correlation coefficients make it possible to test detailed theories about the ways perpetrators respond to the various influence attempts of police negotiators. We conclude by encouraging forensic psychologists to conceptualise their own areas of investigation as a sequence of events rather than a collection of variables.

TIME MATTERS in forensic psychology. One of the few things that transcends the differences of our subdisciplines is a concern for understanding and shaping how events unfold over time. Clinical treatments use a series of interventions to promote incremental changes in patients' behaviour. Risk assessments evaluate the trajectory of an offender's personal development to predict his or her future conduct. Police investigations unfold as a series of decisions and actions. Even serious crimes, the basis of much forensic work, comprise a sequence of actions and reactions between the offender and victim.

Given the importance of time in forensic psychology, we might expect the field to be glutted with analyses of 'forensic processes'. Unfortunately, the reality is very different. To examine the extent to which time has featured in forensic research, we reviewed all articles published in the top 10 forensic psychology journals (as identified by Walters, 2006) between 2000 and 2007. An article was counted as analysing process if it considered data from at least three time points, using a methodology that retained the temporal relations between these time points. For example, a study measuring the impact of treatment on offender behaviour at delivery,

¹ To be counted as analysing process, an article had to consider data from at least three time points using a methodology that respected the temporal relations between the three points. Our decision not to include articles using two time points (e.g. the before-after designs prevalent in recidivism research) was made because such designs speak effectively to what happens but say less about the process by which it happens. A list of the papers identified as examining process is available at: <http://www.lancs.ac.uk/staff/taylorpj/ifp>. Please get in touch if you think we have overlooked an article relevant to process.

² In case of doubt, the number of articles published in the *British Journal of Social Psychology* (BJSP) is significantly greater than those published in the top 10 forensic journals, as measured using a one-way *t*-test comparing BJSP's count to the distribution of number of articles published in the top 10 forensic journals, $t(9) = -7.87, p < .01$.

6-month and 12-month follow-up would be counted as measuring process. So would a study using time-series analysis to examine the unfolding violent interaction between husband and wife in conflict. In total, we found just 16 papers that examined process as set out by our criteria.¹ This equates to just over two articles a year, and less than 1 per cent of all papers published by these journals over the seven years. By way of comparison, the *British Journal of Social Psychology* alone published seven articles on process within the same period.²

The absence of process in forensic publications makes it difficult to draw any conclusion except that forensic psychology has not focused on process nearly as much as it should have (for a similar conclusion in sociology see Abbott, 1990). However, this state of affairs is arguably not without good reason. There continues to be a paucity of available texts on sequence methodologies and their application (particularly compared to other methods such as general linear modelling or qualitative analysis), which makes it difficult for researchers to identify and use available methods. There is also an overriding tendency for researchers to organise their studies in terms of variables rather than events. A variable-centric approach is familiar and, when used appropriately, provides a rigorous way of testing theory. But it limits drastically what researchers can say about the importance of history and change to their phenomenon of interest. For example, the reason for an officer's decision during a murder enquiry can only be understood in the context of previous decisions, evidence seen, and the order in which these decisions and evidence transpired. It is only by using sequence methods that we can begin to understand this decision because it is only sequence methods that examine the decision within the context of an unfolding set of behaviours and events. In sum, methods that examine temporality open up ways of answering some of the questions that forensic psychologists really want to answer.

In the remainder of this paper we seek to

provide a flavour of what studying process can offer forensic psychology, and how it has already begun to reshape practice. We do so by examining three areas of research. Our point of departure is recent studies of violence in the 'night-time economy'. These studies demonstrate what can be learned about group violence simply by conceptualising an incident as a sequence of actions and reactions, rather than as a collection of occurring variables. We then introduce a graphical approach to understanding process by examining a sequence of events that occur over a much larger time scale – that of an individual's life. We review how examining the life histories of female suicide terrorists can provide important insights into the critical events, turning points, and processes of radicalisation that underlie their involvement. Finally, we review research on hostage negotiation, conceptualised as a sequence of cues and responses, and how sequence methods have made it possible to test hypotheses about differences in the effectiveness of influence strategies across cultures. Answers to these hypotheses have informed negotiation strategy.

