

## An Assessment of the Current State of Dependent Interviewing in Household Surveys

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Shifts over the past two decades in the method of data collection, from paper and pencil administration to computer assisted interviewing (CAI), have provided questionnaire designers with a large number of new design features, many of which can be used to reduce measurement error. These features include the expanded use of dependent interviewing. This article examines the historical roots of dependent interviewing and reviews current practices with respect to dependent interviewing within a computer assisted interviewing environment, examining the extent to which dependent interviewing is used in several longitudinal surveys and the empirical evidence with respect to the impact of dependent interviewing on data quality. Surprisingly, few studies have conducted empirical investigations related to either the design or the effects of dependent interviewing. The final sections of the article address the theoretical as well as practical issues related to the design and implementation of dependent interviewing and propose a research agenda to address gaps in our current knowledge of the effects of dependent interviewing.

*Key words:* Measurement error; human-computer interaction; seam effects.

### 1. Introduction

Shifts over the past two decades in the method of data collection, from paper and pencil administration to computer assisted interviewing (CAI), have provided questionnaire designers with a large number of new design features, many of which can be used to reduce measurement error. These features include the ability to tailor question wording to the specific situation of the respondent, randomize the order of questions and the order of response options, conduct on-line editing (e.g., range checks), and expand the use of dependent interviewing. Dependent interviewing refers to the use of “information pre-loaded in the current CAI data record from prior interviews, administrative records, or other sources” (Nicholls, Baker, and Martin 1997, pp. 237–238). Dependent interviewing can be used to remind the respondent of previously reported information or to probe for inconsistent responses between data provided in the current interview and data previously provided. Although dependent interviewing has been used in conjunction with paper and

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pencil questionnaires, CAI “facilitates more timely capture and transfer of prior wave data and its controlled disclosure in the current wave” (Nicholls, Baker, and Martin 1997, p. 238) or as stated by Brown, Hale, and Michaud (1998) “[CAI] removes the logistical constraints that exist with paper and pencil methods” (p. 192).

This article is divided into four sections. The first section examines the historical roots of dependent interviewing. The second section focuses on current practices with respect to dependent interviewing within a computer assisted interviewing environment, examining the impact of dependent interviewing on data quality. The third section raises theoretical as well as practical issues related to the design and implementation of dependent interviewing. In the last section, we propose a research agenda to address gaps in the current knowledge of the effects of dependent interviewing.

## **2. Dependent Interviewing: Paper and Pencil Applications**

In household surveys, the historical roots of dependent interviewing can be traced to the use of bounded interviews (Neter and Waksberg 1964) and the use of “summary” information (Holt 1979). Bounded recall procedures were developed by Neter and Waksberg (1964) in a study of recall of consumer expenditures. The general methodology involves completing an initial interview in which the respondent is asked to report about behaviors and events occurring during a defined reference period (e.g., the last three months, the last twelve months). In subsequent interviews, respondents are reminded about the behaviors or events that have already been reported, hence “bounding” the end point of the previous reference period. The goal is to reduce the extent to which respondents forward telescope; that is, report the date of an event or behavior as occurring more recently than is actually true. Often the data from the initial unbounded interview are not used for estimation but are used solely for bounding purposes (e.g., U.S. National Crime Victimization Survey). Bounded interview procedures work most naturally in longitudinal survey designs, where bounding can be built into the survey without substantially increasing costs.

Several evaluations of the effect of bounding have been conducted. In their original work on bounding concerning the reporting of expenditures for home repairs and alterations, Neter and Waksberg (1964) report significant reductions in the apparent rate of forward telescoping through the use of bounding. A study conducted by the U.S. Bureau of the Census found that the use of bounding significantly reduced forward telescoping of purchases of major appliances and automobiles (U.S. Bureau of the Census 1967).

The presentation of a “summary” of previously reported information represents a slight modification of the concept of a bounded interview. The 1977 National Medical Care Expenditure Survey (NMCES) was a year-long panel survey which collected information on medical care utilization and expenditures for all members of selected households. Prior to the second and subsequent interviews, a summary sheet containing all of the reports of utilization and associated expenditures, as well as the respondent’s reports of health insurance and health conditions, was mailed to both the interviewer and the respondent. Holt (1979) states that the summary had three major purposes:

1. Allow interviewers and respondents to review data reported in previous rounds and add to, change, or delete incorrect or incomplete reports.
2. Provide cross-round continuity for information such as health insurance.

3. Aid the bounded recall approach to collecting information by providing a cumulative record of all previously reported visits and services (p. 228).

The nature of billing for health care utilization, in which respondents are unsure of the final amounts paid by various sources (e.g., insurance, out of pocket payments) until several months following the receipt of the services, makes the use of a summary type instrument essential.

