LIFE SCRIPTS:
IMPLICIT REPRESENTATIONS OF LIFE-COURSE PATTERNS

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Abstract

The aims of this study were (1) to see whether emotional cues are relatively more useful when reconstructing long-term action patterns, as suggested by the hypothesis that emotion operates as a high-level action controller; (2) to see if the reconstruction method of sequence analysis can detect long-term action patterns in people’s life stories; and (3) to show how measures of autobiographical recall might be inflated by the reproducibility of even unfamiliar life stories. Twenty subjects reassembled the autobiographical accounts of eight strangers from a set of disordered parts, using emotional or cognitive cues. They performed accurately overall, but better with life-long accounts than with accounts of shorter periods, and especially so when attending to the rational behaviour of the authors rather than to emotional factors. This shows that reconstruction can be used to study behaviour in the long term, and suggests that people have representations of typical life-course patterns on various time-scales, although the most global, ‘life-scripts’, maybe of special importance, as aids to autobiographical recall and as objects of study in their own right. The data did not suggest a superordinate role for emotion in the control of action.
Introduction

This study deals with three issues which will be introduced separately.

**Cognition and emotion in the regulation of behaviour.**

Complex behaviour is thought to be produced by a number (possibly a hierarchy) of control units operating on different time-scales and different levels of abstraction (Miller, Galanter and Pribram, 1960; Powers, 1973a & b; Gallistel, 1980; Carver and Scheier, 1982; Teasdale and Barnard, 1993). Typically, higher-level units supply the set-points (or goals) for lower-level ones, and to that extent are in more general control of the overall system.

It is a feature of all such control systems that the higher-level controllers operate on a longer time scale than the lower-level ones, otherwise the system as a whole would become unstable (see for instance Powers 1978 and 1989). From this it follows that high-level controllers, with their relatively slower mode of operation, will influence the long-term patterning of behaviour, while low-level controllers, with their faster mode of operation, will influence behaviour in the shorter-term. That is to say, there is a direct correspondence between the level at which a given control process operates in a ‘regulative’ (or ‘controller of’ / ‘controlled by’) hierarchy, and the level at which its effects may be seen in the ‘constitutive’ (or ‘part’ / ‘whole’) hierarchical description of the resulting behaviour (Clarke, 1986). (To emphasise that correspondence, which is the essence of the present study, the terms ‘high level’ and ‘low level’ are used here to refer both to processes, where they mean ‘in control of many other units’ or ‘under the control of many other units’, and to descriptions of behaviour, where they mean ‘long-term and coarse-grained’, or ‘short-term and fine-grained’.)
This principle provides a way of examining the roles of different kinds of process in the regulation of action, by seeing which is more involved (specifically in this case by seeing which is more recognisable) in the long-term patterning of behaviour, as opposed to the short term.

A central issue in understanding the regulation of action, is the relative role of cognitive and emotional processes. Tomkins (1981) challenged the traditional view that cognition controls emotion, and there have been numerous studies showing that affect can influence cognition, in particular that mood has systematic effects on memory (e.g. Beck et al, 1980; Bower, 1981; and Blaney, 1986). Some authors describe emotion as the selector or ‘gear change mechanism’ which switches cognitive activity quickly and appropriately from one of its many modes to another, as plans reach crucial junctures, or as circumstances change (Simon, 1967; Sloman and Croucher, 1981; Oatley and Johnson-Laird, 1985). This would be to ascribe a superordinate role to emotion, with cognition operating under its general direction.

This is quite a different matter from the long-standing debate about the ‘primacy of emotion’, in which arguments that emotion has primacy (Zajonc, 1980 and 1984), or that cognition has primacy (Lazarus, 1984), have dealt with the order in which the two kinds of process are brought to bear on fresh incoming information.

Sequence analysis of long-term behaviour patterns.