One doesn't have to look far

One of the most striking things to emerge from studying cases as sequences of events is that it is not necessary to use sophisticated analyses to derive important findings. Often, simply deconstructing an event into a sequence of behaviours can be sufficient to illuminate what has previously been overlooked. The recent work on violence in the night-time economy by Mark Levine and his colleagues (Levine *et al.*, 2007) is a compelling example of this. Violence and antisocial behaviour in public places continues to rise in the UK, against a background of decline in most crime figures (Nicholas *et al.*, 2007). While alcohol consumption undoubtedly plays a part in this phenomenon, it cannot account for the variety of behaviour observed among individuals who engage in night-time economy activities. The behaviour of the violent few is modified both by

the social context in which drinking takes place, and by the cultural traditions that either inhibit or facilitate aggression in these contexts. Understanding when and why violent episodes erupt therefore offers much to crime reduction initiatives.

To derive an initial understanding of night-time violence, Levine *et al.* (2007) collected 42 CCTV clips of violent episodes that did not include the intervention of the police or private security forces (e.g. bouncers). They then coded the observable behaviour of those involved in the incidents as either escalating (e.g. punch, kick) or de-escalating acts (e.g. hold back), and noted both who acted, and to whom their behaviour was directed. So, for example, a coded behaviour might be a protagonist acting aggressively towards the target (i.e. protagonist–escalate–target), or a bystander acting to de-escalate another bystander (i.e. bystander–de-escalating–bystander). They then arranged these actor–action–target codes into time order. By analysing the resulting sequences of acts, Levine *et al.* were able to identify certain features that lead to

severe violence rather than de-escalation, and to tell a compelling story about the patterns of behaviour that occur in night-time economy violence.

The first step in examining the night-time violence data was to look at the contingencies among the actor–action–target codes. In its simplest form, a contingency is a count of the number of occasions that one event (e.g. protagonist–escalate–target) is followed by a second event (e.g. bystander–de-escalating–bystander) over the sequence being examined.

Table 1 gives an example of contingencies in the night-time violence data. The left panel of Table 1 shows part of a sequence of behaviours and the right panel the counted contingencies. To derive the counts shown in the right panel, move from top to bottom of the sequence in the left panel and, on each occasion, note down the behaviour that immediately precedes the behaviour reached.³ The results when tallied and put in tabular form should match the table shown in the right-hand side of Table 1. As can be seen from Table 1, some behaviours occur

Behaviour Sequence			Contingency Table							
... Protagonist Escalate Target Bystander Deescalate Protagonist Bystander Deescalate Target Target Escalate Protagonist Bystander Deescalate Bystander Bystander Deescalate Protagonist Bystander Deescalate Bystander Bystander Deescalate Protagonist Bystander Deescalate Bystander Bystander Deescalate Target Bystander Deescalate Bystander Bystander Deescalate Bystander Protagonist Escalate Target Target Escalate Protagonist Protagonist Escalate Target Bystander Deescalate Target Bystander Deescalate Protagonist Bystander Deescalate Target Target Escalate Protagonist Protagonist Escalate Target Bystander Deescalate Target ...			Behavioural Response							
			Behavioural Cue			Protagonist	Target	Bystander		
Actor	Behaviour	Recipient	Escalate Target	Escalate Bystander	Escalate Protagonist	Deescalate Bystander	Deescalate Protagonist	Deescalate Target		
Protagonist	Escalate	Target	0	0	1	0	1	2	4	
Target	Escalate	Bystander	0	0	0	0	0	0	0	
	Escalate	Protagonist	2	0	0	1	0	0	3	
Bystander	Deescalate	Bystander	1	0	0	2	1	1	5	
	Deescalate	Protagonist	0	0	0	1	0	2	3	
	Deescalate	Target	0	0	2	1	1	0	4	

NOTE—To conserve space, not all combination of Actor–Behaviour–Recipient codes are shown in this Table (e.g., Target–Deescalate–Protagonist) since they do not occur in the example sequence.

Table 1: An example of a behaviour sequence from the night-time economy data and the resulting table of contingencies.

time and time again regardless of the subsequent behaviour (i.e. they have a higher baseline frequency of occurrence). This makes it more sensible to examine the proportion of occasions when the behaviour is followed by a particular second behaviour versus any other behaviour. Popular methods of analysing contingencies tend to base their analyses on such proportions (e.g. lag analysis, Bakeman & Gottman, 1997; information theory, Taylor & Donald, 2003).

