A COGNITIVE APPRAISAL METHODOLOGY FOR ESTABLISHMENT SURVEY QUESTIONNAIRES

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ABSTRACT

The establishment cognitive appraisal system considers factors that distinguish household from establishment surveys. (See Forsyth, Levin, and Fisher, 1999; Edwards and Cantor, 1991.) In contrast to household surveys, establishment survey tasks often require that organizations integrate complex information from multiple respondents. Respondents in establishments, unlike household respondents, rely more on records and less on memory recall to construct answers. Finally, establishment survey reports are influenced by respondents' roles within the organization, their perceptions of and attitudes toward the organization and features of the organizational structure (Tomaskovic-Devey, Leiter & Thompson, 1995). This work discusses the motivation for incorporating these factors into an expert coding system for establishments. It also offers recommendations for further development and testing.

INTRODUCTION

The cognitive appraisal methodology elicits a systematic expert review of where the cognitive demands and problems are greatest in survey questions. (See Forsyth, Lessler & Hubbard, 1992; Lessler & Forsyth, 1996). Drawing on a cognitive model of survey response, this method guides trained coders through an item-by-item review of question features that may contribute to response error. In using the appraisal methodology on household surveys, coders typically note particular task characteristics of and likely cognitive problems with a survey question. For example, task codes may indicate whether the question asks for a current or past behavior or attitude. In addition to coding particular task demands, coders also note question features which may interfere with a respondent's capacity to understand the question. For example, coders note the presence of unclear goals, vague or complex reference sets, words or concepts. Structural problems such as missing response categories or undefined reference periods are also coded. Finally, the frequency distribution of codes is tabulated, then studied to guide evaluation, testing or revision of the survey instrument (Lessler et al, 1996).

Since the appraisal system has been applied primarily to interviewer-administered household surveys, the motivation for using it in the establishment context must be discussed. Previous research has shown that although establishment respondents typically bring superior knowledge and physical records to bear on survey requests, they *do* fail survey tasks in ways similar to household respondents (O'Brien, 1997). Thus, many cognitive appraisal codes developed for household surveys should be relevant in the establishment context. In addition to the household codes, this paper tests new codes suggested by factors which distinguish establishment from household data collections. The establishment survey appraisal system used here was developed by Westat, Inc. and is documented in Forsyth, Levin and Fisher (1999).

Is the modified appraisal system useful in diagnosing question problems in establishment surveys? Yes. However, establishment surveys pose more factual, quantitative and continuous data requests for respondents (Cox, 1995). As such, they are fundamentally more difficult inquiries conducted in more complex social environments than in most household surveys (Tomaskovic-Devey, 1995). The modified appraisal coding system only begins to tell us why, though in a systematic, reliable manner.

Special Characteristics of Establishment Surveys
Establishment surveys can fail for a variety of reasons, for example, problems of unit nonresponse, estimation, editing and summary. Appraisal codes may suggest where these larger problems will occur, but the main focus here is the response error attributable to the questionnaire.

Several factors distinguish establishment from household data collections. First, in contrast to household surveys, establishment survey tasks often mean organizations must integrate complex information from multiple respondents. Second, respondents in establishments, unlike household respondents, rely more on records and less on memory to construct answers. Third, surveys of establishments are conducted largely through the use of self-administered mail questionnaires. The respondents, their roles, and features of the organizational structure and the external environment in which the firm operates influence how these factors interact in framing and completing survey requests (Tomaskovic-Devey, Leiter & Thompson, 1995).

The Establishment Survey Response Model
Difficult or intrusive questions invite high rates of item nonresponse and response error, thus threatening the validity of the survey estimates based on them. Surveys where difficult or sensitive questions dominate show higher rates of unit nonresponse, diminishing the generalizability of the study as a whole. What chiefly distinguishes difficult questions in establishment surveys from those in households is the depth to which respondents must draw from complex records and collaborate with others to provide responses. This response process begins with a *comprehension* step in which the respondent interprets particular words, concepts and tasks to establish the goal, the reference set and the reference period of the survey question. The second step, *information retrieval*, involves both the strategy and work of gathering and sharing expertise, and gaining access to records and information systems to secure relevant data. In the third step, *synthesis and evaluation*, the respondent synthesizes and evaluates the information gathered. In the *response selection* step, a response is chosen or reported on a survey form (Forsyth et al., 1999). Thus, the persons we generally call respondents actually function as data collectors or secondary users of data produced within their organizations. Therefore, the new appraisal codes direct more emphasis at task demands of the questions rather than problems of interpreting the question itself.