Sequence analysis methods provide a useful alternative to experimentation in psychology, but they tend to be associated with short-term behaviour patterns (e.g. Bakeman and Gottman, 1986). Part of their appeal, though, lies in their potential for use on much longer time-scales. The method of sequential reconstruction (Clarke, 1975) has been used with a variety of short-range, typically social interaction materials (eg Shapiro, 1976, 1977; Rutter, 1982) and also for the study of other non-linguistic action patterns.
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(Fensome, 1987; Tackett, 1991), but never with long-range sequences of the kind that appear in autobiographical materials or other life-course descriptions (Runyan, 1980). Part of the aim of the present study is to explore and demonstrate the broader utility of this technique, which involves an orderly pattern of behaviour being presented to subjects who have never seen it before, as a series of descriptions scrambled into the wrong order. The subjects’ ability to reproduce the original sequence gives a measure of the extent to which it was originally organised according to generally (even if only tacitly) known principles.

The logic of this is rather like showing that a translation program works well, albeit in producing an unfamiliar language in which mistakes could not be recognised directly, by obtaining independent re-translations to the original language to see if they match the initial passage. In this case the object is to find out whether the sequential context of a series of events has been systematically imprinted upon (or ‘translated’ into) the nature of the events themselves, by finding out whether the characteristics of the events alone, taken out of context, can be translated back into the sequence in which they occurred originally.

If action sequences follow recognisable scripts (Schank and Abelson, 1977), or other more flexible kinds of schemata, over a longer term than we have generally recognised, it would help to explain how novel and yet adaptive and interpretable action patterns are produced in general (Newell and Van Emmerik, 1987), and how global regularities can appear consistently in patterns of events which otherwise appear to be under entirely local control. However, in this connection, it is important to distinguish between ‘production’ scripts, telling people how to behave, and ‘recognition’ scripts, telling them what patterns of events to expect. The latter can quite straightforwardly incorporate psychological, cultural and biological influences on a person’s life course, and it is the existence and accuracy of these which this study addresses; whereas the former only make sense as the templates for the particular regularities which are produced by
psychological (or perhaps cultural) mechanisms of action choice. To take an obvious example, people are the children of parents before they are the parents of children. We all know this, so it might be said to be a feature of our recognition script for human life patterns, and it could be used effectively in solving a practical problem such as the dating of photographs or diaries. However, it would be ridiculous to suggest that this is brought about by a production script telling us that the one kind of role should be engaged in before the other. A recognition script is only descriptive of behavioural regularities, not prescriptive.

Life scripts and autobiographical memory.

Although autobiographical memory is not the main concern of this study, it is relevant in two ways. On one hand, the kind of study reported here may be of interest to autobiographical memory researchers, as it illustrates a particular kind of baseline against which memories may need to be judged, namely the apparent recall that can occur when gaps in a biography are filled by reference to general beliefs about ‘life-scripts’, in the absence of any specific memories as such, (Barclay, 1986; Myles-Worsley et al., 1986; Robinson, 1986; Conway and Bekerian, 1987; Thompson and Janigian, 1988). In the present study this effect occurs in an extreme form, where lives are accurately ‘recalled’ by people who had never known them in the first place.

On the other hand, autobiographical memory research can help to answer a criticism often levelled at studies like this one, that their validity is undermined by their use of retrospective autobiographies rather than diaries, say. Fortunately, research on autobiographical memory is reassuring on this point. While tackling questions about the variability, underlying processes and determinants of autobiographical recall, it has not raised any general doubts about the ability of normally functioning people to know what the main events in their life have been with a fair degree of accuracy.
Of course, the very reconstructability of people’s life stories may itself raise doubts about their validity, since they could, at the first telling, have been constructed from the same general beliefs that other people can use to reconstruct them later on, with or without an underpinning of genuine accurate memory.

**The present study**

The aim of the present study is to apply the reconstruction method of behavioural sequence analysis to some very long-term samples of behaviour, to see whether such sequences follow a recognisable pattern, in the sense that other people can reassemble the correct version of each one from its randomly ordered parts. As well as demonstrating the presence of global structure in the organisation of behaviour, this would show that the reconstruction technique is suitable for use in future with an extended range of problems. A demonstration of the way in which one subject can reproduce another’s life story, may also be helpful to autobiographical memory researchers when considering the base-rate at which subjects may be able to report the past accurately (by means other than remembering it).

