Arbeitspapier Nr. 1 des Projektes
Kognition und Kommunikation bei der Längsschnittdatenerhebung

Maike Reimer

Collecting Event History Data About Work Careers Retrospectively: Mistakes That Occur and Ways to Prevent Them

08/2004

Contact:

Maike Reimer
Max-Planck-Institut für Bildungsforschung
Lentzeallee 94
14195 Berlin

reimer@mpib-berlin.mpg.de
http://www.mpib-berlin.mpg.de

The project focuses on cognitive and communicative processes in longitudinal surveys and their influence on data validity and reliability. Retrospective surveys provide a valuable opportunity for observing respondent's cognition and interviewer-respondent-interaction in real-life setting. A special focus lies on the cognitive processes of autobiographical remembering in retrospective interviews of the "German Life History Study". Another central aspect is the development of innovations in the data collection procedure to counteract memory errors. Aided recall techniques and techniques of flexible or conversational interviewing are empirically tested and evaluated.

Contents

Abstract

In this paper, I examine how and how reliably respondents recall the episodes and transitions of their work biographies in the retrospective survey of the "German Life History Study" (GLHS). In a reinterview, about 44 % of the respondents report sequences of episodes and transitions that are not equivalent to those from the first interview. Overall, the later sequences show less change and are more conventional, but changes in any direction occur. Errors are generated at three steps in the cognitive reconstruction process: when respondents report their state at a given point in the past, when they reconstruct a transition into the next episode and when they date start and end of the episode. Inconsistent reports are most likely where the organization of autobiographical memories does not correspond well to the states asked for. To improve retrospective reports, a number of aided recall techniques are introduced in the data collection procedure; their implications for survey standardization and the role of the interviewer are discussed.

1 Introduction

Event histories are an indispensable form of longitudinal data for social scientific analyses of work biographies. Event histories are characterized by a) the episodes that make them up (i.e. episodes of employment or unemployment), b) the transitions between them (i.e. from employment to unemployment) and c) their temporal sequence and dates. From this basic structure, an immense wealth of temporal information is derived, such as frequency, incidence, timing, pacing, and duration of life events and exposures.

Event history data is most conveniently collected in retrospective standardized survey interviews. But here, worlds collide: for social scientific analyses to be valid and meaningful, every respondent has to report all relevant episodes and transitions in every interview in the way intended and to date them correctly. At least, errors should occur at random over respondents and response categories. Retrospective reports however rely on the respondents' autobiographical memory. Autobiographical memory is a selective and reconstructive cognitive process that represents and stores information about the past in a database. Required information is reconstructed from the stored representations, guided by cues that specify what and how information is to be reconstructed. In the course of this process of representation, information is forgotten completely or distorted to be consistent with information already stored and with individual or normative notions of a biography (Bahrick, 1998; Barsalou, 1988; Bartlett, 1932; Bluck & Habermas, 2001; Brewer, 1996; Conway & Pleydell-Pearce, 2000; Neisser, 1986; Neisser & Fivush, 1994; Robinson & Taylor, 1998; Ross, 1991; Rubin, 1998).

So completeness, accuracy and unbiasedness are severely at risk when using memory-based reports as data. To make sure that survey reports are correct and survey estimates measure what they are meant to, data collection methods must be designed to prevent errors and especially biases. The development of effective techniques of aided recall requires a detailed and theoretically based understanding of how responses are generated in a specific interview.

In this paper I examine how and how reliably work biographies are reconstructed in the German Life History Study (GLHS). Using both qualitative case studies and quantitative analyses, I will address the following questions:

> By what cognitive steps is the sequence of episodes and transitions reconstructed and dated?
>
> Where and how does this reconstruction process lead to what kind of errors?
>
> What techniques of aided recall can prevent them?

First, I will explore the respondents' cognitive tasks in detail, relate them to the structures and processes of autobiographical memory and develop assumptions about memory errors. After presenting qualitative and quantitative findings, I will describe innovations in the data collection procedure and discuss their implications for the practice of standardized survey interviewing.

2 Autobiographical Recall in the German Life History Study

2.1 Opportunities for Studying Reliability of Recall

My analyses use work biographies collected in the ongoing German Life History Study (GLHS) at the Max Planck Institute for Human Development in the Center for Sociology and the Study of the Life Course. A research group headed by Karl Ulrich Mayer has collected event history data about residence, work and family from specific birth cohorts in retrospective standardized interviews during the last two decades. The GLHS provides a unique opportunity to study memory error in retrospective reports: East German respondents interviewed in 1991/1992 were interviewed again about their employment histories in 1996/1997 to follow up on their life courses after reunification. In the second interview, work biographies were collected not from the date of the first interview but instead, the reference period was bounded towards the past by December 1989, the month after the fall of the Berlin wall (see figure 1). This landmark event helped respondents to remember their activities at this outstanding point in their lives and find a good "entrance" into the interview. As a side effect, respondents reported a second time on a period of approximately two years, from December 1989 to the date of the first interview in 1991 or 1992. Inconsistencies between reports for this reference period can be attributed to inconsistent autobiographical reconstructions, and since four to five years have elapsed between interviews, to the greater recall difficulties in the second interview.

Figure 1. Time period covered by interviews 1 and 2

	Interview 1					Interview 2 Reference period																			
Year (19..)	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	...
retrospective distance (yrs)																							
Interview 1						0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	...
Interview 2	0	1	2	3	4	5	6	7	8														
appr. age of respondents (yrs)																							
... born 1939-41	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	...
... born 1951-53	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	...
... born 1951-53	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	...

Source: German Life History Study

The reference period coincides with the immediate Post-"Wende" period in East Germany, where the transition from a planned to a free labor market system uprooted all labor market institutions and employment structures at an unprecedented pace (Goedicke, 2002). Precarious jobs and unemployment became and have remained common; industrial output slumped in the second half of 1990 to 60% of its pre-unification level (Flockton, 1998) and Diewald (1999) estimates that since 1989, available employment has declined by 40%. In such an extremely volatile institutional situation, respondents' careers will be less stable, contain more changes and complex biographical constellations than careers in stable labor markets. This makes data collection a greater challenge, but offers the analytic advantage of a sufficiently large number of difficult cases in which memory errors can be observed.

2.2 Cognitive Tasks in the GLHS

In the GLHS, an employment history is a continuous sequence of *employment episodes* (or jobs), interrupted by episodes of *unemployment* and *labor market inactivity* (primary education, house work, maternity leave, pension and other). A person's work history is described as a continuous chronological movement through this comprehensive and mutually exclusive "state space": he

or she is at any given point in time in one and only one of those states[1]. During times of continuous employment, any of the following changes constitutes a transition into the next employment episode or job: change of company, work time, income, professional activity or professional position. I will concentrate on how and how reliable this basic episode structure is reconstructed and dated.

Analyses are based on reports of 1049 respondents born in 1939-41, 1951-53 and 1959-61, approximately half men and half women. Most interviews were conducted by telephone in collaboration with *infas*, a professional data collection institute. Interviewers were trained by members of the research group in the collection of event history data and the use of the computer based questionnaire. Episodes of employment and vocational training were collected in separate modules, each one in forward chronological order. In interview 1, recall started with the first job or first vocational training ever, in the second interview with the first episode at or after December 1989. So each respondent went through his or her life repeatedly. After that, all remaining temporal gaps had to be closed; respondents could report another employment or vocational training episode not yet mentioned, report unemployment or choose another of the states of labor market inactivity[2].