Although no experimental evaluation of the effectiveness of the use of the summary with regard to reducing forward telescoping was conducted as part of the 1977 NMCES, Holt (1979) did examine the nature and direction of changes that were made during one or more retrospective reviews of previously reported data. She found that for over 50 per cent of the events reported, one or more changes (e.g., date of visit, name of provider, total charge, amounts paid by various sources) were made as a result of the summary review. With respect to the reporting of total charges, 34 percent of the charges originally reported as "don't know" responses were later changed to a dollar value as a result of the summary review. The production of a paper summary has continued to be used in subsequent medical expenditure surveys, including those conducted via paper and pencil (the National Medical Care Utilization and Expenditure Survey and the National Medical Expenditure Survey) as well as those administered via computer (e.g., the Medical Expenditure Panel Survey and the Medicare Current Beneficiary Survey).

The use of dependent interviewing in paper and pencil questionnaires is not limited to household-based surveys. In fact, the use of dependent interviewing or "historical data" in establishment surveys is quite common. For example, Pafford (1988) studied the effect of providing planted acreage information obtained during an interview in the spring during a subsequent interview in the fall of the same year. In a randomized experiment, the response variance was reduced among those provided with their earlier responses. Dependent interviewing appears to be used often in agricultural surveys (e.g., Stanley and Safer 1997). The U.S. Consumer Price Index Commodities and Services Survey uses reactive interviewing in its collection of in-store pricing. Interviewers provide the price of the item as of the last interview, request the current price, and then, in cases of an increase or decrease by at least ten percent, request information concerning the reason behind the change.

### **3. Current Uses of Dependent Interviewing in Studies Conducted via CAI**

Several longitudinal household surveys involving the use of computer assisted interviewing have incorporated dependent interviewing into their designs. In reviewing these studies, it appears that the major uses of dependent interviewing fall into one of three distinct substantive categories: presenting and maintaining a roster from round to round, as a means to remind respondents of their status as of the last round of data collection or to verify changes occurring across rounds, and in the design of reinterview surveys. Each of these uses of dependent interviewing is discussed in detail below.

#### *3.1. Presenting and maintaining a roster from round to round*

Many longitudinal studies utilize dependent interviewing in the presentation of rosters of

household members, enumerating those individuals who were household members at the time of the last interview, requesting that the respondent add to or delete from the roster as necessary to reflect the current composition of the household (see, for example, the Panel Study of Income Dynamics and the National Longitudinal Survey of Youth). In addition to household rosters, some of these studies incorporate rosters of health conditions, prescription medicines, and health care providers reported in previous rounds or waves of data collection (e.g., the Medical Expenditure Panel Study and the Medicare Current Beneficiaries Study). The use of dependent interviewing is seen as a more efficient approach to the collection of this information, in that interviewers do not need to repeat information obtained in previous interviews.<sup>3</sup>

### *3.2. To remind respondents of their status as of the last round/wave of data collection for the purposes of reducing measurement error*

Many longitudinal surveys ask questions concerning continuous and discrete “state” variables, for example, employment, health insurance coverage, and receipt of program benefits. The use of dependent interviewing with respect to questions concerning status is designed to reduce two sources of measurement error: (1) false rates of change due to slight variations in open-ended responses and the subsequent coding of that information and (2) misdating of changes in status, in which an overreporting of transitions occurs at the interface between the reference periods for consecutive interviews, often referred to as the “seam” effect. Several panel studies have documented the existence of a seam effect; panel surveys asking respondents to date events yield over-estimates of transitions between the end of a prior data collection reference period and the start of the next reference period. This seam effect results in considerable measurement error for key survey estimates, such as transition rates into and out of employment (e.g., Moore and Kasprzyk 1984; Burkhead and Coder 1985; Murray, Michaud, Egan and Lemaitre 1990).

The form of this type of dependent interviewing falls into one of two categories: proactive and reactive (Brown, Hale, and Michaud 1998). Proactive dependent interviewing or feedback refers to designs in which respondents are first reminded of their status at the time of the last interview and are then queried as to their status during the current reference period. However, the use of CAI also facilitates a reactive feedback approach, in which a response is compared to previously acquired information; discrepant information leads to one or more questions concerning the source of the discrepancy. Brown et al. (1998) suggest this approach if the presentation of previously reported information may bias the current responses (e.g., suppress the reporting of change). The use of CAI also facilitates selective reactive dependent interviewing, for example, when change in income exceeds a specific threshold.