Two kinds of sequences were used - ‘high-level’ sequences, or life-long autobiographical descriptions; and ‘low-level’ sequences, covering a two or three year period of the person’s life. As a further contrast, crossed with this in a 2x2 design, the reconstructing subjects were either instructed to attend to ‘cognitive’ cues, to do with the content of events and the attributions they made to the autobiographers’ rational decision-making and planning; or else to attend to more ‘emotional’ considerations, looking for plausible continuities and progressions of affect and mood. This was to see whether an emphasis on emotional considerations would be most helpful to subjects when trying to reproduce long-term action patterns, as would be the case if emotional processes lay behind high-level action regulation and dictated the macro-structure of behaviour; or the reverse, as one would expect if cognition provided the superordinate control system.
Method

Stage 1

Subjects. Eight subjects took part in the first stage of the study. They were recruited from the Subject Panel of the Oxford University Department of Experimental Psychology, and paid a small honorarium and travelling expenses. There were 4 men and 4 women, mean age 42.5 (s.d. = 11.1). Six were married and 1 divorced, with an average of 1.7 children during 15.7 years of marriage, and 1 was single. The men were two students, a school supervisor and a retired person, the women were all housewives.

Procedure. Each subject was asked to write two short autobiographical essays or ‘accounts’, between which they did part of another experiment, which functioned as a distractor task. The first account covered their whole life-story up to the present, and the second covered a period of 2-5 years when they were approximately 2/3 of their present age. There was no counterbalance for order, as the task of considering an entire life story and then expanding on part of it seemed inherently more sensible than describing a specific period first and then attempting to write a coherent biography around it.

The purpose of the first account was to capture the highest levels of organisation in that subject’s stream of actions, as an ultra-short biography or autobiography tends to do, although terms like ‘high level’ or ‘low level’ were not used with the subjects, and no reference was made to concepts like the hierarchical patterning of action or control. The second account, by dealing at the same length with a much shorter period of time, was intended to capture a finer level of detail in the person’s action patterns. The period to be reported was set at 2/3 of the person’s present age so that neither type of account should be constructed distinctively on the basis of recent, fresh and detailed memories. It was expected that the whole-life account would tend to show some recency bias, so it would
have been an over-correction to ask for the shorter account to be based on the time when the subject was only half their present age, even though the life events to be reported would then have had the same mean retention interval as the complete set of life events which could appear in principle in the whole-life account.

Because of the nature of the next stage of the experiment, subjects were asked to construct their accounts in accordance with several additional requirements, which they also had on a written check-list to remind them while they were writing. They were asked to write in chronological sequence, without ‘flashbacks’; in continuous prose rather than in notes; as a coherent story, not just a list of facts and events; using about 600 words in all, or approximately 30 sentences of 20 words each; writing one sentence on each of a pile of blank cards, keeping them in correct sequence afterwards, using a rough draft on a single sheet of paper beforehand if they wished; avoiding explicit indications of sequence such as “firstly” and “secondly” or “after leaving school....”; and as neatly as possible. Subjects were warned in advance that others would see what they wrote, and they were invited to omit or disguise any details they were not happy for others to see. The second account was written without reference to the first, and subjects were told that the ‘units’ in which the accounts were written need not be the same in the first and second account.

Each account, in the form of a sequence of cards, was collected by the experimenter, and the back of each card coded from a secret and random key to indicate the author, the type of account, and the place of that card in the overall sequence of items.

Stage 2

Subjects. Twenty subjects from the same subject panel took part in the second part of the study. There were 10 men and 10 women, average age 36.2 (s.d. = 14.5). Nine were married, 3 divorced and 8 single. Those who had been married had an average of 1.67
children in 15.8 years of marriage. The men included students, unemployed men and professionals, the women included students, professionals and housewives.