This data collection strategy requires respondents to perform a reconstruction process that involves three cognitive steps:

> Step A: "*Episode labelling*": respondents recall their main activity and describe their state as employed, unemployed or labor market inactivity,
>
> Step B: "*Transition reconstruction*": respondents delimit the episode by reconstructing a change that constitutes a transition into another episode,
>
> Step C: "*Dating*": respondents recall month and year for start and end of the episode.

Inconsistencies and errors can be generated at all three steps. At step A, respondents might recall and label their main activities differently at a later date – for example, as having been

[1] This concept of the work biography focuses on a respondent's *main activities* that are highly structured by labor market and education institutions (i.e., full-time or part-time jobs or full-time vocational training or study). A second, less institutionally structured path of irregular, seasonal or minor work episodes, additional vocational training or further schooling, is assessed separately and not included in the present analyses.

[2] Technically, the data consists of records each representing an episode; with one variable containing the ID of the respondent who reported them and one running index to distinguish them from each other. The dates of start and end of n episode – the transition into and out of them – is another detail variable of the respective episode. After collection, the data was extensively and meticulously edited on a single case basis to create consistent and plausible event histories. I will, however, use the unedited responses as provided by the respondents in the actual interview.

unemployed in the first and as having been on maternity leave the second time. At step B, they might forget or erroneously recall a transition, i.e. forget a promotion or insert a raise in pay. In the same way, they might also forget or insert entire episodes. Finally, at step C, they might misdate start and end of an episode by months or years, either reporting a later or an earlier date. Since the reference period is bounded towards past and present, this can mean that whole episodes or transitions are moved out of the reference period, or into it.

3 Episodes and Transitions in Autobiographical Memory

Information about past experiences is stored as a network of representations in a long-term store. The representations are interconnected by the information they share. The interconnecting pathways run hierarchically within domains ("top down"), parallel across domains and according to the temporal sequence of events (Barsalou, 1988; Conway, 1996). When presented with a cue (such as a survey question), the required information is reconstructed by searching this network of autobiographical memory for information that matches the cue to a sufficient degree (Conway, 1996; Shum & Rips, 1999). Recall is most successful when cues are faithful (match to the respondents' representation of his experiences) and specific (match only the correct information) (Shum & Rips, 1999).

Representations in autobiographical memory are organized around sequences of episodes and transitions and grouped into thematic domains, such as "School", "Work" or "Family life". According to Conway and Pleydell-Pearce (2000), autobiographical information is represented on three levels of abstraction. On the lowest level, there is very detailed event specific knowledge (such as persons, activities, sights, sounds, and other basic perceptions about a work place). On the intermediate level, there is a heterogeneous mix of specific episodes of shorter or medium duration (such as specific work days or a job interview) and recurring episodes ("lunch breaks at company Z"). On the top level, there are "lifetime periods", extended episodes that characterize sections within a thematic domain (such as "my time with company X" or "When I was a housewife"). The episodes and transitions to be recalled in the GLHS correspond to the level of life time periods. Life time periods are defined by the activities, social roles, persons, goals and plans in the respective domain. Transitions into another life time period are marked by relevant changes in these activities, social roles, persons, goals and plans (Barsalou, 1988;

Conway & Pleydell-Pearce, 2000; Habermas & Bluck, 2000; Markus, 1977; Robinson, 1992; Singer & Salovey, 1993).

All represented and reconstructed episodes and transitions are *subjective constructions,* as Neisser (1986) observes: "...events like these have no objective reality – that they are brought into existence only by the way we perceive and talk about them." Auto biographical memory has a central function for the self: in order to provide a sense of identity and biographical meaning, representations are organized into a life story within a framework of normative expectations about biographies and the way they are to be recalled and told in certain recall situations – even if this means that information has to be partly ignored or distorted. Information not receiving this "treatment" is often forgotten completely (Barclay, 1986; Bluck & Habermas, 2000; Conway & Pleydell-Pearce, 2000; Lampinen, Faries, Neuschatz, & Toglia, 2000). Therefore, life time periods are formed according to the normative expectations and perceived internal logic of a life at the time of representation and at the time of recall. If the perceived internal logic changes, the memory organization can also be adapted. Unreliable recall leads to retrospective reconstructions being more conventional and simplified and more consistent with the individual's self perception at the time of recall (Barsalou, 1988; Neisser & Fivush, 1994).

3.1 Steps A and B: Potential for Unreliability of Recall

Unreliability at step A (episode labelling) is likely when the activities and social roles, goals and plans of a lifetime period do not match any of the cues given (lack of cue faithfulness), or match more than one of the states (lack of cue specificity). Likewise, unreliability at Step B (episode reconstruction) is likely when the transitions the GLHS assesses do not correspond to transitions between represented life time periods.

The episodes and transitions assessed in the GLHS reflect research interests into a society's labor market institutions rather than life time periods in autobiographical memory. Biographical constructions and societal institutions however are not independent of each other (Kalicki, 1996; Kohli, 1985; Neugarten & Datan, 1973). In industrialized societies, labor market institutions profoundly structure the everyday life and the life course; identity and success within these institutions are central to self-esteem and well being. The institutional labor market structure of a society should therefore be reflected in the representation of the work biography as life time periods. Cues such as "employed", "vocational training" or "end of

employment", which stand for very specific and complex sociological concepts, should correspond to stored lifetime periods.

Some biographical constellations are more ambiguous than others, however. A person who works 45 hours per week as a teacher will straightforwardly match this memory to the cue of "employed", while for someone doing irregular free lance work while raising children, the cues will be less faithful and specific. Unemployment can resemble some forms of labor market inactivity, especially being a housewife. Respondents will resolve ambiguities in line with the internal and normative logic of their life course at the time of recall. Later reconstructions will therefore be more consistent and conventional. Some employees do not fit the concept of a company, like institutions of public service or schools, making the apparently straightforward cue of "change between companies" ambiguous. Episodes of employment (as a young and middle-aged adult's "standard activity") will be recalled more reliably than other types of episodes, and when episodes are re-labelled, a switch to employment will be most widespread.

Transitions in life time periods reflect emotional and consequential self-relevant changes in work-related activities, social roles, plan and goals (Bahrick, 1998; Brewer, 1996). Such transitions will be reconstructed more reliably than transitions into episodes that do not constitute a life time period. For example, a transition from employment to being a housewife for several years or a change between companies will be recalled reliably. Changes within a company need not be that marked and will, on the whole, be recalled less reliably. Overall, memory's tendency towards reduction in complexity and conventionalisation will lead to transitions being more often forgotten than inserted.

3.2 Recall for Unemployment

Unemployment constitutes a special case. A transition into unemployment should be a profound and marked change in work-related social roles, activities and goals. Findings from survey research, however, show that episodes of unemployment have a particularly high risk of being forgotten (Dex & McCulloch, 1997; Elias, 1997; Paull, 2002). In fact, unemployment is not characterized by positively defined social roles and activities, but rather the absence of precisely that (Mutz, 1996). This can be explained by the social stigma unemployment carries: in terms of biographical goals and developments, it constitutes a personal failure or "dead end". A stable life time period of unemployment, therefore, will only rarely be formed. Whenever the

information stored about the time period of unemployment matches another cue, the ambiguity will be more readily resolved into the direction of labor market inactivity or employment at step A. Also, transitions into unemployment or whole episodes are at risk of being omitted at step B. Unemployment, therefore, will be recalled very unreliably and has a strong tendency to be reported less often at a later date.

3.3 Step C: Time and Dates in Autobiographical Memory

The temporal orderliness of events and transitions is a central principle of autobiographical memory organization, especially the temporal succession of events (Conway, 1996). But calendar dates such as months and years do not correspond to personally and socially meaningful time patterns and are not represented in autobiographical memory. Calendar dates are less recalled than *inferred* from an event's biographical context by relating a reconstructed event to one or more landmark events, the dates of which happen to be known – such as birthdays or (public) holidays ("I started working at X after I married in 1990") (Friedman, 1993; Larsen & Thompson, 1995; Larsen, Thompson, & Hansen, 1996; Thompson, Skowronski, & Lee, 1987).