Task demands and Semantic Demands of Survey Questions
Establishment survey questions are typically complex and require multiple respondents and sources of data to produce optimal responses. Respondents, however, may choose among several approaches. They may rely on their own personal knowledge and resources, engage internal experts within or beyond their divisional boundaries, pass the responsibility on to others, or use outside sources such as the firm's contracted legal teams, auditors, and so on. This may require considerable collaboration and coordination by the respondent on behalf of the organization. Lacking formal or perceived authority, they may simply engage in guessing.

Certain question features can increase the likelihood that multiple respondents and data sources are needed. Such features may include the following: a dependence on technical or industry specific language; omnibus surveys which request a myriad of data or expertise beyond the organizational boundaries of the unit receiving the request; items requiring complex estimation; items that draw from current and historical records; sensitive, strategic, confidential or proprietary data; using

unfamiliar or nonstandard response metrics; and overall data accessibility issues due to these features. A mix of cognitive appraisal codes for household surveys and new codes for the establishment context are suggested by these features. For example, codes retained from the household appraisal methodology include the following: complicated content, complex topic, problematic length (historical versus current data), sensitive information, and so on. Appraisal codes added for reviewing establishment questions include these: industry specific terminology, complex estimation necessary, proprietary, strategic or confidential information, variability in recorded units, data availability issues, multiple sources required, and distributed knowledge likely.

Structural Problems

Because the appraisal coding system was originally developed for evaluating interviewer-administered surveys, few codes addressed problems related to formatting, design, instructions, mail packages, letters and so on. Mail is the mode preferred by government statistical agencies in collecting data from establishments (Christianson and Tortora, 1995). In 1995, the mail mode was used exclusively in half of these surveys. Thus, to fully reflect the semantic and task burden, more codes identify design and layout problems. These codes include navigation or formatting not salient, confusing typographics, and confusing conventions. New codes for instruction problems include conflicting, inaccurate, transition needed, and so on. A code was added for detecting where responses are labeled with the wrong units.

METHODS

Funded by the Department of Housing and Urban Development, the Residential Finance Survey (RFS) is conducted by the Census Bureau as a follow-on survey to the Decennial Census. The RFS includes three distinct questionnaires: a homeowner version, a rental unit owner version and a version for their mortgage lenders. Thus, the RFS is a survey of large companies (lenders), smaller businesses (rental property owners) and homeowners.

Three questions across the forms were coded using Forsyth's organizational survey appraisal (Forsyth et al., 1999). Although these questions each shared the same measurement goal, they were not equivalent questions. For example, a mortgage-type question is asked on all three versions but posed in slightly different ways, using different formatting conventions, and appearing in different contexts. A standardized evaluation protocol increases the chance of detecting sources of these sometimes unintentional, subtle discrepancies between homeowner and lender reports.

A comprehensive summary of all codes assigned is not offered here. Rather, this paper discusses how unique task problems of establishment questions are identified, where semantic problems are shared across survey contexts, and finally, where task codes developed for establishment surveys are useful in the household domain.

RESULTS

Comprehension

Codes to identify comprehension problems include categories for Instruction Content, Navigation and Formatting, Question Content, Question Terminology, Question Structure and Reference Period (Forsyth et al., 1999).

A Tendency to Underspecify What the Question Is about

Establishment surveys require more knowledgeable, motivated respondents. This is reflected in the density and complexity of question text, instructions, responses and formatting conventions. It is also manifested in what is taken for granted. For example, establishment survey questions may underspecify the reference set of a survey item. The reference set is the set of activities, behaviors or concepts the question asks about or refers to. By assuming respondents bring superior knowledge to bear, the reference sets are often poorly specified, vague, undefined or have unclear boundaries. An item that seeks a discrete, factual response, may be interpreted inconsistently across respondents.