Procedure. There were two experimental conditions, with slightly different instructions. Subjects were allocated to conditions so that 5 men and 5 women did each condition, but otherwise randomly. As a separate matter, the accounts from Stage 1 were assigned to two groups of materials so that one group contained the high-level accounts of half the authors, and the low-level accounts of the other half, and vice versa for the other group of materials. This was fully crossed with sex of author. The two groups of accounts were also fully crossed with the two experimental conditions in which the Stage 2 subjects operated. The cards in each pack were thoroughly shuffled before each trial, and the packs within each group administered to each subject in a different random order.

In one condition, the ‘cognitive’ condition, subjects were asked to take each pack of cards in turn and to “focus on the concrete circumstances, events, decisions and actions making up each person’s essay, and try to arrange the cards in the most appropriate sequence to capture the pattern of logical planning and reasoning in that person’s life”. In the other condition, the ‘emotion’ condition, subjects were asked to “focus on the (explicit or implicit) feelings underlying each person’s essay and try to arrange the cards in the most appropriate sequence to capture the emotional pattern or continuity of that person’s life”. Of course, this does not mean that the reconstructing subjects were using their own emotions in performing the task, rather that they were using beliefs about the nature and role of people’s emotions in shaping their lives, as opposed to their beliefs about the nature and function of systematic planning, decision making, and so forth.

Subjects were instructed orally, and asked to paraphrase the instructions to the experimenter’s satisfaction, to ensure that all the salient points had been taken in. They were given a written summary of the instructions to refer to while doing the task, and were asked to spend about 10 minutes on each pack of cards.
They were asked to find the sequence which was ‘most appropriate’ to their version of the task, rather than the ‘correct’ or ‘original’ one, so that, in the event of a conflict between cognitive and emotional cues, they would be free to use one and ignore the other, which they could not so readily do if their objective was to find a particular sequence (such as the original one) to which both kinds of cue were relevant.

After each trial the cards were collected, and the sequence produced by that subject were recorded using the code letters on the backs of the cards.

Results

The reconstructed sequences produced by subjects were compared with the key, and two kinds of scores constructed for each trial. The first score was based on the number of correctly ordered pairs placed anywhere in the sequence. So for instance, if a subject had placed the cards which should be in 4th and 5th position, in the 12th and 13th position respectively, they would gain one ‘point’ towards the score for that trial (see Clarke, 1975). However, that scoring system would have been insensitive to the coherence of each subject’s solution, by assigning the same score of \( n \), to a reconstruction with \( n \) disjointed pairs scattered along its length and to a reconstruction containing a coherent ‘run’ of \( n+1 \) consecutive cards. So a second score was also recorded for every trial, consisting of the number of cards in the longest single correct run.

As different packs of cards (that is different autobiographical accounts from the Stage 1 subjects) had different numbers of items, all scores were calculated as percentages of the maximum score that could be obtained with the deck of cards in question, to make them more comparable. As a further check, the number of cards per pack was compared between the two sub-sets of packs used by the Stage 2 subjects, and not found to differ significantly (\( t=0.711, \text{df}=14, p>0.1 \)). Likewise, the number of cards per pack was
compared between the set of high-level accounts and the set of low-level accounts, and
not found to differ significantly ($t=0.252$, df=14, $p>0.5$). Furthermore, the two subsets of
packs contained equal numbers of high and low-level accounts, and were used equally
often in the emotion and cognition conditions, so differences between packs in the two
sub-sets were fully crossed with the two main treatment variables in the experiment.

The two methods of scoring turned out to be highly correlated ($r=0.79$), and to give
essentially the same pattern of results in subsequent analysis, so only the results for the
original scores (the number of correct pairs per trial) will be reported.

The results were cast in a 2x2 table of high versus low-level accounts x emotional versus
cognitive reconstruction strategies. Within each cell, there were the data from 10
reconstructing subjects each working on 4 separate accounts. However, some subjects
within each cell had worked on one subset of accounts and other subjects on the other
subset. A t-test was carried out within each of the four cells, to compare the two groups
of accounts. In no case did the test even approach significance, so these data were
subsequently treated as equivalent. Finally the four scores were averaged for each of the
10 subjects in each cell, to give a simplified 2x2 analysis with repeated measures on the
high versus low-level variable.¹

The mean (percentage correct) scores for the four conditions are shown graphically in
figure 1.
The main effect due to high versus low-level accounts was significant (F=93.342; df=1.18; p<<0.01), as was the interaction between level of account and reconstruction strategy (F=7.047; df=1.18; p<0.05). The main effect due to cognitive versus emotional reconstruction was not significant (F=1.471; df=1.8; n.s.).