In the night-time economy data, an analysis of contingencies in this manner has helped reveal much of the dynamics of the violence. The first thing that is apparent when examining these sequences is that night-time economy violence is regulated by the behaviour of bystanders. Acts of violence by the protagonist or victim are typically met by interjections by one or more bystanders, and it is the valence of the bystander's responses, rather than the behaviour of perpetrators or victims, which is most likely to shape the trajectory of violence. At the same time, and contrary to the popular stereotype, bystanders are far more likely to try to de-escalate than to escalate violence. Of the 42 clips examined by Levine *et al.*, only 4 were characterised by bystanders who responded to perpetrator aggression with more escalation than de-escalation. In 33 of the incidents, the only response of the bystanders was de-escalation, no matter how many times the perpetrator tried to escalate the situation (the average was 6.8 times).

A second finding to emerge from decomposing the violent episode in this way relates to the severity of the incident. In contrast to de-individuation theory (Zimbardo, 1969), which suggests that increasing group size leads to a reduction in the controls of per-

sonal identity and thus a greater chance of antisocial behaviour, and in contrast to bystander research (Latané & Darley, 1970), which suggests that increased group size leads to greater diffusion of responsibility and thus less likelihood of bystander intervention, the contingency data suggest that increasing group size leads to more, not less, regulation. To be precise, as the number of bystanders involved in the incident increases, so too does the amount of escalating behaviour. However, this increase is dwarfed by a far sharper increase in the number of de-escalation interventions made by bystanders, making the ratio between escalating and de-escalating behaviour firmly in favour of de-escalation with this effect becoming more dominant as group size increases. Group size and social identity interact in ways that can sometimes lead to the escalation of violence, but more often lead to the de-escalation of violence.

The findings that are beginning to emerge from Levine *et al.*'s research have implications for police understanding and management of night-time violence (cf. Drury *et al.*, 2003). All of the findings point towards the importance of the role of bystanders in regulating violence, suggesting that efforts to design strategies to combat violence are likely to benefit from engaging with the bystander group. The findings suggest, for example, that intervention strategies should not necessarily seek to remove bystanders from the equation but, instead, work to facilitate their regulation of the incident. Similarly, they suggest that messages encouraging group responsibility and regulation may be a valuable part of a wider crime reduction initiative focused on the night-time economy. Of course, Levine *et*

³ There are many analogies that can help with understanding the different facets of an event sequence. One that seems to resonate with many audiences is to imagine capturing data for a game of football. To capture the game dynamics it is necessary to note down, on each pass, the player who had the ball and to whom they passed the ball (and, to be exact, something about how they passed). Counting the number of passes made, or taking the average number of passes per player, tells us very little about the quality of the game and does not readily predict the final score.

al.'s preliminary findings open up important questions that are best answered by studying the unfolding interaction among protagonists and bystanders. One such question relates to the failing of bystander regulation during incidents in which violence escalates out of control. Identifying the behavioural dynamics that characterise these incidents, and comparing these to the dynamics found in incidents where bystanders successfully regulate behaviour, is likely to enhance our understanding of the factors that initiate and facilitate night-time economy violence.

A picture paints a thousand words

One of the easiest and most rewarding ways to examine a process is to represent the contingencies among its constituent parts in a 'state transition diagram'. These diagrams represent events within the process as nodes and contingencies as arrows between the various nodes. The result is a 'flow chart' like diagram that allows us to begin to interpret the ways in which events come together over time. This interpretation is often made easier by a shading of the arrows. Typically, thicker arrows are drawn for associations that occur far more frequently than would be expected by chance. This kind of method-

ology has been used for understanding rape interactions (Fossi *et al.*, 2005), the use of accommodation in courtrooms (Gnisci, 2005), the interaction of husbands and wives (Gottman *et al.* 1977), and even the sequence of events that leads up to road-traffic accidents (Clarke *et al.*, 1999).