To cite a specific example, the RFS asks lenders to categorize the type of mortgage on the sampled property address. The item as it appears in the questionnaire is shown in Figure 1.

Figure 1: Mortgage Type Question, Lender Version, (Source: RFS, 1991)

2. The mortgage or similar debt you hold or service is a --	1☐ **First mortgage or deed of trust (including land contract or contract to purchase)** 2☐ **Home equity line of credit** 3☐ **Second mortgage (EXCLUDING home equity line of credit)** 4☐ **Third mortgage (EXCLUDING home equity line of credit)** 5☐ **Wrap-around mortgage** 6☐ **Other** - *Specify* ↯ _____ _____

The reference set, or what the question asks about, is the mortgage or similar debt held or serviced by the lender on the property described on the label. This is asked so that the Bureau can complement homeowner data for a specific loan with more detailed data from the Lender. This is especially important where there are multiple loans and perhaps multiple lenders for one property address.

Four appraisal codes identified problems with the reference set: vague, complex, underspecified, and carried over from previous question. Reference set codes are holdovers from the system used for reviewing household surveys. These codes detect a significant weakness in establishment question design, leaving what the question is about open to broad interpretation.

The reference set is vague because 'mortgage' and 'similar debt' incorporate a myriad of loan types for which the property is used as collateral. Without additional guidance, these terms may be interpreted too narrowly by some lenders. Conversely, without explicit caution the question may incorrectly capture unsecured debt such as personal property loans. We think of mortgage lenders traditionally as banks and S&L's who both hold and service mortgage notes. Lenders may also include insurance companies, credit unions, pension funds, and individual investors. These institutions may not carry the same expertise or means to respond.

The excessive use of conjunctions makes it difficult to isolate question intent, making the reference set complex. It refers to the 'mortgage or similar debt' that 'you (lender) hold or service'. Respondents in general often misinterpret conjunctions. 'Or' is sometimes understood to join, other times to disjoin two objects. Some respondents will infer that both conditions must be met.

Unlike the homeowner version, the lender version offers insufficient text about the type of loans that are in-scope. The homeowner version places the following instruction directly below the question: "Include all loans that are secured by the property." It is probably better understood by lenders than homeowners, but it is not offered where needed. There is also no direct reference to the property address in this question. Although the property is clearly referenced in the preceding item, complex response tasks intervene. Reorienting the respondent here is wise since the lender may have multiple mortgages on parts of or the whole property address, especially in the case of rental properties.

Content and Formatting

The same words and concepts that create poorly defined reference sets stem from problems with terminology, content, and structure. Seventeen codes were assigned to problems with instruction, question or response content including hidden content, complicated content, complex syntax, unclear examples, unclear goal, question and answer mismatch, and no question. Many of these result from using the phrase 'mortgage and similar debt', not specifying what may be included in 'other' for a response, and the general use of complex syntax in response options. The hidden content is the implicit question, 'Which of these debts do you hold or service on the property?'

Further formatting and layout problems were detected including confusing conventions, non-salient navigation instructions, and confusing typographics. As laid out, the question-answer task is very non-linear. Critical instructions are buried in earlier text or not salient where needed. It generally overuses and inconsistently uses typographics such as bolding, italics, and parenthetical instructions. These problems violate emerging principles of self-administered questionnaire design which enhance data quality (Jenkins and Dillman, 1997). A better design would ensure a straighter path through the form, the formatting conventions are established and maintained throughout, the directions are placed where they can be seen, and the information respondents are expected to integrate are collocated. In doing so, the designer would exert more control over how and what information is processed when.

Information Retrieval

Codes to identify retrieval problems include categories for Organization Characteristics, Source Identification, Memory Retrieval, and Record Retrieval (Forsyth, et al., 1999).