**Discussion**

The main finding of the study is that complete autobiographical sequences have more recognisable structure in them than somewhat shorter periods from a person’s life story, regardless of whether the reconstruction task is being attempted with predominantly cognitive or emotional considerations in mind. There is also some evidence, from the significant interaction effect in the two-way analysis of variance, that the high-level patterns emerge more strongly from cognitively based reconstructions than from affectively based ones.
As long-term patterns seem more pronounced overall than short-term ones, they probably arise from something more than just the accumulation of local regularities. However that is not to say that high-level patterns are governed by exceptionally strong production scripts; only that the combination of all the constraints on the course of a person’s life, including biological, psychological and cultural factors, produces a set of regularities for which people have good recognition scripts.

The advantage enjoyed by high-level descriptions may seem rather obvious. References to school, adolescence, marriage, and so on, in a complete autobiography, can only come in a certain order. But, in the same way in the shorter sequences, college days always begin before they end, relatives grow old (if at all) before they die, and so on. The overwhelming dominance of the high-level sequences is not a logically necessary characteristic of this kind of material.

In the experimental condition where the reconstructing subjects were asked to concentrate on emotional considerations, their performance suffered relatively more with long-term patterns than with short-term ones. This is not what would be expected if the highest-level or longest-term behavioural influences were emotional in character. It may be that emotion is not after all the basis of the high-level control system, or else that subjects in the ‘high-level / cognitive’ condition were so advantaged by the availability of ‘life-scripts’ that other factors were occluded completely.

Overall it seems that sequential patterns, which have usually been studied in relatively short stretches of behaviour, can also be detected in much longer ones using this technique. Performance in all four experimental conditions was extremely accurate, suggesting that recognition scripts are being used effectively under all circumstances. Because of the combinatorial complexity of the resequencing task, the probability of getting any consecutive pair of items together correctly, by chance, from an ordered set of \( n \) items would be \( n^{-1} \), the probability of getting any two independent pairs would be \( n^{-2} \),
and so on. So the chance of getting between 25% and 40% of the possible pairs right by chance, from sets with an average of 28.75 items, is vanishingly small. (It is impracticable to calculate the probability exactly, as the parts of the task interact strongly and in a different way for each of the n! different configurations which can arise with a set of n items, see Clarke, 1975).

It seems then that recognition scripts may need to be considered in future in the design and interpretation of autobiographical memory studies. They are also worth studying in their own right, since they are likely to differ markedly between individuals and groups, with implications for the ways in which false expectations and mis-attributions may arise, and may lead to misunderstandings.

The general picture which emerges, of freedom within constraint, or detailed variation within more global consistency, is in itself a characteristic of hierarchical control structures with downward flows of control. It is a further reminder that explanations of behaviour patterns on any scale need to consider the larger framework of which the behaviour is part, as well as the finer components of which it is made.

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Notes

1 With percentage data such as these, a situation can arise where the within cell variances differ markedly from cell to cell, and in systematic relation to the differences in means
between cells. This is a serious violation of the assumptions of an analysis of variance, for which the usual remedy is an arcsin transformation of the data prior to analysis. However, an unnecessary transformation would be undesirable as it would tend to reduce the value of any interaction terms in the analysis, which in this case were especially relevant to the general purpose of the experiment. According to Hartley’s criterion (Winer, 1962, p.93), results appearing at the 5% significance level may be accepted on the basis of the untransformed data if the highest within-cell variance is less than 6.31 times the lowest. Results appearing at the 1% level of significance may be accepted so long as the disproportion between highest and lowest within-cell variances is less than 9.9 fold. In this case the ratio of highest to lowest within-cell variance was only 1.63, so it was judged appropriate to proceed with the untransformed data.

References