#### *3.2.1. Proactive dependent interviewing*

The U.S. Current Population Survey (CPS) provides an illustrative example of the use of proactive interviewing. The CPS is a rotating panel design in which persons residing in sampled households are interviewed for four months, not interviewed for eight months,

<sup>3</sup>Note that the determination of more efficient administration as a function of CAI dependent rosters is based on qualitative feedback from interviewers.

and then interviewed for four months.<sup>4</sup> In any given month, approximately 75 percent of the sample has been interviewed the previous month. The paper and pencil version of the CPS required the respondent to answer five questions concerning industry and occupation every month.<sup>5</sup> Several of the questions were open-ended and burdensome for both the interviewer and the respondent; interviewers reported that respondents often complained that they have provided the information of interest during the previous month's interview (Polivka and Rothgeb 1993). The collection of independent industry and occupation information every month resulted in apparently spurious changes in both industry and occupation by respondents. Due to the detailed 3-digit nature of industry and occupation coding, minor changes in the wording used by the respondent to describe his or her job or minor changes in the recording of the information by the interviewer lead to a different industry or occupation classification for the person, when in fact no change had occurred. The effects of subtle response wording changes were exacerbated by the fact that different household members could serve as the respondent for different months of the CPS. Using data for cases interviewed in consecutive months (for which the occupants of the sampled address remained the same), Collins (1975) reported that approximately 32% of the sample had a change in their 3-digit occupation classification and 16% had a change in their 3-digit industry classification, a change rate far in excess of what was believed to be the true one.

To ease both interviewer and respondent burden and improve the quality of occupation and industry change information, the redesigned CPS introduced dependent interviewing for the collection of industry and occupation information. In the current design, respondents are reminded of the company that they reported working for during the previous interview and asked whether they still work for that company. With respect to occupation, the respondent is asked if his or her activities and duties have changed and if not, they are presented with the description of their usual activities and duties from the previous interview and asked to confirm that the description is accurate for their current job.

An experimental study compared month to month changes in industry and occupation using the paper and pencil (no dependent interviewing) version and the dependent interviewing methodology. The findings indicated a decline in the rate of industry change from 23 percent to 5 percent and a decline in the rate of occupation from 39 percent to 7 percent, as compared to the true rate of change of 4 percent for industry and 6.5 percent for occupation (Cantor 1991). The findings suggest that in this application, involving open-ended questions coupled with a highly specific, detailed coding system, the use of dependent interviewing both improved the quality of the data and reduced interviewer and respondent burden.<sup>6</sup>

Hill (1994) compared the relative validity of proactive dependent interviewing to that of

<sup>4</sup>Note that the design of the CPS is not a longitudinal study *per se*. Respondents are not followed over time; rather it is the sampled address that is included in the four month-eight month-four month schedule outlined above, regardless of whether the occupants remain the same or change over time.

<sup>5</sup>These questions include four open-ended items: (1) For whom did you work?; (2) What kind of business or industry is this?; (3) What kind of work were you doing?; and (4) What were your most important activities or duties at this job? In addition, respondents were asked to classify themselves as employees of a private company or business, as an employee of the Federal, State, or local government, self-employed, employed without pay in a family business or farm, or not working.

<sup>6</sup>The improvement is in the statistic examining rates of change in industry and occupation and does not address the quality of the initial report of either industry or occupation for the person.

independent interviewing for the collection of industry and occupation information in the Survey of Income and Program Participation (SIPP), based on a paper and pencil data collection effort. He found, similar to the experience of CPS, that the use of dependent interviewing for the collection for industry and occupation information significantly reduced the rate of change in the two measures. Although the findings indicate that the use of dependent interviewing may result in the underreporting of change, Hill states that “most of the change *missed* by the dependent method of collection methodology is noise” and that the use of dependent interviewing “substantially improve[s] the signal-to-noise ratio as indicated by the higher empirical validity of the dependent method data” (p. 379).

SIPP makes extensive use of proactive interviewing; income sources reported by respondents during the previous wave are fed back to them.<sup>7</sup> If a respondent denies receiving income from a source in the current reference period that he or she reported receiving in a previous period, the respondent is asked to provide the month in which the income source was last received. In addition, SIPP has adopted the CPS dependent interviewing approach to industry and occupation questions.

### 3.2.2. Reactive dependent interviewing

The Canadian Survey of Labour and Income Dynamics (SLID), a longitudinal survey that collects data retrospectively over a one-year time span on several labor-related topics, incorporates both proactive and reactive dependent interviewing. Reactive dependent questions may be triggered in the income interview portion of the SLID if respondents fail to report a source of income in the current reference period that was reported in the prior reference period. For example: “Based on our January interview, we thought we would get an amount for (type of income). Did we miss it?” Evaluation of this trigger across the various income sources indicates that reporting of wages and salaries, the most frequently reported income source, was improved the least of all income items, by 5 percent. Reporting of dollar amounts for the more sensitive and/or rarer income items was improved to a much larger extent, by 27 percent for social assistance, nearly 42 percent for workers’ compensation, and nearly 32 percent for unemployment insurance.

