

Cognitive Issues and Reporting Level Patterns
from the CE Diary Operational Test

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1. INTRODUCTION

The Consumer Expenditure (CE) Survey Diary Operational Test was conducted to examine alternative diary formats for the CE Survey. Prior research has shown that when compared to independent data sources, the CE Diary Survey underestimates consumer purchases (Giesman, 1986). Alternative formats were designed in an attempt to improve reporting.

By making the diary more attractive and easier to complete, it was hypothesized that respondents would report more purchases, and report them more accurately. Two experimental formats were used in the test along with the regular production diary, which was used as a control.

Examining differences in reporting levels is the most important aspect of this test. However, response rates, processing problems, the extent of recall and other nonsampling error aspects are also important aspects are also important in deciding if format changes should be made to the existing diary. This paper examines several cognitive issues related to the completion of the diaries.

The rest of Section 1 describes the sample design and how variances were calculated. Section 2 describes the diaries used in this research. Section 3 describes the cognitive issues examined. Section 4 describes the experiment in relation to the cognitive issues. Section 5 describes the level of analysis and the method of measurement. Section 6 discusses classification issues. Section 7 shows results of the actual comparisons. Finally, Section 8 gives some cognitive conclusions.

1.1 SAMPLE DESIGN

The sample for this research consisted of addresses selected for the Current Population Survey (CPS) in 22 large metropolitan areas. Addresses in this sample were last interviewed for CPS in January and February of 1979. A sample of 3,640 addresses was selected from the 22 areas for designation in this research sample. The 22 metropolitan areas were selected to make efficient use of personnel and to minimize cost. Consequently, results from this analysis should only be applied to areas with similar characteristics.

1.2 VARIANCES

The variances for this analysis were derived assuming simple random sampling with a design effect of 1.5. The design effect is a measure of the effect of CE's complex sample survey design on the variances computed assuming simple random sampling. Prior research has shown that the CE Diary Survey variances can be approximated using simple random sampling with a design effect somewhere between 1.2 and 1.5. In order to be conservative with our analysis, a design effect of 1.5 was used.

2. THE DIARIES

The CE Surveys collect information on purchases made by respondents. The two components of CE are the Quarterly Interview Survey and the Diary Survey. The Quarterly Interview Survey collects data on large one time purchases such as automobiles, houses, and appliances. This survey is done with a personal interview and respondents are asked to recall purchases over a three month period.

The Diary Survey collects data on smaller, more frequently purchased items such as food and household supplies. This survey is completed using an expenditure diary.

The aim of an expenditure diary is to collect, as accurately as possible, data on these small, frequently purchased items which may be difficult to recall in detail. The diary instrument for the CE Diary Survey is respondent-filled. That is, an interviewer drops the diary off at the respondent's household, gives

instructions for completing the diary, and returns one week later to pick up the diary. This is done twice for a total of two weeks of data. During the weeks, the diary entries are made by the respondents themselves. When the interviewer returns, questions are asked to determine if any items purchased were not yet reported. Any purchases reported at this time are transcribed directly on the diary for the Control but are placed in a special recall section on the experimental diaries.

The style and format of the diaries may affect the respondent's burden of recalling and reporting items purchased. Styles and formats different from those used in the production (i.e., Control) diary were designed to improve the quality of the respondent's reporting (Vacca and Killion 1986).

2.1 STYLE

Style changes were made to the experimental diaries to improve the respondent's first impression of the diary. Census Bureau technicians on forms design were consulted for suggestions on size, shape, color, and type of paper to be used. All of these characteristics were redesigned in an effort to improve data quality. The two experimental diaries were very similar in style.

2.2 FORMAT

The current diary (the Control diary) uses item cues in headings of expenditure categories (ECs) to assist the respondent in recalling items purchased in those categories. Blank lines are to the right of the EC headings and respondents are instructed to write on these lines the items purchased, the number of purchases, how the items were packaged (including the net weight or volume for food items), and the price. Respondents are encouraged to list all purchases. The experimental diaries are laid out by EC also, but they are more comprehensive in their cues.

One of the experimental diaries, the Non-specific diary, lists many more cues than the Control diary, but focuses these cues on the major ECs used in the economic analysis. The headings include a few specific examples to illustrate the meaning of the category. Each heading is then followed by blank lines similar to the Control diary. The item, price, and packaging description are all to be written in. This is similar to the Control, except net weight is not asked for. Also in an attempt to make completing the diary easier, reporting of items in categories not mentioned such as rent and utilities, are not encouraged.

The other experimental diary, the Specific diary, includes only titles in the headings of each EC. The headings are then followed with lines listing specific Uniform Classification Codes (UCCs) and item descriptions in those classifications. For items that can be classified easily into a UCC, respondents have to indicate only if the item was purchased and what its price was on the Specific diary. Blank lines were included for those items not listed and for items that the respondents felt did not fit into any of the UCCs listed.

The reason for using these two formats was to compare reporting levels between the blank line approach (Non-specific) and the checklist approach (Specific).

3. COGNITIVE ISSUES

There are several cognitive issues which may play a role in the success or failure of the experimental diaries. Cognitive issues are those phenomena related to how one knows, understands, or perceives something. In the realm of cognitive psychology, there are different theories concerning situations that help or hinder one's ability to retrieve information from memory.