One recent application of the method has been to understand the process by which individuals become involved (and later uninvolved) in extremism. Karen Jacques (Jacques & Taylor, 2007) has explored the structure and development of female suicide terrorists' life stories, as measured by the sequence of pertinent events that occurred in their lives. Specifically, she has collected biographies of female and male suicide terrorists from various open sources (e.g. biographies, interviews and martyrdom videos), and coded these biographies for the occurrence of life events ranging from changing employment to travelling abroad to participating in jihad. These events can then be arranged chronologically, and the sequences examined using a state-transition diagram. By comparing across many sequences, this diagram provides a modelling that shows some of the most likely pathways into extremism and some of the most likely pre-

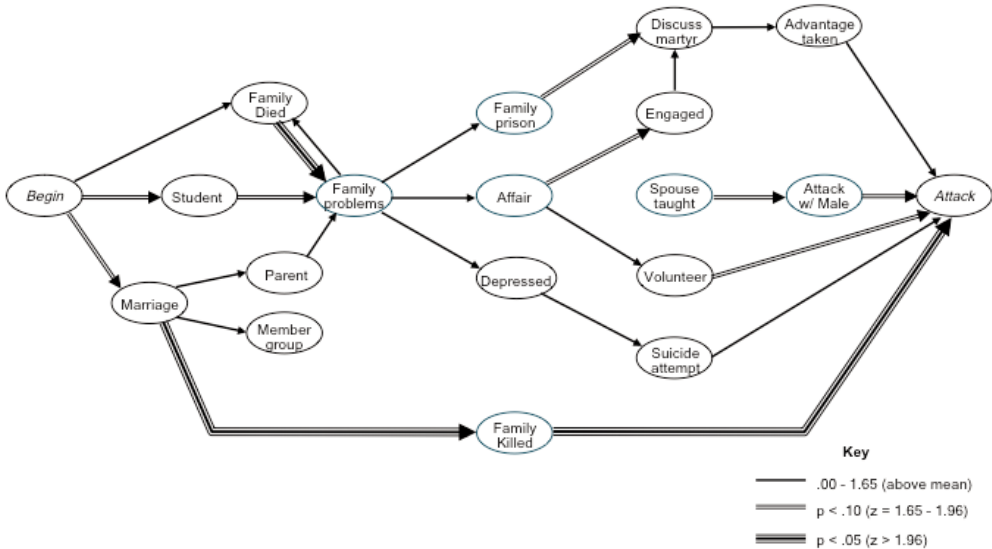


Figure 1: State-transition diagram of life events for female suicide terrorists

sequence of events in 23 female extremists' lives prior to undertaking a suicide attack, as reported in Jacques and Taylor (2007). The state-transition diagram in Figure 1 represents the females' life histories schematically as arrows connecting 'nodes' of life events. An arrow is drawn between two nodes when the events associated with the nodes are found to occur next to one another in one or more of the females' life histories. The direction of the arrow corresponds with the temporal order in which the events occurred. For example, since family problems (e.g. arguments, parental violence) sometimes precede having an affair with another man, an arrow is drawn on Figure 1 from the node representing family problems to the node representing affair.

To capture the significance of the transitions, and to avoid presenting an overly complex web of arrows, Figure 1 shades the connections according to a standardised conditional probability. A standardised conditional probability is a z -score of a conditional probability derived using the mean and standard deviation of the sample of conditional probabilities that begin with the same initiating behaviour (i.e. behaviour a followed by any behaviour). The higher the resulting z -score for a contingency, the more common that particular sequence of events was in the lives of the females. A contingency that occurred fewer times than average (i.e. standardised conditional probability < 0.00) was removed from Figure 1 (i.e. made invisible) on the basis that this was not a common pathway and might reflect error within the data. In contrast, a contingency that occurred more than average is represented in Figure 1 by a single line, while standardised conditional probabilities above 1.00 ($p < .10$) and 1.96 ($p < .05$) are identified with double and triple lines, respectively.

An examination of Figure 1 provides an efficient way of evaluating the 'conceptual mire' of theories about why people engage in terrorism (Silke, 2001). First, the diagram suggests that no common pathway of events exists for females prior to conducting an act

of suicide terrorism. This highlights the complexity of the issue and suggests that single motive explanations of involvement are not sufficient accounts of what occurs. However, while there is no common pathway to female involvement, the various pathways shown in Figure 1 share the characteristic of being predominantly linear. Events further along the sequence do not (re-)connect with previous events in the sequence; no arrows move from right to left on the figure. This linear characteristic of Figure 1 suggests that it may be possible to 'measure' how far an individual is through the process, which is something that might support risk assessment and threat prioritisation.