Underreporting of sensitive sources of income such as unemployment insurance is known to be a persistent source of survey measurement error, with estimates of at least 20 percent underreporting of this source in household surveys (Dibbs, Hale, Loverock, and Michaud 1995). In an empirical investigation of the prevalence of this type of underreporting and the impact of reactive dependent interviewing on it, Dibbs et al. (1995) demonstrated that approximately 35 percent of respondents who previously reported unemployment insurance as income failed to report it in a follow-up interview four months later. When a reactive dependent question regarding this skipped income source was triggered, 54 percent provided a valid amount (with the other half responding “don’t know,” “zero,” or with a refusal). This increase in reporting represented approximately 25 percent of all valid amounts for the unemployment insurance income source. The authors also provided empirical evidence that data quality obtained using these reactive questions was high. Comparison of the dollar amount provided in the survey

<sup>7</sup>“According to the information we obtained last time [NAME] had received [INCOME SOURCE] during [TIME PERIOD]. At any time during the past 4 months...did [NAME] get income from [INCOME SOURCE]?”

as a result of the reactive questions with that provided on the Revenue Canada tax file showed that the survey report comes within 92% of the amount reported on the tax file.

### *3.3. Reconciling information provided during the course of a reinterview with information reported during the original interview*

Reinterviews which are designed to elicit information concerning apparent discrepancies in reports provided by the respondent during the original interview and the reinterview require that the respondent is made aware of the originally reported information. For example, in the 1991 British Census Validation Survey, interviewers began by administering the validation questions to the respondent, followed by a comparison of the original census response to the response to the validation questions (Heady, Smith, and Avery 1996). Respondents for whom the information was discrepant were queried as to the reason for the difference. The advantages of the use of a CAI-based reinterview are two-fold: interviewers are blind as to the original response until the reinterview information is collected and machine-based decisions concerning the definition of discrepant information can be implemented. Depending upon the goals of the reinterview program, the design of the reinterview questionnaire can follow proactive or reactive dependent interviewing.

### *3.4. Summary*

Several panel studies conducted using CAI methodology include proactive or reactive dependent interviewing as part of the design of the questionnaire. Evaluation of the use of dependent interviewing suggests that, when targeted to address a specific source of measurement error, the use of dependent interviewing appears to be effective. However, the empirical literature is limited with respect to experimentation in the design phase of dependent interviewing and is weak with respect to the assessment of the effect of dependent interviewing.

## **4. Theoretical and Practical Design Considerations**

Several factors should be addressed as part of the design and integration of dependent interviewing into a questionnaire. The factors include:

### *4.1. What information should be subjected to either proactive or reactive dependent interviewing?*

Current use of proactive dependent interviewing appears to be based on a desire to (a) design a more efficient means of collecting information, eliminating recording redundancies; (b) reduce respondent burden; (c) reduce measurement error associated with responses to open-ended items, specifically those in which slight variation in response wording results in significant differences with respect to classification; or (d) reduce or eliminate seam effects. The literature is less informative with respect to the use of reactive dependent interviewing.

The use of dependent interviewing in the development and revising of rosters makes intuitive sense: in using household rosters dependently, interviewers spend less time

enumerating previously reported information. The CAI roster simply replaces paper versions of instruments known as “control cards.” Other rosters (e.g., rosters of medical conditions) can be used to distinguish unique events from ongoing episodes. The major concern with the use of dependent interviewing with respect to rosters is the lack of evaluation completed to date on the effect of the use of these rosters. For example, does the use of dependent household rosters result in an underenumeration of new births or other additions to the household?

The decision as to which information should be subjected to either proactive or reactive dependent interviewing should be made cautiously. The obvious concern with respect to proactive dependent interviewing is that the presentation of the information to the respondent may serve to suppress the reporting of change. From a cognitive perspective, proactive dependent interviewing represents a form of anchoring and adjustment (Tversky and Kahneman 1973). The use of an anchor and adjustment strategy is only effective if the respondent uses the anchor as it was meant to be used, as means for establishing a baseline from which to adjust. The threat of cognitive satisficing (Krosnick 1991) in which the respondent attempts to minimize the cognitive effort associated with performing the role may, however, lead to respondents simply stating that there has been no change since the last reference period. Questionnaire designers will need to weigh the costs of potential suppression effects against the benefits of reducing false transitions. In the case of the CPS, the level of month-to-month changes in occupation was so greatly inflated that even a net suppression effect yielded a measure whose mean squared error properties were greatly improved.