A Tendency to Assume Unfettered Access to Current and Historical Records

Omnibus establishment surveys often ask for information that cuts across formal organizational structures and work roles. For example, with job specialization, financial accountants are probably not good informants on production, payroll, or R&D data. Production engineers probably know little about financial data prepared for SEC filings. Also, information management and access to information systems in large organizations typically involve more complex, formal processes. To some degree, respondents must master internal organizational and information systems in addition to mastering the questionnaire. A question on the RFS Lender version illustrates how this problem may be detected. The mortgage insurance-type question asks the respondent to report the type of mortgage insurance on the sampled property address (Figure 2). Though many problems are evident, the focus here is on characteristics that may contribute to retrieval problems.

Several problems begin in the comprehension stage of this question. Most important, no specific

reference period is mentioned and induces problems in the retrieval process. Respondents may assume the question refers to 'today'. The interpretation of 'today' could be the date the document is stamped *received* by the person who directs the mail, the date it lands on the respondent's desk, or the day the respondent completes the form. Forms can circulate about organizations for months. Home and rental unit owners must make the same decision. Recognizing that respondents in lending institutions need to refer to information systems, the problem is amplified. If insurance-type were a fixed mortgage characteristic and the mortgage was active, not specifying a reference period would be acceptable. However, it is not and the reference date defines which records are used.

Figure 2: Mortgage Insurance Type, Lender Version, (Source: RFS 1991)

	FIRST MORTGAGE (1)	SECOND MORTGAGE (2)	THIRD MORTGAGE (3)
6. How is the mortgage insured or guaranteed?	1☐ Federal Housing Administration (FHA) 2☐ Department of Veteran's Affairs (VA) 3☐ Farmer's Home Administration (FmHA) 4☐ Private mortgage insurance company (*Do NOT include borrower's life insurance*) 5☐ State bonding agency 6☐ Other - *Specify* ➘ _____ _____ 7☐ Not insured or guaranteed	1☐ Federal Housing Administration (FHA) 2☐ Department of Veteran's Affairs (VA) 3☐ Farmer's Home Administration (FmHA) 4☐ Private mortgage insurance company (*Do NOT include borrower's life insurance*) 5☐ State bonding agency 6☐ Other - *Specify* ➘ _____ _____ 7☐ Not insured or guaranteed	1☐ Federal Housing Administration (FHA) 2☐ Department of Veteran's Affairs (VA) 3☐ Farmer's Home Administration (FmHA) 4☐ Private mortgage insurance company (*Do NOT include borrower's life insurance*) 5☐ State bonding agency 6☐ Other - *Specify* ➘ _____ _____ 7☐ Not insured or guaranteed

Mortgage insurance is typically required when lenders finance more than 80 percent of the purchase price of the loan. As the equity reaches the 20 percent mark either through loan payments or property appreciation, mortgage insurance can be dropped. The respondent must invent a reference date to meet a variety of data access and availability constraints. These data may only be available on a periodic basis relating to the tax year, changes in tax or real estate laws which affect payments, or when escrow is recalculated. Are the data maintained in current or historical databases? Can the data be retrieved by the respondent or formally request them from others? How frequent are lender payments to the insurer on the owner's behalf? Does this affect data availability? The answers are likely to vary according to lender type. Is the lender the mortgage holder, only the mortgage servicer, or both? Is the lender a large bank offering varied mortgage products, a small finance company specializing in particular loan types, or perhaps an individual investor? Do loan servicers, smaller lenders, etc. maintain the same types of data as loan originators? Must these data be of the same vintage as other questions with unspecified reference dates? Without explicit guidance, the respondent may reach a compromise that meets the spirit but not the intent of the question.

Under Organization Characteristics, the code 'distributed knowledge likely' was used. Under Source Identification the codes 'sources may not be accessible' and 'multiple sources required' were used. Under Record Retrieval, 'record availability issue ' and 'record access issue' were used.

For homeowners, other issues are likely to dominate. Under Source Identification codes the following problems were identified: instructions not available to help identify the source(s), multiple sources required, and sources may not be available. Since the mortgage type cannot be inferred simply from the type of mortgage on the property, homeowners will need guidance on what physical records to reference. Alternatively, the question could rely on respondents' ability to recall the information by priming particular events during which the information would have been encoded.