Second, the diagram highlights the importance of several common key events to the lives of many females prior to their attack. Particularly prevalent in Figure 1 is the variable family problems, which appears to act as a 'gate keeper' to many of the subsequent events in the females' lives. Thus, consistent with findings on other types of offender (Payne *et al.*, 2007), an unsettled family life appears to lead to changes in circumstances, which opens up – or facilitates existing – avenues into terrorism. A complete explanation for the central role of this event in the female pathways requires replication and further qualitative analysis of each person's life history, but it is possible to make some general observations. One important observation is that the centrality of family problems is consistent with recent evidence suggesting that females often become involved for personal motivations, rather than group or ideological motivations that are often associated with male involvement (Jacques & Taylor, 2008).

Third, towards the bottom of Figure 1 appears a very direct pathway to engagement in a suicide attack, that of marriage followed by having a family member (typically husband) killed. This pathway is separated from the other events shown in Figure 1, and suggests that for some females these two events represent a clear trigger towards suicide terrorism. The pathway to involvement in

extremism for these females, and the experiences that this encapsulates, is arguably very different from those who engage over a longer sequence of events. Such a striking pathway towards the end point is quite common on state-transition diagrams of criminal life histories, and might be thought of as a fast-track of particular concern to prevention efforts. Conversely, note that other events which we might predict to have a direct association with engagement in suicide terrorism do not appear to have such a direct relationship. For example, as can be seen in Figure 1, membership of an extremist group (member group) does not set in motion a clear pathway of events towards committing an attack. This suggests that many females who engage in suicide terrorism did not engage with an extremist group in any formal way over a sustained period of time. Rather, at some point in this process, they decided to act to support the group's cause.

On more complex state-transition diagrams it is possible to find events or behaviours that assume other roles not found on Figure 1. For example, in an analysis of the process of rehabilitation, a backwards link may concern an event that causes relapses in patients' recovery. Similarly, in an analysis of investigative interviewing, a backward link may represent occasions where the interviewer returns to a previous line of questioning. Another type of role concerns events or behaviours that represent 'turning points' in the overall pathway, with the behaviour that follows on from the event either leading to a new set of events further 'downstream' or leading back to a set of events encountered previously. The turning-point event therefore represents a particularly critical point at which to intervene to influence the way a person moves through the process. Studies using state-transition diagrams will often then target such events for further analysis, in order to identify why the event is critical and how it might be possible to influence its relevance.

Dissecting a complex process

There are at least two reasons why state-transition diagrams may not be sufficient for a researcher. The first is that they do not provide an immediate means of making inferences about the differences in process across two or more subgroups (e.g. across independent variables). While drawing separate state-transition diagrams for various subgroups can prove useful, the visual comparison they afford tells us less about the likelihood of a difference in contingency occurring by chance. This problem is particularly pertinent when the events of interest occur rarely; they may not take a prominent position in the state-transition diagram but they may represent a critical event in the way the process unfolds in the subgroups. The second is that state-transition diagrams typically focus on immediate contingencies, and in more complicated processes it is often the case that behaviours in the sequence are related, but only after one or more intermediate behaviours. For example, a police interviewer's line of persuasive questioning may lead to an immediate confession by a perpetrator, or it may lead to a confession following a number of intermittent exchanges. It may thus be important to capture these less direct relationships between events, since it may be these delayed relationships that are critical to how a process unfolds. History may take its time to affect the present (Taylor & Donald, 2003; Watzlawick *et al.*, 1968, p.131).

There are a number of ways to overcome this problem. One possibility is to adapt contingency analysis to be sensitive to this possibility by counting behaviours that occur the 'one before last' (often referred to as lag-2), or the 'one before last before last' (lag-3), and so on (Olekals & Smith, 2000; Taylor & Donald, 2003). A second possibility is to examine sequences as a series of larger episodes wherein one can examine the co-occurrence of behaviours (Taylor, 2002; Taylor & Donald, 2004). But neither of these solutions is ideal. Each requires a fairly arbitrary decision about how to divide up the

data to ensure that relevant relationships are captured. Fortunately, a recent development in sequence analysis methods, known as the proximity coefficient (Taylor, 2006; Taylor & Donald, 2007), has gone a long way to resolving this problem because it is derived from the intrinsic interrelationships between events.