The use of dependent interviewing in the collection of industry and occupation represents an ideal use of the approach. Both industry and occupation, but most notably occupation, are subject to a great deal of variation with respect to the words used by respondents to provide answers to open-ended questions. Slight modifications in the description of an occupation can lead to major differences in the classification of that occupation. We would anticipate that other information collected via open-ended questions and subject to highly detailed coding, such as the reporting and coding of medical conditions, would similarly benefit from experimentation with dependent interviewing.

Concern with cognitive satisficing has led some questionnaire designers to opt for reactive dependent interviewing, so as to avoid bias associated with the presentation of previous information. For example, in SLID, the previous year’s wages are not fed back to the respondent; instead the respondent is asked to report his or her current wage rate. Reactive dependent interviewing in SLID is selective in that only for those respondents who report a decline in wages or an increase of more than ten percent are interviewers presented with a screen that displays the previous year’s wages and the current wage rate, and directs the interviewer to confirm and probe to determine the reason for the change (Hale and Michaud 1995). A number of measures which require the reporting of a numeric response within a longitudinal design would appear to be ideally suited to this approach, such as earnings, hours worked, health insurance premiums, public program reciprocity levels, number of doctor visits in the past year, and total number of trips taken for business purposes.

Reactive dependent interviewing should be presented in a way that engages the



respondent in the task of providing the most accurate data possible and does not imply that his or her responses have been inconsistent. Consideration must be given to how the information is presented as well as to the number of times during the interview or reinterview the respondent is requested to clarify or confirm previously reported information. The latter would suggest that reactive interviewing should be limited to a small number of key measures.

#### *4.2. The timing, context, and specific wording related to the presentation of the information to the respondent*

Dependent interviewing alters several dimensions of the respondent task. The presentation of proactive dependent interviewing questions shifts the response task from one of free recall (open-ended, nondependent questions) to one of recognition (proactive question). The use of proactive dependent interviewing also provides the respondent with additional opportunities to acquiesce. In addition, for many surveys, open-ended responses are edited and massaged as part of the post processing; design decisions should address whether the originally recorded information or the “massaged” information will be provided to the respondent. Reactive dependent interviewing represents a question form unaddressed in the survey literature; that is, one in which the respondent is asked to resolve discrepancies between independently obtained pieces of information. As part of the design and implementation of either proactive or reactive dependent interviewing, the impact of alternative question wording, form and context should be assessed.

In addition to the use of dependent interviewing per se, one means by which information can be provided to both the interviewer and the respondent is through the use of hard copy summaries, as is done in the various medical expenditure surveys. The provision of a hard copy version of previously reported information may be more effective in serving as a bounding tool than oral presentation of the information as part of a question.

#### *4.3. The impact of dependent interviewing on respondent-interviewer dynamics*

Little is known about how the presentation of reactive information affects respondent-interviewer dynamics. The “machine driven” nature of reactive interviewing may result in a shift in the dynamics from a two-person dyad to a three-person group, where the machine is now an active participant in the process. The use of both proactive and reactive interviewing most likely results in additional probing by the interviewer. Depending upon the extent to which the probes are fully scripted, the use of dependent interviewing may result in differences in the stimuli presented to various respondents, as well as an increase in interviewer variance. On the other hand, the use of dependent interviewing could serve to improve the rapport between the interviewer and the respondent, through the provision of information to remind the interviewers about the person they are interviewing or his or her family.

#### *4.4. The design of the display of the information so as to facilitate the interviewer's task*

Both the interviewer and the respondent are consumers of the information presented in dependent interviewing. The respondent's task, for the most part, is a cognitive task

related to processing the information and resolving discrepancies between the information presented and the respondent's memory or perception of the measure of interest. The interviewer's task is quite different; he or she has less to process with respect to the substantive content of the information and is more focused on the mechanics of recording the information. Therefore, the development of dependent interviewing questions should involve both the testing of question wording, so as to address the respondent's perspective, and usability testing related to the overall screen design and function keys required to maneuver within and across screens, so as to address the interviewer's perspective.

Segmentation, in which the interviewer sees the questionnaire only in discrete displays of single questions, is often cited as one of the shortcomings of CAI data collection instruments (Groves and Mathiowetz 1984). The use of dependent interviewing can potentially exacerbate these effects by adding another dimension to the CAI system, data obtained at an earlier time or place.

#### *4.5. Effect on the respondent's perception of confidentiality*

It is unclear, and undocumented, whether the presentation of previously reported information heightens or decreases respondents' concerns over the confidentiality of their data. If the interviewer presenting the information is not the interviewer who collected the information, does this affect the respondent's perception of confidentiality? How do changes in the household respondent affect the perception of confidentiality?