Another strategy is the use of temporal schema, which contain general knowledge about time, and the occurrence of events ("I started to work for X in spring"). In both dating strategies, people explore of all kinds of temporal connections between events: "earlier than", "after", "during" and "time elapsed since" (Friedman, 1993; Huttenlocher, Hedges, & Bradburn, 1990; Larsen & Thompson, 1995; Larsen et al., 1996; Loftus & Marburger, 1983; Shum, 1998). Chronological sequence – either backward or forward – is one oft the most helpful dating strategies (Linton, 1986; Loftus & Fathi, 1985; Means & Loftus, 1991).

Dating errors have been shown to be frequent, partly large and greater for more remote events (Rubin, 1982; Rubin & Baddeley, 1989). In some studies they also lead to biased dates, i.e., wrong dates are more often reported as having occurred later or earlier than the actual dates (Bradburn, Rips, & Shevell, 1987; Loftus & Marburger, 1983; Neter & Wakesberg, 1964; Sudman & Bradburn, 1973; Thompson, Skowronski, & Lee, 1988). Other studies found a tendency to err by exactly one year while recalling the month correctly. Such "scale effects" occur because different calendar units are reconstructed independently of each other and errors on the month scale are therefore independent of errors on the year scale (Auriat, 1993; Friedman, 1987;

Larsen & Thompson, 1995; Rubin & Baddeley, 1989; Thompson et al., 1988). If the year is harder to infer for a specific event than the month, wrong dates will be exactly one or more years off.

In the GLHS, the dating at step C follows after episodes and transitions have been reconstructed at steps A and B. This facilitates dating, since calendar dates are reconstructed within the context of the reconstructed events and their sequence. Dating errors will occur frequently, but will mostly be small and equally often in both directions, possibly with scale effects of one or rarely two years.

3.4 Memory Error for Work Biographies in Surveys

Studies of memory error in work histories (or events histories in general) that use real survey data are rare, since criteria for evaluating accuracy (such as valid documents from other sources or concurrent reports) are seldom available. Studies that make use of such opportunities include Auriat, 1992; Belli, Shay, & Stafford, 2001; Brückner, 1995; Cannell, Fisher, & Bakker, 1965; de Graaf & Wegener, 1989; Dex & McCulloch, 1997; Elias, 1997; Freedman, Thornton, Camburn, Alwin, & Young-DeMarco, 1988; Künemund, 1990; Lieury, Aiello, Lepreux, & Mellet, 1980; Marquis, 1978; Mathiowetz & Duncan, 1988; Means & Loftus, 1991; Miller & Groves, 1985; Papastefanou, 1980; Paull, 2002; Pierret, 2001; Thélot, 1990; Tölke, 1980 and van der Vaart, 2002.

Their results indicate that retrospective survey reports do differ from reality – and that reports with longer retrospective intervals differ from reports with shorter retrospective intervals – in a specific way that reflects memory processes. Events are frequently forgotten entirely. Most at risk are events that are short, insignificant and inconsequential for the individuals' biography, do not correspond to individual and normative expectations about a life or do not fit well to the researcher's cues. Episodes of unemployment and episodes of labor market inactivity are remembered less reliably than episodes of employment, and the more densely a work biography is packed with change and the more its episodes resemble each other, the more likely are memory errors.

Memory for the broad temporal placement of events and their sequence is usually quite good. Exact calendar dates can be quite reliable for major life events and transitions and deviations from the actual date seem to be symmetrical.

Various principles and techniques of aided recall have been shown to improve both the recall of events and their dating: the bounding of reference periods (Johnson, Gerstein, & Rasinski, 1998; Loftus & Marburger, 1983; Sudman, Finn, & Lannom, 1984), the individual contextualization of memories across and within domains (Belli, 1998) and calendar grids and lines as dating aids (Belli et al., 2001; Means & Loftus, 1991; van der Vaart, 2002; van der Zouwen, Dijkstra, & van der Vaart, 1993).

4 Results

4.1 Qualitative Analysis: Case Studies of Recall Inconsistencies

To understand in detail how work biographies in the GLHS are dismembered, I compared reports of 150 respondents with inconsistent numbers and kinds of episodes in the two interviews. I represented each pair of event sequences graphically on a time line and tried to understand the nature of their causation by examining detail variables and taped records of the interviews. A number of common inconsistencies could be identified that changed the sequences episode structure in characteristic ways and were related to the three cognitive steps outlined in section 2.2. Illustrative examples are graphically displayed in appendix 1 and described in the following paragraph.

4.1.1 Step A: Inconsistent Episode Labelling

In the first example, a woman describes herself in the first interview as a housewife; the same time period is described as unemployment in the second interview. As said before, social roles and activities of being unemployed and being a housewife can resemble each other, so that both cues match the information stored to a certain degree. In the second interview, this ambiguity is resolved in favour of unemployment.

In the second example, an episode of unemployment covers the time where in the first interview an employment episode was reported. Upon closer inspection, this employment episode is one with "Kurzarbeit". During "Kurzarbeit", when there is work shortage in a company, employees work less and gain less for an unspecified period of time but keep their work place and contract as before. In extreme cases, working hours can be reduced to zero. Some compensation for the reduced income can be received from the Bundesanstalt für Arbeit (Federal Employment Services) that also distributes unemployment benefits. So this lifetime period matches both cues

– employment and unemployment – to a certain degree, and this ambiguity is resolved in favour of unemployment in the second interview.

4.1.2 Step B: Inconsistent Transition Reconstruction

Example B 1 illustrates retrospective reduction in complexity and retrospective elimination of unemployment episodes from the life course. In May and June 1990, two transitions into unemployment and back to employment are omitted in the second interview. Thus, an episode of unemployment (UE 1) is omitted. The same error occurs again later in the sequence, leading to the omission of the unemployment episode UE 3. The two temporal gaps are filled in two different ways: for UE 1, one of the adjoining employment episodes is temporally "stretched", so that a transition between the first and second employment episode is reported where there was the transition from unemployment back to employment in the first interview. For UE 3, the two adjoining employment episodes are merged into one, "ironing out" any transition.

Example B 2 illustrates how retrospectively, complexity can be increased: four transitions and two episodes are inserted into a time of continuous employment. In order to "make room" for an unemployment episode (UE), the first employment episode is temporally compressed and ends much earlier than in the first interview. An episode of labor market inactivity (LMI illness) is inserted into the middle of an employment episode, splitting it into two jobs.

Example B 3 again illustrates retrospective reduction of complexity: one transition is omitted and the adjoining episodes merged. The respondent reports the same professional activity, driving a vehicle, in both interviews, but the employer changed from "VEB" (Volkseigener Betrieb, a state run company of the former GDR) to an "AG" (incorporated company). This change is reconstructed as a transition in the first but not in the second interview. During the early nineties, companies in the former GDR were very frequently closed, reopened under other names and in other organizational forms, dissolved, partitioned and reassembled (Goedicke, 2002). As a consequence, the cue "company" does not match the represented information as straightforward as in less volatile situations.

Example B 4 illustrates how complexity increases by inserting a transition and dissecting a period of continuous employment into two episodes. Again, "Kurzarbeit" is to blame. The period with Kurzarbeit matches the cue "employment" in both interviews alike, but only in the second interview, the introduction of Kurzarbeit is reconstructed as a transition. A look at the reports

for the time after the reference period shows that in 1994, this respondent became unemployed following the Kurzarbeit. It seems plausible that the introduction of Kurzarbeit did indeed constitute a consequential transition into another lifetime period only with this changed perspective in 1997.