The basis of the proximity coefficient is the notion that events contribute to the same part of a sequence and have more in common when they occur close together within the sequence than when they occur far apart. Events over time occur in ways that are connected and organised rather than random and haphazard (Argyle, 1969; Gottman *et al.*, 1977; Kelley, 1997). This is reflected conceptually in the proximity approach by associating less immediate relationships in a sequence with lower proximity. Specifically, the coefficient equals 0.00 if the events being considered occur only at the beginning and end of the sequence. It equals 1.00 if one event immediately precedes the second event whenever it occurs in the sequence without exception. Values between these two limits reflect differing amounts of proximity between the two events being examined. The proximity coefficient decreases monotonically as more events are found (on average) to separate the two events being examined (i.e. proximity reduces). It does this in a manner that is independent of the length of the sequence, and independent of the number of times an event occurs in the sequence.

One area where the proximity coefficient has been valuable is in studying interactions between police and offenders. A good example of this is in hostage negotiation, where chains of cues and responses come together to form the interaction between police nego-

tiator and perpetrator. Ellen Giebels and her colleagues have used a range of sequence methods to understand the use and impact of influence strategies within this context (Giebels & Noelanders, 2004). Recent work (Giebels & Taylor, in press a; in press b) has considered differences in influence across cultures by comparing the interaction processes of negotiations where the perpetrator originated from either low-context or high-context cultures.⁴ As with all the examples in this paper, the negotiations were examined by coding the behaviour as it occurred in the unfolding interaction. Specifically, transcripts of the dialogue between police negotiator and perpetrator were coded at the level of utterance using a framework of ten influence tactics (well-known in the field as the 'Table of Ten', see Giebels & Noelanders, 2004), which includes tactics such as being kind, intimidation and rational persuasion.

To further illustrate the data and how the coefficients are derived, Table 2 presents an excerpt of an interaction adapted from a negotiation with a high-context perpetrator. This table is divided in a similar way to Table 1. In the left-panel is a sequence of coded utterances as spoken by the police negotiator (PN) and the perpetrator (HT). In the right-hand panel is the matrix of proximity coefficients derived from the behaviour sequence in the left panel. When laid out in this way it is possible to explore how interrelationships among behaviours are reflected by different values of the proximity coefficient. For example, instances of the perpetrator sharing information (i.e. HT information sharing) always occur directly after a police negotiator expresses empathy (PN empathising). Consequently, the proximity of these behaviours is the maximum

⁴ The theoretical and empirical background to the distinction between low- and high-context perpetrators is best understood by reading the original works of Giebels. Briefly, however, as noted by Hall (1976), low-context communicators favour the use of direct and explicit messages in which meanings are principally contained in the transmitted messages. In contrast, high-context communicators engage in a less direct way, with information being more hidden and meaning located in the social context of the interaction.

	Hostage Taker's Response				
	Persuasive arguments	Information sharing	Threats	Empathising	Compromise
Police Negotiator's Cue					
Persuasive argument	94	92	82	33	22
Information sharing	--	--	--	--	100
Threat	--	89	100	56	44
Empathising	--	100	89	78	67
Compromise	--	--	--	--	--

Table 2: An example of a hostage negotiation sequence and the resulting proximity coefficient matrices

possible. In contrast, the police negotiator's persuasive arguments (PN persuasive arguments) occur towards the beginning of the sequence, while the hostage taker's compromise (HT compromise) occurs at the end, which means that the proximity of these behaviours is low. Consistent with these examples, the coefficient matrix reports a perfect association between PN empathising and HT information sharing (1.00) and a low proximity between PN persuasive arguments and HT compromise (.22). All of the other relationships in the example sequence fall between these two extremes and, accordingly, have coefficient values that depend on their distances apart in the sequence.