#### *4.6. The development of systems to maintain the confidentiality of previously reported information*

In many federal data collection efforts, one respondent provides information for him or herself as well as all other members of the family. If the same individual does not serve as the informant in subsequent rounds, the question arises as to what information, if any, should be presented to the new respondent. Does this require the development of both a dependent-based and an independent form of the questionnaire? Does the provision of "family level" information imply that the information is accessible to all members of the family? The U.S. Bureau of the Census is moving toward a system which will require all information reported by one member of a household to be held secret from other household members unless consent from the original respondent has been obtained.

#### *4.7. An assessment of the costs and benefits associated with the incorporation of dependent interviewing*

Any design decision should be made in light of the relative costs and benefits associated with the design feature. The costs associated with dependent interviewing include those related to the design and testing of the specific questions, the maintenance and updating of information from previous rounds of data collection or abstracted from other data sources, and the correct assignment and uploading of that information prior to each round of data collection. Less visible are the costs related to interviewer training to effectively use dependent interviewing, costs associated with the respondent's concern with confidentiality, the potential impact on the rapport between the interviewer and the

respondent, and maintaining the confidentiality of the data from round to round (e.g., in cases where the respondent changes over time).

The potential benefits are related to improvement in the quality of the data and reduction in the administration time of the survey. With respect to the improvement in data quality, the empirical evidence is limited. The most notable evidence is the improvement of measures of industry and occupation change evident in the CPS and SIPP and the reporting of income sources in the SLID. It is not clear as to the effect of dependent interviewing on administration time; interviewers for several studies have indicated that the use of rosters resulted in more efficient interviewing (no quantitative data available), but the need to resolve conflicting pieces of information may lead to increases in administration time.

## **5. Field Tests to Address Gaps in Empirical Knowledge**

As noted earlier, the empirical basis for the design and implementation of dependent interviewing is small; for the most part little experimentation has been conducted with alternative approaches, or if it has been conducted, has not been documented in either published or unpublished articles. From this limited literature, it appears that dependent interviewing has been implemented on the basis of the following criteria:

1. The use of previously acquired information reduces the amount of reporting and recording in the current interview. The use of dependent interviewing for household rosters is the best example; other examples include rosters of medical conditions, prescription medicines, and health care providers in medical expenditure surveys. To some extent this use of dependent interviewing is simply an updated version of paper control cards that were a design feature of many longitudinal studies (e.g., CPS, NMES).
2. The information of interest is subject to very specific coding and classification, resulting in spurious change due to round to round minor changes in respondents' reporting of the information, interviewers' recording of the information, or coders' interpretation and classification. Industry and occupation represent the best example of this situation. Other information such as medical conditions may also be ideally suited for dependent interviewing due to the nature of the classification scheme.
3. The information can be used by the respondent as an anchor for adjustment.

In light of the small body of empirical literature by which to inform design, we offer the following suggestions for designers of dependent interviewing systems as well as recommendations for research to address gaps in the literature.

## **6. Field Tests Related to the Use of Dependent Interviewing for Rosters**

Gaining efficiency in the interviewing situation is almost always desirable; however, if that efficiency comes at the cost of increased measurement error, questionnaire designers should be cautious. In a panel survey, it is hard to imagine that one would want the interviewer to independently enumerate all members of the household. This would most likely be annoying to respondents, especially in designs in which the time between waves or rounds is short. Whether the use of such household rosters affects the enumeration of

individuals is a question that may have been addressed at the time control cards were first used in the design of surveys; however, we were unable to find evidence of any experimentation. Here the design of the presentation of the roster may affect the quality of the data and the degree to which interviewers review the composition of the household. Is the entire household roster presented on one screen? Does the interviewer need to indicate through some marking or recording that the respondent has acknowledged whether the individual still resides in the household? How are questions concerning new additions to the household presented to the interviewer? Does the system require the interviewer to make an entry for each person? Is the updating of the household roster a multi-task screen in which the interviewer scripts his or her own probes to identify new members?

### *6.1. Best advice without empirical evidence*

Continue to use dependent interviewing for the development and maintaining of rosters across rounds of data collection.

### *6.2. Methods test*

Several experiments could be conducted related to the use of dependent interviewing and household rosters. The first concerns dependent vs. nondependent roster updates. Although independently listing the household roster each round would appear to be a burdensome and inefficient approach to data collection, the question remains as to whether such an approach would be better or worse for identifying new household members. A second field test might examine how alternative presentations of the household roster and updating questions impacts the enumeration of new household members. Specifically a comparison could be made between a fully-explicit set of questions and screens versus interviewers' use of their own probes to update a dynamic roster screen. Alternative wording for rostering, informed by ethnographic work completed in this area, could also be examined. In all of these evaluations, one would want to examine validity and or reliability of the rosters, ease of administration for the interviewer, and administration time.