4.1.3 Step C: Inconsistent Dating

The first example shows a dating error of two months for a transition between employment and unemployment. There are few consequences for the sequence and its episode structure, only one episode is now of longer and the other one of shorter duration. The second example illustrates how even small dating errors can have severe consequences, if they move transitions across the borders of the reference period. In this case, one whole job is excluded ("dairy") at the front of the reference period, and another job included at the rear ("catering").

4.2 Quantitative Analyses I: Inconsistent Numbers of Episodes

As table 1 shows, the number of episodes and transitions declines considerably from the first to the second interview, reflecting autobiographical memories' tendency to forget rather than to add and to simplify rather than render more complex. The drop from 1883 to 1731 episodes is equivalent to a loss of about 8%. Correspondingly, the number of transitions decreases by 18%. The decline is more pronounced for episodes of labor market inactivity than for employment episodes, and there is actually an *increase* of about 24% in episodes of unemployment. The heavier loss in episodes of labor market inactivity reflects autobiographical memory's tendency towards the more conventional and normative. The increase in unemployment, however, comes as no little surprise.

Table 1. Number of episodes and transitions in interviews 1 and 2

	Interview 1	Interview 2	Change in %
Episodes	1883	1731	-8.07 %
Transitions	834	682	-18.2 %
Employment episodes	1586	1424	-10.2 %
	84.2%	82.3%	
Episodes of labor market inactivity	156	131	-16.0 %
	8.3%	7.6%	
Unemployment episodes	141	176	+ 24.8 %
	7.5%	10.2%	

Source: German Life History Study

To examine the correspondence between individual reports, table 2 compares pairs of sequences from the first and the second interview. In the upper third, the numbers of jobs reported by a respondent in the first and in the second interview are crosstabulated. In the diagonal, those who report a consistent number of jobs appear in bold face; beneath the diagonal those who report less and above the diagonal those who report more jobs.

Overall consistency is high: 734 respondents (69.9%) report the same number of episodes. This percentage decreases with the number of jobs: if only one episode (and no transition) occurred in the first interview, 86% report consistently in the second interview, but only 35% if three or more episodes occurred. A decrease in jobs is much more common than an increase: of the 315 respondents with inconsistent numbers of jobs, 71.7% report a lower number in the second interview. This asymmetry leads to the net loss of employment episodes visible in table 1.

Table 2. Correspondence of individual reports – numbers of episodes of employment, labor market inactivity and unemployment

Interview 1		Interview 2				
		N employment episodes				
		0	1	2	3 - 5	Total
Employment episodes	0	24 80.0%	6 20.0%			30
	1	8 1.40%	481 86.4%	61 10.9%	7 1.3%	557
	2	7 1.9%	152 41.0%	197 53.1%	15 4.0%	371
	3 - 5	0	21 23.7%	38 41.8%	32 35.2%	91
	Total	39	660	296	54	1049
		N episodes of labor market inactivity				
		0	1	2		
Episodes of labor market inactivity	0	854 94.8%	45 5%	1 0.1%		900
	1	64 45.1%	74 52.1%	4 2.8%		142
	2	5	2			7
	Total	923	121	5		1049
		N unemployment episodes				
		0	1	2		
Unemployment episodes	0	854 93.2%	60 6.8%	2 0.2%		916
	1	26 20.6%	97 76.9%	3 2.4%		126
	2 - 3	1	3	3		7
	Total	881	160	8		1049

Source: German Life History Study

The pattern for labor market inactivity (in the middle third of the table) and unemployment (bottom third) is slightly different. Most respondents report no such episode, and only very few report more than one. Consequently, any inconsistency is a move between one and zero, in other words: either the re-labelling of an episode at step A – or the omission or insertion of an episode (or two transitions) at step B. For both unemployment and labor market inactivity, there is a very high consistency for reporting no episode at all: more than 90 % who report no such episode in the first interview also report none in the second.

For labour market inactivity, respondents who omit an episode of labor market inactivity outnumber those who insert one: 45 respondents (41.9% of those who report an inconsistent number) move from no episode to one episode, while 64 respondents (58.7%) move into the opposite direction from one to no episode. The asymmetry that produces the net loss in table 1 is therefore less pronounced than it is for episodes of employment.

Also, the unexpected net gain in unemployment episodes is the result of two opposing currents: the 65 respondents who insert an unemployment episode in the second interview (71.4% of those who report an inconsistent number) outnumber quite strongly the 30 (27.6%) who omit one.

4.3 Quantitative Analyses II: Equivalence of Episode Sequences

Table 3 explores the consequences of the changes in recall for the comparability of sequences. I distinguish between sequences that are *equivalent* with respect to their episodes and transitions and *non-equivalent* sequences. Two sequences are equivalent if they contain consistent numbers of employment, unemployment and episodes of labor market inactivity, and in addition the same numbers and kinds of transitions. Among our qualitative cases, only the example C (misdating within the time period) consists of equivalent episodes and transitions.

More than half of the respondents (56.1%) reconstruct equivalent sequences. This figure is clearly lower for those with more change and complexity in their lives: among those who reported no transitions and only one episode, 84% reported equivalent sequences in the second interview. Among those with two transitions, this percentage is only 39% and drops to 25% for those with three and 12% for those with four or more transitions.

Table 3. Percentage of equivalent sequences

	N of transitions in interview 1				
	all	**0**	**1**	**2**	**3+**
Equivalent sequences	589 56.1%	393 84.3%	155 39.0%	35 25.4%	6 12.2%
N	1049	466	397	138	49

Source: German Life History Study

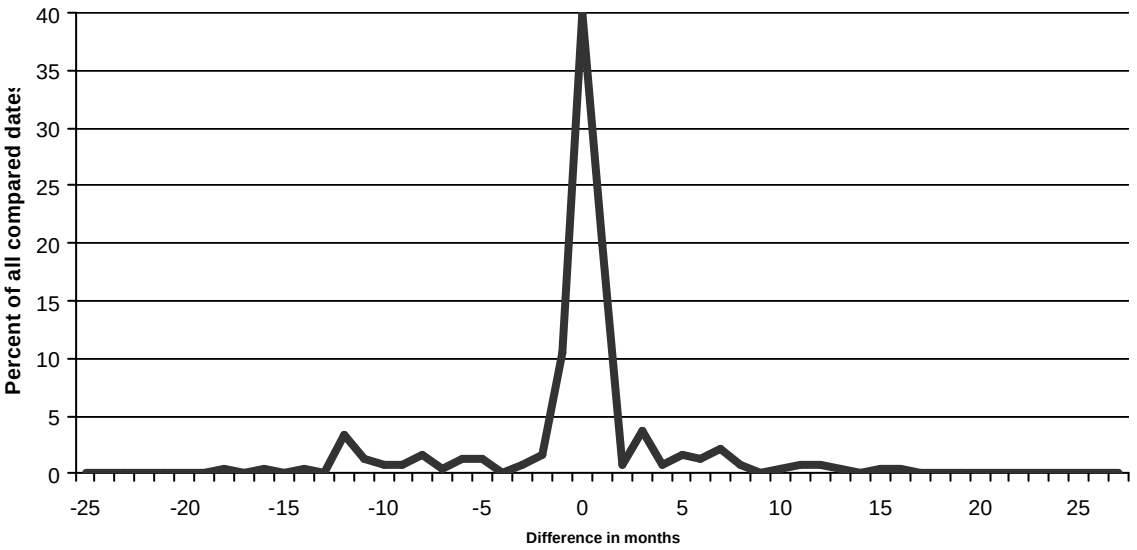
4.4 Quantitative Analyses III: Dating Errors- Frequency, Size and Distribution

In order to examine size and distribution of dating errors, I look at the inconsistencies in dates between two dated transitions. This makes only sense if the two transitions are actually the same or equivalent. In example B 2 (insertion of an episode) or example C (misdating across the borders of the reference period), the first transition in the reference period is clearly not equivalent. Therefore, I compare dates only for those 237 pairs of sequences that describe their first transition consistently as transitions from employment to another employment within or between companies, to labor market inactivity or to unemployment.