Rental unit owners often contract out to legal or accounting firms their complex tax, financial and real estate work. As with the lender version, problems identified included distributed knowledge likely, multiple sources required, and record access and availability issues. Rental properties may be financed through various mortgage products to achieve a variety of business goals. As with the homeowner version, the code, 'instructions not available to identify source', was used. A property manager is even less likely to have encoded the insurance-type information and will need some guidance to properly direct the inquiry.

Synthesis and Evaluation

Codes used to identify problems in synthesizing and evaluating retrieved data include categories for Record Match to Item issues, Evaluation Processes and Task Characteristics (Forsyth et al., 1999).

A Tendency to Assume Expertise Resides in One Respondent

Citing Lawler and Rhodes (1976), Edwards and Cantor (1991) identify three distinct relationships people have in relation to information systems within their organizations: they are either measured and controlled by them, responsible for the maintenance of them, or users of the data. In the RFS context, a slightly modified taxonomy applies because the data systems relate to persons outside the system, the mortgagors. Thus, the respondent in the lending institution is more likely to be a person who has limited read-access and data entry capabilities, a person responsible for system maintenance, or a person who uses the system for accounting, analysis or other decision-making purposes.

Because the RFS requests both current and historical data relating to a loan on a particular property address, it is not clear which respondent-type best serves the survey task. To synthesize and evaluate the data output, a respondent must have sufficient motivation, authority and capacity to access the information. Respondents vary on these characteristics. Metadata in these systems may offer insufficient clues to help the average respondent identify the correct data items.

For reasons of system efficiency and security, historical data are often less accessible than current data. Data availability may be limited to certain times of the month or calendar year. Parts or all of the original loan data may reside in the lender's information system. Whether these data are maintained by and accessible to mortgagees, loan servicers or only companies that do both needs to be investigated. For example, a lender who only services the loan may have data for current loan characteristics but no access to the original terms of the note requested by the RFS. As an omnibus data request, it requires more elaborate collaboration and coordination within an organization.

An example from the RFS illustrates how expertise interacts with information systems to create a complex task of synthesizing and evaluating data gathered from them. The question in Figure 3 basically asks the lender to record the original loan amount when initiated by the homeowner.

Though there are several other design issues, the focus here is on synthesis and evaluation problems.

Figure 3: Mortgage Origination Date, Lender Version, (Source: RFS 1991)

	FIRST MORTGAGE (1)	SECOND MORTGAGE (2)	THIRD MORTGAGE (3)
9b. What was the amount of this mortgage when made? If refinanced or renewed, enter amount at time of most recent action.	$ .00	$ .00	$ .00

Again, comprehension problems contribute to problems in later stages of the response process. For example, the boundaries of the reference set 'this mortgage' are only defined in the response category of the preceding question. Thus, it is not clear from this question alone that only new mortgages and assumed mortgages with new terms are to be reported here.

A variety of data may reside in the system regarding the original loan, refinancings, assumptions, renewed terms, and so on. Historical data from previous lenders about this property loan may also be available. Deciding which of these data meet the question objective is a complex judgement task. Codes identified several problems under the Synthesis and Evaluation phase: under Match Record to Item, 'information is incompatible with the organizational unit's objectives', 'survey specific system unlikely'; under Judgment Processes, 'coordination or collaboration likely', 'guessing or estimation likely'; and under Task Characteristics, 'timing issues', and 'confidentiality issues'.

Homeowners are more likely to collaborate with co-owners when relying on recall or retrieving records to answer this item. Because the mortgage amount is typically salient and richly encoded, homeowners may be more inclined to resort to estimation if record retrieval is difficult. In the same situation, a lender may simply leave the item blank. The quality of response from rental units will largely depend on who has access to historical records or whether the original mortgagor who encoded the information is available. Since rental unit owners engage in more and varied property financing, individual mortgage events may be less salient. Thus, recall error may be greater if those owners rely more heavily on recall and less on records.

Response Selection

Codes used to identify response selection problems include categories for Response Terminology, Response Units and Response Structure (Forsyth et al., 1999).