The updating of roster information has two elements of concern: the presentation and mechanics of updating by the interviewer and the archiving (or not archiving) of changes within the data base. Design decisions must be addressed at both levels. For example, many longitudinal studies assign a "line number" to members of the household (e.g., 1,2, etc.) which differs from a unique identification number. If members leave the household, should remaining members be numbered sequentially? How should this be reflected in the data structure? What if the respondent wishes to change previously recorded information relevant to the previous reference period?

## **7. Proactive Dependent Interviewing**

If proactive dependent interviewing is being considered in other areas to improve efficiency or data quality, research should address the extent to which the provision of previously recorded information results in suppression of the reporting of change. The studies reviewed vary considerably with respect to the amount of proactive information provided

the respondent. For example, the CPS is quite judicious in its use of proactive dependent interviewing. Only those respondents who report no change in employer or duties since the last interview are provided with a description of the previously reported occupation and requested to verify the information. SIPP, on the other hand, provides the respondent with each of the income sources reported during the last interview and then queries the respondent as to whether he or she has received income from that source during the past four months. SLID handles the same types of income source questions in a reactive mode, asking the respondent to report current income sources and then, for sources identified in the previous round but not in the current round, a question is asked concerning whether the source had been missed. At the far end of the proactive dependent interviewing continuum is the presentation of a summary to the respondent containing, in a succinct form, most of the information provided in previous rounds.

Why should proactive dependent interviewing be used? Clearly the use of information as a means of bounding has been shown to have its merits in reducing forward telescoping. Apart from the desire to reduce spurious change over time due to various sources of measurement error, the answers to the question center on efficiency (or minimizing redundancy), the need to retrieve information missed during the previous round, and the invoking of an anchoring and adjustment heuristic by the respondent. If the latter, then the use of proactive dependent interviewing should be used for those items for which the respondent must provide a numeric response, where the use of an anchor would be beneficial.

### 7.1. *Best advice without empirical evidence*

The use of proactive information to bound the reporting of events and behaviors is clearly an extension of bounding within a paper and pencil environment and should continue to be used. Note that as a bounding device, the goal is to reiterate the occurrence of discrete behaviors and events, and not “states” (e.g., employment or receipt of income from a particular source). The use of summaries as a method of proactive interviewing serves both as a bounding device and as a means for collecting previously unknown information. Both uses appear to be beneficial.

The example of *proactive* dependent interviewing regarding industry and occupation information offers clear evidence of an overall improvement in the measure. Note that this example is one in which the prior interview information concerning occupation and industry is only provided to those respondents who indicate no change in employer and no change in the duties and responsibilities of their job. Only if both responses are negative is the respondent asked to confirm the previously reported information. The demands of the industry and occupation coding scheme, a highly specific classification scheme, make this an ideal situation in which to use proactive dependent interviewing.

Finally, if one can teach the respondent to use an anchor as a basis for adjustment, then proactive dependent interviewing may improve the quality of the measure. However, the number of measures for which this is true in a longitudinal panel may be small. For many of the measures of interest, having the respondent report his or her current state is, from a cognitive perspective, the easiest task (current wages, current receipt of SSI benefits), after which previous information can be used in a reactive mode to stimulate dates of changes,

identify “false negative” reports, or confirm continuity in the state. The CPS questions for retired persons represent such an example, as do the SLID income sources questions.

## 7.2. *Methods test*

The current SIPP design uses a proactive approach to the enumeration of income sources, whereas SLID uses a reactive approach. A split ballot experimental design could address effect on estimates. Coupled with validation data, the design could address relative validity of the two approaches. The effect on interviewers and respondents could be measured through interviewer and respondent debriefings or tape recording of interviews coupled with behavior coding.

Prior to a split ballot design, cognitive testing of alternative question wording and timing should be conducted.

## 8. **Reactive Dependent Interviewing**

The use of reactive dependent interviewing requires the questionnaire designer to make choices concerning three distinct design features. These features involve:

1. Whether the previously reported information is revealed to the interviewer prior to the question concerning the current status or whether that information is only revealed under a specific set of criteria (e.g., the SLID requirement of a decline in wages or an increase of 10 percent or more).
2. The extent to which the respondent and interviewer can “repair” the discrepancy, either by changing information recorded in a previous wave or round or changing information provided in the current interview.
3. The extent to which the decision concerning a discrepancy is machine-driven or left to the interviewer. The degree to which the resolution is fully scripted is, in part, based on whether the identification of the discrepancy is machine-driven or interviewer-based. A machine-based discrepancy provides the questionnaire designer with the option to fully script the resolution. If the identification of a discrepancy is based on interviewer decision, it may be more difficult to develop an accurate script to resolve the inconsistency.
4. The wording of the presentation of previously recorded information and the means for resolving inconsistencies should be carefully considered and tested.