Figure 3 displays the difference in months between the two reported dates on the horizontal and the percentual frequency of occurrence on the vertical axis. A difference of zero means that identical dates are reported, a positive difference means a later date in the second interview, and a negative difference means an earlier date in the second interview.

Around 40% of respondents report the exact same month and year, and about 73% of inconsistent dates differ by no more than 2 months. Differences of up to 15 months in both directions happen with low frequency. Most respondents deal very effectively with the challenging task of inferring a calendar date of a work transition that occurred around five years earlier, once they have reconstructed it correctly.

Figure 2. Difference between dates for first transition reported in interview 1 and 2



Source: German Life History Study

The distribution of dating errors is more or less symmetrical, with slightly more respondents reporting later dates in the second interview and a slightly higher number of large discrepancies when earlier dates are reported. A weak but perceptible scale effect appears as a small peak at 11-13 months negative difference. Here, a number of respondents reconstructed the month correctly but erred by one year. This, however, occurs only when an *earlier* date is reported. A possible explanation for this asymmetry is that errors that move the reported date one whole year towards a later date frequently result in moving the transition out of the reference period altogether, so that such cases were not included in the date comparison anymore.

4.5 Summary of Results

Respondents fail to reliably reconstruct their work histories at three points of the reconstruction process: when matching their recalled activities and social roles to one of the cues from the state space, when reconstructing transitions in activities and social roles in accordance with the cues, and when dating start and end of an episode (although dating errors are not biased and in two-thirds of the cases no larger than two months). Both at the aggregate and the individual level, this leads to a widespread instability in the reconstructed sequence of episodes and transitions.

Errors follow a memory pattern of simplification and conventionalisation, leading to an overall reduction in episodes and transitions, because those who omit transitions and re-label episodes according to the "standard activity" outnumber those who err into the opposite direction by a larger (employment episodes) or smaller (labor market inactivity) margin.

Errors are not distributed evenly among all respondents but affect mostly those respondents who have complex careers with more than one transition.

Inconsistent labels are assigned then when the state space categories offered as cues do not match straightforwardly onto the respondent's recollections. Transitions are reconstructed inconsistently when they are not relevant to the normative and individual biography of the respondent in one or both interviews.

The marked increase in unemployment episodes, which runs contrary to all expectations and findings from the survey literature, deserves special attention. Since there are no internal divisions of episodes of unemployment, it cannot be due to the dissection of one longer period of unemployment into two or more episodes. Neither do the inserted unemployment episodes

predominantly occur towards the end of the reference period, making it unlikely that they are mostly moved erroneously into the reference period by predating. The increase seems to be due to a widespread tendency to insert episodes into lives previously free of any unemployment or resolve ambiguities from the later date in favour of unemployment.

I assume that the fundamental changes in labor market context between the two interviews are responsible for this unexpected result. Unemployment was officially nonexistent in the GDR and promoted as an exclusive problem and flaw of the rival capitalist system. At the time of the first interview in 1992, representations of activities and social roles are especially unlikely to match the cue "unemployment", and any ambiguity will more likely be resolved in favour of employment or labor market inactivity. At the time of the second interview, however, the profound and speedy transformation had given way to a longstanding structural crisis: unemployment became and has remained widespread and common. In such a context, unemployment need not be explained as a result of individual (failed) decisions. It loses its stigma (Gallie & Vogler, 1994; Mutz, 1996) and can become more easily a life time period of its own. One might even assume that unemployment has become a collective experience of East Germans, making it part of the East German standard biography.

For two reasons, there is no direct correspondence between specific memory errors and numbers and kinds of episodes in the sequence: The same inconsistency can be the result of different mechanisms. For example, omission, inconsistent labelling and merging of episodes all reduce the number of employment episodes. More than one memory error can affect a sequence, either the same error occurs repeatedly, or a respondent makes different kinds of errors. These can either lead to a decrease or to an increase in episodes and transitions (and therefore change and complexity), and may even cancel each other out – as in example C 2.

5 Strategies and Techniques of Aided Recall for Retrospective Event History Data

5.1 Improvement of Cues for Episode Labelling and Transition Reconstruction

One way to increase the specificity and faithfulness of cues is to provide respondents with a better understanding of the concepts behind them. When the US's Current Population Survey (CPS) introduced a more detailed cueing of "unemployment", the number of people reported being unemployed increased considerably (Norwood & Tanur, 1994).

Detailed concept definitions, however, make questions more wordy and increase respondent and interviewer burden. The amount of information one can pack into a cue is also limited by working memory restrictions (Baddeley, 1986). Moreover, comprehensive definitions that would do justice to all possible biographical constellations are superfluous for the majority of respondents with "straightforward" lives. A promising solution is to provide a more detailed specification only when necessary - i.e. when respondents explicitly asks for an explanation or when interviewers notice a misunderstanding from side remarks or from their knowledge of the respondent's earlier answers (Conrad & Schober, 2000; Schober, Conrad, & Fricker, 1999; Suessbrick, Schober, & Conrad, 2000).

Another way of making cues more specific is not to operate with pre-written specifications but let interviewers and respondents work out in an individual conversation how to record a given biographical constellation. Interviewers must point out possible problems to respondents, provide the necessary clarification or ask for detailed information in order to decide how a certain biographical constellation is to be labelled or whether a change constitutes a transition into another episode. Thus the cue can, in interaction, be tailored to suit the idiosyncratic biographical circumstances and cognitive needs of the respondent.

5.2 Exploitation of the Individual Network of Representations for Better Recall and Dating

The questionnaire structure in the GLHS facilitates the use of memory's mechanisms and structures at several points. The chronological sequence of assessment allows respondents to search for information along the temporal-sequential interconnections between representations. The recall of episodes within domains makes the thematical "top-down" pathways accessible. But there are some limitations. First, the separation into modules does not allow parallel or horizontal pathways to be explored to full effect. Second, respondents are not explicitly encouraged or supported to explore any of the pathways. And third, apart from the bounding of the reference period towards the past by the fall of the Berlin wall, the connection to the conventional calendar of months and years is not facilitated by any means.

Data collection and recording instruments known as Event History Calendars or Biographical Calendars have been shown to make parallel memory pathways more accessible, to encourage and even require respondents to reconstruct their responses within the context of their idiosyncratic biography and facilitate the connection to the conventional calendar (Belli et al.,

2001; Means & Loftus, 1991; van der Vaart, 2002; van der Zouwen et al., 1993). A suitable calendar instrument could therefore promote recall and dating accuracy considerably.

5.3 A Technical Solution for the Standardized Interview of the GLHS

The suggested improvements will add a number of highly complex tasks to the interviewer's already demanding work of asking questions and recording responses:

- clarify concepts in case of ambiguities,
- detect ambiguities or misunderstandings from side remarks or previous answers,
- communicate possible problems to the respondent and help resolve them in the researcher's interest,
- encourage and support the use of the top-down, temporal and horizontal pathways of memory organization, and
- offer support in relating memories to a month and year calendar.