A few other aspects of the matrix in Table 2 are worth noting because they illustrate how the proximity approach helps examine process. One is the occurrence of missing coefficients (e.g. for PN empathising to HT persuasive argument). These reflect the distribution of behaviours in the negotiation, with missing values in a variable row (or column) indicating that most observations of the behaviour occur toward the end (or beginning) of the interaction (as is the case for compromise in Table 2). A second is the coefficients that appear on the diagonal of

the matrix. These provide a measure of reciprocity (Putnam & Jones, 1982) that quantifies the number of codes that occur before reciprocation, rather than simply the occurrence of immediate reciprocation. A third is the asymmetric nature of the coefficient values. For example, the coefficient for PN empathising preceding HT threats (i.e. .89) is higher than the coefficient for PN threats preceding HT empathising (i.e. .56). In general, proximity coefficients will be asymmetrical, reflecting the possibility that one event occurs before the second on the majority of occasions. In such cases, the difference between two coefficient values may provide an indication of dominance between the behaviours.

One of the advantages of the proximity coefficient is that it is possible to derive a matrix of coefficients – similar to that in Table 2 – for each sequence in the data set. This is useful because it becomes possible to derive coefficients for the same cue–response relationship across a number of cases. This, in turn, makes it possible to both derive means and standard deviations for the coefficients, and make comparisons across subgroups of coefficients using standard tests (e.g. ANOVA). In their hostage

negotiation analysis, Giebels and Taylor (in press a) used this approach to examine distributions of coefficients calculated from incidents involving perpetrators from high- and low-context cultures.⁵ The results of their comparisons across cultural groups begin to offer insights for those interacting with perpetrators from low- or high-context cultures.

The first lesson to emerge from Giebels and Taylor's research is that rational persuasion, often considered the backbone of negotiation strategy, is typically more effective with low-context than high-context perpetrators. For example, a comparison of responses to persuasive argument suggests that low-context perpetrators are more immediate to respond with compromises than their high-context counterparts (proximity coefficient = .86 compared to .65). Interestingly, this finding emerged irrespective of whether analysis considered interaction from early 'crisis' periods (so-called because of their association with high-anxiety, emotionality, and cognitive deterioration) or later 'normative' periods, where the extremes of the context have dissipated. Perhaps because logic and deductive thinking are valued in low-context cultures (Gelfand & Dyer, 2000), arguments elicited compromises from low-context negotiators regardless of whether or not they were in crisis.

The second lesson to emerge from this research is that using threats to influence interaction often results in an escalation of conflict with high-context perpetrators. Specifically, while low-context perpetrators are found to be more likely to communicate threats, high-context perpetrators were more likely to reciprocate them. One com-

elling explanation for this finding, which carries important lessons for practice, is that threats draw attention to the need to preserve face, and that this need is sufficiently important within high-context cultures for them to reciprocate the explicit challenge (Ting-Toomey & Oetzel, 2001). Threats are a confrontational way of handling an interaction and, while this is consistent with low-context interactions, it is generally more inappropriate in high-context cultures (Fu & Yukl, 2000). Thus, it is not surprising that threats are used more by low-context perpetrators, but that high-context perpetrators are more likely to respond to them by 'punishing' with counter-threats. This is likely to be particularly true in high-stakes criminal settings (e.g. police interviews) where establishing dominance and saving face may become particularly salient factors (Adair & Brett, 2004).

Discussion

Sequence analysis holds great promise for forensic psychology. Most if not all of our classic theories and contemporary issues involve development or change over time. Our practices also comprise events that are sequential or interactional rather than static and variable-centric in nature. It is time our analyses reflected this. The methods we consider in this paper make it possible to address forensic issues as sequences. What the field needs are scholars and practitioners committed to advancing existing wisdom by uncovering the sequential regularities that lie behind forensic phenomena. These pioneers will adopt cases not variables as the focus of their enquiries. They will talk about development and change, turning points

⁵ In Giebels and Taylor (in press a), the comparisons of proximity coefficients are taken one step further by the use of randomisation tests. A randomisation (or permutation) test assesses statistical significance in a way comparable to conventional parametric tests, but rather than compare the resulting test statistic (e.g. an *F* value) to the critical values found in the back of statistics textbooks, it compares it to a distribution obtained from re-sampling of the available data (see Edgington, 1995). The advantage of this approach is that it avoids many of the data assumption of traditional significance tests (Dunlap *et al.*, 2003) and so provides a reliable way to derive significance levels for the proximity coefficients.

and critical pathways, life courses and phases, and facilitators and inhibitors.