A Tendency to Assume Establishments Have All the Answers

Omnibus establishment surveys often fail to explore what data organizations maintain and thus are able to provide. Survey questions often request a level of detail beyond what is maintained in their information systems. For example, the mortgage insurance-type question in Figure 2 asks the respondent to report the specific type of mortgage insurance on the loan. Whether the lender has the data may depend on whether they only hold the note, simply service the loan, provide annual tax data to the homeowner, and so on. The information system may only retain data on the type of loan, say that it is a VA loan. Lacking insurance-type data, the lender respondent may infer from the loan type whether mortgage insurance is paid and its type.

In terms of Response Selection problems, the firm may maintain a different categorical taxonomy of insurance types than that requested by the survey. For example, the lender may combine FHA and VA insurance types or combine State Bonding Agency with a long list of other insurers under 'Other'. For these reasons, a Response Structure code notes a problem with overlapping categories.

Perhaps assuming they know less than lenders, the home and rental unit owner versions only offer response categories for FHA, VA, FmHA mortgage insurers and 'None of the Above'. It offers neither an opportunity to report private nor other mortgage insurance. Though homeowners may know little more than what they pay each month to whom, rental property owners probably know more. Rental unit owners have a greater incentive to actively manage their costs and to maintain records of costs for tax purposes. Therefore, they are probably more aware of their mortgage insurance obligations. Such respondents would minimally have the capacity to report, if not the motivation.

CONCLUSION

The RFS was last fielded in 1991, well before much of the 'cognitive revolution' in federal survey research. Thus, coding was successful in facilitating a systematic, standardized review of three questionnaires that had never been subjected to a cognitive pretesting method. It ensured that each question received the same level of scrutiny. It also facilitated a quicker understanding of instruments with which the reviewer was quite unfamiliar.

In their comparison of pretesting methods, Presser and Blair (1994) contrasted two fairly standardized methods, behavior-coding and a fixed cognitive protocol, against a relatively unstandardized review of experts. Education and training seemed to matter in the number and type of problems identified by these experts. This appraisal protocol may offer a standardized checklist to compensate for limitations attributable to the education, training or experience of cognitive interviewers. It may actually accelerate the learning curve of novice cognitive interviewers by ensuring they attend to particular question problems.

As with the behavior coding methodology, the appraisal coding developed by Forsyth et al. (1999) offers the richness of detail of a qualitative methodology with that of a quantitative one, simply counting the number of problems where they occur. Appraisal coding of a questionnaire certainly enumerates the broad nature and level of problems possible in a particular survey design. However, it does not sufficiently identify the source of the question problems. It was necessary to supplement the codes with comments explaining why a code was used and to facilitate comparisons across the three forms. Thus, this method is fairly labor intensive and requires a coder who is knowledgeable of cognitive sciences.

A mastery of cognitive science seems inadequate to properly identify question problems and suggest solutions in establishment surveys. Across the three forms, the nature of the problems for which a single code was applied were quite different and complex. Typically, different solutions were necessary based on the characteristics of the target population. For lenders, examples illustrated the breadth of respondent expertise needed in these large, complex social organizations. The demands on the reviewer's expertise are perhaps greater. Therefore, future research might explore which type of expert should participate in the appraisal. Drawing together a broader sample of experts should

clarify where the questions are simply difficult to understand (semantic problems) versus where they are more difficult to address (task problems). Each problem suggests a different solution. For example, subject experts such as financial accountants, survey program managers, and data users bring a variety of goals and perspectives to a survey design. They may be particularly skilled at suggesting solutions which meet analysis goals. Organization experts such as social psychologists, organizational ethnographers, and administrative science researchers can provide insight on what organizational processes impede the flow of survey data. They may also offer more appropriate data collection strategies. In pursuit of better data quality, survey methodologists can continue to explore which questions and survey methods impose reasonable cognitive and task demands on respondents.

Appraisal coding helped to identify unique question problems of establishment surveys, define the focus of our pretesting efforts, and consider a mix of data collection strategies. It also revealed a variety of themes to explore in further research: a tendency to underspecify question intent, to assume unfettered access to current and historical records, to assume expertise resides in one respondent, and to assume establishments have all the answers. This methodology may also provide the means for the survey research community to formally document the history of question problems, performance, and solutions.

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