To help interviewers master these demanding tasks, we developed a computer-based questionnaire. It supports the interviewer in addressing an individual respondents biographical constellations and cognitive needs throughout the interview. It provides personalized cues by drawing on earlier responses, identifies potential problems automatically and prompts the interviewer to resolve them. Interviewers can also review earlier responses to detect problems and tailor cues to the individual biographical circumstances. After completing the interview, a special "correction module" provides opportunities to a) individually and flexibly communicate doubtful or problematic responses to the respondent, b) resolve any remaining ambiguities in collaboration with the respondent by deleting or inserting episodes and transitions. Various supportive features prevent confusion and unproductive communication. First, the assessed life courses are graphically displayed along a calendar line to the interviewer. Second, the system points out potential temporal inconsistencies and third, it proposes probes and questions tailored to specific problems and the specific biography.

5.4 Implications for Survey practice and Survey Standardization

These innovations assign to the interviewer a highly responsible and expanded role: that of the researchers' competent agent in the field, of a "memory guide" and of leader in a flexible and individualized interaction. How does this fit with the principles of survey standardization that ensure comparability and objectivity of scientific data collection in the survey interview? According to Fowler and Mangione (1990), interviewers must deliver the cues by asking the

questions exactly as worded by the researcher, react uniformly to any individual case or request for explanation and suggest no cue interpretation or response category whatsoever to the respondent. As Maynard and Schaeffer (2002) observe, however, interviewers frequently deviate from these principles – and are even tacitly expected to do so – in order to keep the conversation going and to get valid responses. Consequently, Schober and Conrad (2002) and others argue for a "collaborative" or "conversational" approach to survey interviewing that attempts to achieve the aims of standardization – valid responses – by loosening some of the stricter principles of standardization in a controlled manner. There is experimental evidence to suggest that this has a beneficial effect especially for those respondents whose individual circumstances do not match the cues straightforwardly (Conrad & Schober, 2000).

Increased flexibility will lead to better data quality only if the interviewers are equipped with the necessary competences to fulfil their enlarged responsibilities. In essence, this means a thorough understanding of the concepts that lie at the heart of the cues they deliver to respondents, and the cognitive processes involved in generating the survey responses.

We, therefore, provide our interviewers with in-depth training with respect to both points, consisting of quizzes, the assessment of scenarios and of their own lives in interaction. We also involve them continuously in the development and discussion of the data collection procedure and use their experiences in matching cues to individual lives.

6 Conclusion and Outlook

There is a big demand for more research on data quality with a focus on detection and prevention of errors, as part of a continuous quality control process for survey practice. In conclusion, I want to point out three aspects that (my) future research should and will address:

Quantification and evaluation of benefits and costs of innovations. Since all innovation is costly, benefits must be assessed and critically evaluated against their costs. Costs may arise both in terms of money and time (i.e., development of new tools, training of interviewers, longer interviews) – and in terms of possible trade-offs between error sources (i.e., more specific cues lead to longer interviews and a higher or more selective dropout rate). Of course, innovations can also *reduce* costs, for example by reducing the need for data editing.

Enlarging the theoretical background. As the saying goes, "there's nothing as practical as a good theory". Models of recall in a survey must be embedded in larger models of survey response generation, especially connecting cognitive processes to models of interviewer-respondent interaction (Houtkoop-Steenstra, 2000; Schaeffer & Maynard, 1996; Schober & Conrad, 2002). Also, error influences before or after the interview, such as sampling or data edition, should be considered.

Choosing conclusive methods. An experimental approach is most informative about causes of error or the effect of improvements in the data collection procedure on data quality. Experiments, however, should be embedded in a real life survey to ensure that results can be generalized and that the costs are estimated realistically. Since realistic samples often provide no opportunity to check for reliability, and often include only few "interesting" error-prone cases, experimental simulation methods using scenarios seem a promising approach (Conrad & Schober, 2000; Schober & Conrad, 1997).

7 Literature

Auriat, N. (1992). Who forgets? An analysis of memory effects in a retrospective survey of migration history. *European Journal of Population, 7*, 311-342.

Auriat, N. (1993). "My wife knows best" - A comparison of event dating accuracy between the wife, the husband, the couple and the Belgium population register. *Public Opinion Quarterly, 57*, 165-190.

Baddeley, A. (1986). *Working Memory*. Oxford: Clarendon.

Bahrick, H. P. (1998). Loss and distortion of memory content. In C. P. Thompson & D. J. Herrmann & D. Bruce & J. D. Read & D. G. Payne & M. P. Toglia (eds.), *Autobiographical memory: Theoretical and applied perspectives* . Mahwah, N.J.: Erlbaum.

Barclay, C. R. (1986). Schematization of autobiographical memory. In D. C. Rubin (ed.), *Autobiographical Memory*. Cambridge: Cambridge University Press.

Barsalou, L. W. (1988). The content and organization of autobiographical memories. In U. Neisser & E. Winograd (eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory*. New York: Cambridge University Press.

Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. Cambridge: Cambridge University Press.

Belli, R. F. (1998). The structure of autobiographical memory and the Event History Calendar: Potential improvements in the quality of retrospective reports in surveys. *Memory, 6*(4), 383-406.

Belli, R. F., Shay, W., & Stafford, F. (2001). Event history calendars and question list surveys: A direct comparison of interviewing methods. *Public Opinion Quarterly, 65*(1), 45-74.

Bluck, S., & Habermas, T. (2000). The Life Story Schema. *Motivation & Emotion, 25*(2), 121-147.

Bluck, S., & Habermas, T. (2001). Autobiographical memories: building blocks of life narratives. In P. Clark (ed.), *Narrative gerontology: Theory, research and practice*. New York: Springer.

Bradburn, N. M., Rips, L. J., & Shevell, S. K. (1987). Answering autobiographical questions: The impact of memory and inference on surveys. *Science, 236*, 157 - 161.

Brewer, W. F. (1996). What is recollective memory? In D. C. Rubin (ed.), *Remembering our past. Studies in autobiographical memory.* Cambridge: Cambridge University Press.

Brückner, H. (1995). Surveys don't lie, people do? An analysis of data quality in a retrospective life course study. Berlin: Max-Planck-Institut für Bildungsforschung.

Cannell, C. F., Fisher, G., & Bakker, T. (1965). *Reporting of hospitalization in the Health Interview Survey* (6). Washington D. C.: National Center for Health Statistics.

Conrad, F. G., & Schober, M. F. (2000). Clarifying question meaning in a standardized survey. *Public Opinion Quarterly, 64*, 1-28.

Conway, M. A. (1996). Autobiographical knowledge and autobiographical memory. In D. C. Rubin (ed.), *Remembering our past. Studies in autobiographical memory.* Cambridge, Mass.: Cambridge University Press.

Conway, M. A., & Pleydell-Pearce, C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review, 107*(2), 261-288.

de Graaf, N. D., & Wegener, B. (1989). (Un)reliability of job career and social resource data. *Unpublished manuscript*.

Dex, S., & McCulloch, A. (1997). *The reliability of retrospective unemployment history data* (97-17): Working Papers of the ESRC Research Centre on Micro-Social Change.

Diewald, M. (1999). Entwertungen, Umwertungen, Aufwertungen - Ostdeutsche Erwerbsverläufe zwischen Kontinuität und Wandel. Unpublished Habilitationsschrift, Freie Universität Berlin, Berlin.

Elias, P. (1997). *Who forgot they were unemployed?* (97 - 19): Working Papers of the ESRC Research Centre on Micro-social Change.

Flockton, C. (1998). Economic transformation and income change - from an "employment" society to a 2/3-society? In E. Kolinsky (ed.), *Social Transformation and the Family in Post-Communist Germany.* Hampshire: Macmillan.