There are of course many forensic and investigative processes that we have not considered (for an overview see Donald & Taylor, 2007). One core area for investigative psychology is the problem of differentiating offenders on the basis of their behaviour at the crime scene (Canter, 2000; Nutch & Bloombaum, 1968). The intriguing aspect of this research is that, overwhelmingly, it has focused on the behaviour of the offender (rather than the interaction between offender and victim) using a methodology that takes absolutely no account of the order in which behaviours occur during the crime. Not only does this approach neglect the importance of interaction process, but it is at odds with what we know from interactionist theories of human behaviour (Mischel, 2004), which is that people do not act consistently in different situations. As others have acknowledged (Alison *et al.*, 2002), we must assume either that victims provide a fairly uniform context (something shown to be false, see Ullman, 2007) or that the models are robust enough to withstand context-based changes in behaviour. It would seem important, therefore, to test whether offenders' behaviour is consistent when faced with changing behaviour from their victims. Or, if this is not the case, to ensure that existing models provide a robust measure of interpersonal style from which to develop inferences about offenders' characteristics.

To test this possibility, Jan Winter is undertaking doctoral research that examines whether or not existing typologies of criminal behaviour can capture actual consistencies in the way in which an offender behaves as observed in an unfolding interaction between offender and victim (Winter & Rossi, submitted; Winter & Taylor, 2006a, 2006b; see also Fossi *et al.*, 2005). To achieve this, Winter is examining victims' accounts of their sexual assaults and piecing together from these accounts the sequence of offender and victim behaviours as it occurred during the offence. The result is

event sequences that capture the interaction between offender and victim, which should allow for an analysis of the interpersonal style of the offender. Winter's initial analyses reveal some important lessons for those in the business of making inferences from crime scene behaviour. First, when offenders are examined according to the similarities and differences in their interpersonal style (i.e. the ways in which they respond to their victim's behaviour), it is not possible to replicate the typologies found previously when examining offender behaviour alone. Second, when an offender's interpersonal style is viewed as a function of a number of context variables, then consistencies and differences in behaviour begin to emerge in a form that is amenable to theoretically grounded classification. Thus, if this preliminary analysis stands up to further scrutiny, it suggests that offender differentiation should begin to focus on interaction processes and the context in which an offender behaves.

While the examples in this paper have focused on investigative issues, it is a mistake to assume that process is not equally important to the broader church of forensic psychology. Over the last five years there have been isolated but impressive pieces of process research that have illustrated just what can be learned from studying forensic psychology as a process. For example, in the courtroom, Gnisci (2005; Gnisci & Bakeman, 2007) has shown the value of examining hostile examinations in a criminal case as question-answer exchanges. Among other things, his findings demonstrate ways in which lawyers use verbal and non-verbal behaviours to control a witness's narrative freedom and their ability to make the point they wish to make. In a very different area, the recent study by Wareham and Dembo (2007) used latent growth models to examine the changes in psychological functioning of juveniles arrested on misdemeanour or felony charges. They show how modelling change in psychological functioning over time can provide not only a more reliable indication of the factors that influence devel-

opment, but also an assessment of when (i.e. at what point on the process) to target intervention and prevention.

Conclusion

Criminal acts and investigative decisions occur not as variables to be counted but as events to be understood within a larger sequence of events. This is often acknowledged in forensic theory, but rarely examined in forensic research. As we have explored, there are simple and more complex methods available for examining forensic processes that correspond well with the way the issue occurs in practice. It is, we believe, risky for researchers to draw conclusions about process when they use a methodology that does not examine process. As we have explored in this paper, there are a range of simple and more complex methods for examining such sequences and it is time for forensic psychologists to take advantage of these methods. We therefore encourage research and practitioners alike to take the time to understand and apply sequence

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methods in their own areas of work. To assist those willing to take up the challenge, we have made available a number of resources at: <http://www.lancs.ac.uk/staff/taylorpj/ifp.htm>. Among other things, you can download from this website details of the material discussed in this article, a biography of forensic research that examines ‘process data’, and software to examine process in your own data.

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