### 8.1. *Best advice without extensive empirical evidence*

The limited empirical evidence suggests that reactive dependent interviewing can improve measures of change; the best example is the SLID collection of earnings and program participation income questions. Hence, for a limited number of key data elements, especially those where a primary analytic use concerns measures of change, reactive dependent interviewing would appear to be beneficial. However, without experimentation and evaluation, it is difficult to make recommendations concerning the design features enumerated above.

## 8.2. *Methods test*

Methods tests could be designed to address any or all of the design features listed above. For example, one could assess the effect on administration time, interviewer-respondent rapport, interviewer burden, and estimates of change of two different reactive dependent interviewing designs. These designs could represent radically different approaches; for example, in one approach, no information is provided to the interviewer and the determination of a discrepancy is completely machine-based, the resolution is fully scripted, and only the current information is amenable to change. This approach may be compared to a second one in which the interviewer, presented with the previously reported information, must determine whether the information is inconsistent, uses his or her own probes to resolve the information, and can change both data provided in previous rounds as well as information provided during the current interview.

Less ambitious would be the simple documentation of what information is changed when reactive interviewing is used – the previous information, the current information, or neither.

Empirical evaluations of alternative approaches to reactive dependent interviewing have the benefit of informing the design of reinterview programs, since many reinterview questionnaires include reactive types of questions.

## 9. Confidentiality

Evaluations should be conducted concerning the respondent's perception of confidentiality. For studies such as SIPP, where much of the information appears to be "family level" information, we need to gain some understanding of how respondents view the provision of that information to other family members as well as to an interviewer different from the one who originally recorded the information.

### 9.1. *Best advice without empirical evidence*

None.

### 9.2. *Methods test*

At a minimum, focus groups or debriefing interviews should be conducted to understand respondents' perceptions of confidentiality and the provision of information to other members of the family, particularly "family level" information or information concerning other individuals in the family. A second dimension concerns the respondent's perception of confidentiality when different interviewers are involved in the original collection of the information, and dependent interviewing based on that information. A change in face-to-face data collection to telephone may also affect the respondent's perception of the confidentiality of data provided as part of a dependent interviewing system. If confidentiality appears to be a concern, alternative dependent and independent approaches to questions need to be designed and tested.

## 10. Human-Computer Interaction

There appears to be no empirical data addressing the human-computer interface in the

design of dependent interviewing questions. Two aspects of the interaction need to be explored. The first concerns evaluation of alternative screen designs with respect to key-stroke patterns, eye movement, and the ability of the interviewer to continue to engage the respondent. Should the screen be designed so as to facilitate joint review (in the case of face-to-face data collection)? Is full screen editing preferred to movement between screens? The second aspect concerns a feature discussed earlier: the “machine-driven” nature of reactive interviewing may result in a shift in the dynamics from a two-person dyad to a three-person group. If so, how do the interviewer and the respondent view this third party? To what extent does reactive dependent interviewing “relieve” the interviewer from responsibility for interviewer tasks such as probing and clarifying?

#### *10.1. Best advice without empirical evidence*

None.

#### *10.2. Methods test*

Usability testing to understand interviewer’s needs and increase efficiency in the presentation of dependent information to the interviewer should be conducted. The presentation of previously recorded information often results in long questions; screen real estate becomes critically important for long questions, as does the use of design features (capital letters, reverse video, color). Methods testing could examine screen real estate, the use of design features such as capital letters, bold, or reverse video, function keys, and full screen edit preferences and efficiency.

### **11. Conclusions**

With respect to dependent interviewing, the empirical literature is virtually nonexistent. The small body of literature that does exist suggests that, for those design features which have been evaluated, the use of dependent interviewing is beneficial, both in terms of interviewer and respondent feedback as well as in improvement of data quality. Most notable is the improvement in measures of industry and occupation change realized from the redesign of the CPS questions. Similarly, the selective use of reactive dependent interviewing in SLID appears to have been quite successful, especially with respect to the enumeration of underreported income sources. However, we must be cautious in extrapolating from the limited evaluation literature to suggest that dependent interviewing is always beneficial or results in an improvement in data quality. As is obvious from the discussion, we know little concerning the impact of dependent interviewing in many of the areas in which it is currently being used. For example, evaluation is needed as to the effect of dependent interviewing on changes in household composition, specifically the enumeration of new household members when dependent interviewing is used for household rosters. Similarly, apart from industry and occupation research, we know little as to the effect of the presentation of previously reported information on measures of change over time. Given the lack of empirical information to inform the design and presentation of dependent interviewing, any field work which addressed any of the issues outlined above as well as those discussed in the section concerning theoretical and practical design considerations would be beneficial.



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