Fowler, F. J., & Mangione, T. W. (1990). Standardized survey interviewing: Minimizing interviewer-related error. Newbury Park: Sage.

Freedman, D. A., Thornton, A., Camburn, D., Alwin, D. F., & Young-DeMarco, L. (1988). The Life History Calendar: A technique for collecting retrospective data. *Sociological Methodology, 18*, 37 - 68.

Friedman, W. J. (1987). A follow-up to "Scale effects in memory for the time of events": The earthquake study. *Memory and Cognition, 15*, 518 - 520.

Friedman, W. J. (1993). Memory for the time of past events. *Psychological Bulletin, 113*, 44 - 66.

Gallie, D., & Vogler, C. (1994). Unemployment and attitudes to work. In D. Gallie & C. Marsh & C. Vogler (Eds.), *Social change and the experience of unemployment*. Oxford: Oxford University Press.

Goedicke, A. (2002). Beschäftigungschancen und Betriebszugehörigkeit: Die Folgen betrieblichen Wandels für ostdeutsche Erwerbstätige nach 1989. Wiesbaden: Westdeutscher Verlag.

Habermas, T., & Bluck, S. (2000). Getting a life: The emergence of the Life Story Schema in adolescence. *Psychological Bulletin, 126*(5).

Houtkoop-Steenstra, H. (2000). Interaction and the standardized survey interview: The living questionnaire. Cambridge: Cambridge University Press.

Huttenlocher, J., Hedges, L. V., & Bradburn, N. M. (1990). Reports of elapsed time: Bounding and rounding processes in estimation. *Journal of Experimental Psychology, Learning, Memory and Cognition, 16*, 196 - 213.

Johnson, R. A., Gerstein, D. R., & Rasinski, K. A. (1998). Adjusting survey estimates for response bias: An application to trends in alcohol and marijuana use. *Public Opinion Quarterly, 62*(3), 354-377.

Kalicki, B. (1996). Lebensverläufe und Selbstbilder: Die Normalbiographie als psychisches Regulativ. Opladen, Germany: Leske & Budrich.

Kohli, M. (1985). Die Institutionalisierung des Lebenslaufs. Historische Befunde und theoretische Argumente. *Kölner Zeitschrift für Soziologie und Sozialpsychologie, 37*(1-29).

Künemund, H. (1990). *"Wie war das doch gleich..." Zur Problematik retrospektiver Befragungen.* Unpublished Diplomarbeit, Freie Universität, Berlin.

Lampinen, J. M., Faries, J. M., Neuschatz, J. S., & Toglia, M. P. (2000). Recollection of things schematic: The influence of scripts on recollective experience. *Applied Cognitive Psychology, 14*, 543-554.

Larsen, S. F., & Thompson, C. P. (1995). Reconstructive memory in the dating of personal and public events. *Memory and Cognition, 23*(6), 780 - 790.

Larsen, S. F., Thompson, C. P., & Hansen, T. (1996). Time in autobiographical memory. In D. C. Rubin (ed.), *Autobiographical memory.* Cambridge: Cambridge University Press.

Lieury, A., Aiello, B., Lepreux, D., & Mellet, M. (1980). Le role de repères dans la récuperation et la datation des souvenirs. *Année Psychologique, 80*, 149 - 167.

Linton, M. (1986). Ways of searching and the contents of memory. In D. C. Rubin (ed.), *Autobiographical Memory.* Cambridge: Cambridge University Press.

Loftus, E. F., & Fathi, D. C. (1985). Retrieving multiple autobiographical memories. *Social Cognition, 3*(3), 280-295.

Loftus, E. F., & Marburger, W. (1983). "Since the eruption of Mt. St. Helens, has anyone beaten you up?" Improving the accuracy of retrospective reports with landmark events. *Memory and Cognition, 11*(2), 114 - 120.

Markus, H. (1977). Self-Schemata and processing information about the self. *Journal of Personality and Social Psychology, 35*, 63-78.

Marquis, K. (1978). Record check validity of survey responses: A reassessment of bias in reports of hospitalizations: Rand Corporation.

Mathiowetz, N. A., & Duncan, G. J. (1988). "Out of work, out of mind": Response errors in retrospective reports of unemployment. *Journal of Business and Economic Statistics, 6*(221 - 229).

Maynard, D. W., & Schaeffer, N. C. (2002). Standardization and its discontents. In D. W. Maynard & H. Houtkoop-Steenstra & N. C. Schaeffer & J. van der Zouwen (eds.), *Standardization and tacit knowledge: Interaction and practice in the survey interview* (pp. 3-45). New York: Wiley.

Means, B., & Loftus, E. F. (1991). When personal history repeats itself: Decomposing memories for recurring events. *Applied Cognitive Psychology, 5*, 297 - 318.

Miller, P. V., & Groves, R. M. (1985). Matching survey responses to official records: An exploration of validity in victimization reporting. *Public Opinion Quarterly, 49*(3), 366-380.

Mutz, G. (1996). Das Problem der Versprachlichung von Arbeitslosigkeit in West- und Ostdeutschland. *BIOS - Zeitschrift für Biographieforschung, Oral History und Lebensverlaufsanalysen, 9*(1), 93-113.

Neisser, U. (1986). Nested structure in autobiographical memory. In D. C. Rubin (Ed.), *Autobiographical Memory.* Cambridge: Cambridge University Press.

Neisser, U., & Fivush, R. (Eds.). (1994). *The remembering self. Construction and accuracy in the self-narrative*. Cambridge: Cambridge University Press.

Neter, J., & Wakesberg, J. (1964). A study of response errors in expenditures data from household interviews. *Journal of the American Statistical Association, 59*, 18 - 55.

Neugarten, B. L., & Datan, N. (1973). Sociological perspectives on the life cycle. In P. B. Baltes & W. K. Schaie (eds.), *Lifespan Developmental Psychology: Personality and Socialization* (Vol. 53-69). New York: Academic Press.

Norwood, J. L., & Tanur, J. M. (1994). Measuring unemployment in the nineties. *Public Opinion Quarterly, 58*, 277-294.

Papastefanou, G. (1980). Zur Güte von retrospektiven Daten - eine Anwendung gedächtnispsychologischer Theorie und Ergebnisse einer Nachbefragung. unpublished manuscript.

Paull, G. (2002). *Biases in the reporting of labour market dynamics* (Discussion Paper No. 10, The Labour Market Consequences of Technical and Structural Change). London: The Institute for Fiscal Studies.

Pierret, C. R. (2001). Event history data and survey recall. *The Journal of Human Resources, 36*(3), 439-466.

Robinson, J. A. (1992). First experience memories: Contexts and function in personal histories. In M. Conway & D. C. Rubin & H. Spinnler & W. A. Wagenaar (eds.), *Theoretical perspectives on autobiographical memory* (pp. 223-239). Dordrecht: Kluwer Academic.

Robinson, J. A., & Taylor, L. R. (1998). Autobiographical memory and self-narratives: A tale of two stories. In C. P. Thompson & D. J. Herrmann & D. Bruce & J. D. Read & D. G. Payne & M. P. Toglia (Eds.), *Autobiographical memory: Theoretical and Applied Perspectives*. Mahwah, N.J.: Erlbaum.

Ross, B. M. (1991). *Remembering the personal past*. New York: Oxford University Press.

Rubin, D. C. (1982). On the retention function for autobiographical memory. *Journal of Verbal Learning and Verbal Behavior, 21*, 21-38.

Rubin, D. C. (1998). Beginnings of a theory of autobiographical remembering. In C. P. Thompson & D. J. Herrmann & D. Bruce & J. D. Read & D. G. Payne & M. P. Toglia (eds.), *Autobiographical memory. Theoretical and applied perspectives*. Mahwah, N.J.: Erlbaum.

Rubin, D. C., & Baddeley, A. (1989). Telescoping is not time compression: A model of the dating of autobiographical events. *Memory and Cognition, 17*(6), 653 - 661.

Schaeffer, N. C., & Maynard, D. W. (1996). From paradigm to prototype and back again: Interactive aspects of cognitive processing in standardized surveys. In N. Schwarz & S. Sudman (eds.),

Answering questions: Methodology for determining cognitive and communicative processes in survey research. San Francisco: Jossey-Bass.

Schober, M. F., & Conrad, F. G. (1997). Does conversational interviewing reduce survey measurement error? *Public Opinion Quarterly, 61*(4), 576-602.

Schober, M. F., & Conrad, F. G. (2002). A collaborative view of standardized survey interviews. In D. W. Maynard & H. Houtkoop-Steenstra & N. C. Schaeffer & J. van der Zouwen (eds.), *Standardization and tacit knowledge: Interaction and practice in the survey interview*. New York: Wiley.

Schober, M. F., Conrad, F. G., & Fricker, S. S. (1999). *When and how should interviewers clarify question meaning?* Paper presented at the Proceedings of the American Statistical Association, Section on Survey Methods Research, Alexandria.

Shum, M. S. (1998). The role of temporal landmarks in autobiographical memory processes. *Psychological Bulletin, 124*(3), 423 - 442.

Shum, M. S., & Rips, L. J. (1999). The respondent's confession: Autobiographical memory in the context of surveys. In M. G. Sirken & D. J. Herrmann & S. Schechter & N. Schwarz & J. M. Tanur & R. Tourangeau (eds.), *Cognition and Survey Research* (Vol. 95-109). New York: Wiley.

Singer, J. A., & Salovey, P. (1993). *The remembered self: Emotion and memory in personality*. New York: Free Press.

Sudman, S., & Bradburn, N. (1973). Effects of time and memory factors on response in surveys. *Journal of the American Statistical Association, 64*(344), 805 - 815.

Sudman, S., Finn, A., & Lannom, L. (1984). The use of bounded recall procedures in single interviews. *Public Opinion Quarterly, 48*(2), 520 - 524.

Suessbrick, A., Schober, M. F., & Conrad, F. G. (2000). *Different respondents interpret ordinary questions quite differently.* Paper presented at the The American Statistical Association, Section On Survey Research Methods, Alexandria.

Thélot, C. (1990). L'erreur de mémoire sur la situation professionnelle. In INSEE (ed.), *Les ménages : mélanges en l'honneur de Jacques Desabie.* Paris : INSEE.

Thompson, C., Skowronski, J., & Lee, D. J. (1987). Reconstructing the date of a personal event, *Paper presented at the Second International Conference on Practical Aspects of Memory.* Swansea, Wales.

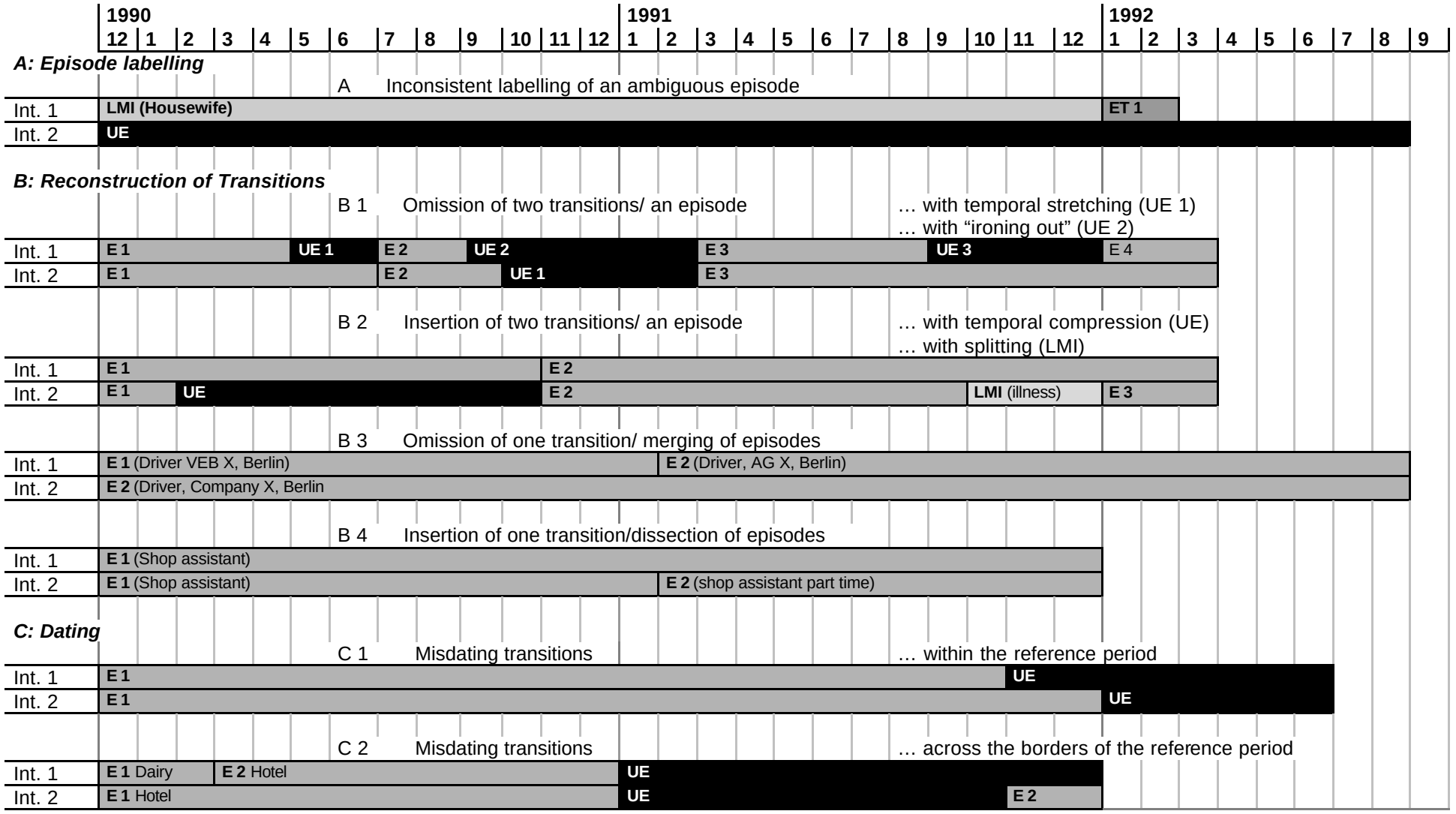
Thompson, C. P., Skowronski, J., & Lee, D. J. (1988). Telescoping in naturally occurring events. *Memory and Cognition, 16*(3), 461 - 468.

Tölke, A. (1980). Zuverlässigkeit retrospektiver Verlaufsdaten - Qualitative Ergebnisse einer Nachbefragung. Unpublished manuscript.

van der Vaart, W. (2002). The time-line: The effects of an experimental aided recall technique in a real life survey.Unpublished manuscript, Charleston, South Carolina.

van der Zouwen, J., Dijkstra, W., & van der Vaart, W. (1993). Effects of measures aimed at increasing the quality of recall data. *Bulletin de Méthodologie Sociologique, 39*, 3-19.

Appendix 1. Common Inconsistencies in the Episode Structure – Illustrative Single Cases



Source: German Life History Study