Several of these were examined in the Diary Operational Test and are described below.

3.1 THE PART LIST CUING EFFECT

The part list cuing effect is the effect of providing a partial list of cues. The intention of the list is to assist the respondent in retrieving information from memory. One observation about including a partial list is that any cue listed does not have to be recalled. Only the purchase of that item needs to be recalled. The more complete the list of cues the fewer items have to be recalled directly from memory. However, an opposing theory to the inclusion of a list of cues is that the amount of successful recall decreases as the number of cues increases (Roediger, 1974). Respondents become less able to remember items not mentioned when a large list of cues is used.

3.2 THE CATEGORIZATION CUING EFFECT

The categorization cuing effect is the effect of the level at which cues are given. The memory retrieval process is limited by the number of categories that can be recalled rather than the number of items within a category that can be recalled (Lynch and Srull, 1982). This theory suggests that more general cues may elicit more responses since items that are categorized into the general cues would not be as difficult to recall as other general cues not mentioned.

4. COGNITIVE ISSUES IN THIS EXPERIMENT

By examining the cognitive issues described in Section 3, we hope to determine why certain items are reported more often on one diary type than on another. Although a very important goal of this experiment was to see which diary format leads to higher reporting levels (which is considered to be the primary measure of success), it is also important to understand why there are differences of reporting by item. It is conceivable that different items will do better on different diaries. This inconsistency may be due to the wording of category headings and classifications on the diaries, and how that may affect the respondent's ability to remember and classify other items.

Beyond selecting a particular diary format based on reporting levels, we hope to examine the effect of the cognitive issues in order to make recommendations for possible improvements to the selected format.

Because the diary is respondent-filled, there is no control as to when the respondent actually completes the diary in relation to when purchases are made. There is evidence that some respondents may wait until the end of the day or several days later to complete the diary. Even if data are recorded as soon as the respondent returns home from a store, recall abilities are required.

The cues that are given on the diary are meant to assist the respondent in retrieving information from their memory concerning purchases of such items. For items listed, the recollection of purchasing the item is all that is necessary. For items not listed, the item itself and the purchasing of the item must be recalled. The process involves two steps:

- . How the respondent perceives what is asked of them, and
- . How that information is retrieved from memory.

These steps are examined throughout this paper.

4.1 THE PART LIST CUING EFFECT IN THIS EXPERIMENT

The Nonspecific diary relies on the information in the headings of ECs as cues for the respondent's memory and as assistance for categorizing items purchased. The presence of a partial list of classifications is expected to have an effect on the response levels within the EC.

The more complete the list of classifications in the heading, the more clearly defined the heading will be. For listed classifications, the classification does not have to be recalled by the respondent; only items purchased within the classification will need to be recalled. As

was stated earlier, prior research has shown that it is easier to recall items in classifications mentioned than to recall the entire classification. The presence of this effect is tested by looking at UCCs mentioned as cues on the Specific diary, but not mentioned on the Nonspecific diary. The theory would suggest that these items should be reported more often on the specific diary. A similar comparison will be made between the Specific and Control Diaries.

The other side of the part list cuing effect is the fact that a larger list of cues makes it more difficult to remember items in classifications that are not listed in the heading. (Lynch and Srull, 1982) This is known as an accessibility problem. That is, items in classifications not mentioned become less accessible to memory when the list of classifications that are mentioned is large. There is also no clear expectation to report items from classifications not mentioned.

In order to measure this effect, we looked at miscellaneous or residual classifications, such as "miscellaneous prepared foods." Although the residual classification is listed as a cue on the Specific diary, items that go into it are not listed. Within the more general EC that the residual classification is listed, other items were mentioned on the Specific diary, possibly making it more difficult to recall items not mentioned (i.e., those that should be classified in the residual UCC). For example, the "miscellaneous prepared foods" UCC falls into the Other food EC but items such as soup, nuts, and potato chips are also mentioned on the Specified diary. Items that fall into "miscellaneous prepared foods" would be expected to have been reported less often here than on the Nonspecific diary. Another possibility is that the list of cues that is present gives the respondent the impression that items not mentioned are less important to recall. Since the Nonspecific diary has fewer items mentioned in the EC heading than the Specific diary has mentioned in the body of the category, the theory would suggest that there would be less of a hindrance for recalling other items on the Nonspecific. This would result in higher reporting levels for the Nonspecific diary in residual UCCs.

4.2 CATEGORIZATION CUING EFFECT IN THIS EXPERIMENT

As an option to giving a partial list as a cue for recall, more general cues can be given. Prior research has shown that a broader list of cues can be more useful than specific items. (Lynch and Srull, 1982) Therefore, if the heading lists general classifications the mind is given the chance to freely recall all items. If the heading is specific, then items in classifications not mentioned become less accessible. This is because the "path" of memory has been limited by the specific classifications mentioned. This effect is illustrated with the Fruits and Vegetables EC on the Nonspecific and Control diaries. The classifications listed on the Nonspecific diary in these categories are more inclusive than those on the Control diary. The heading for fruits on the Control diary says "apples, peaches, apricots, etc." The heading on the Nonspecific diary says "any fresh, frozen, canned, dried, or bottled fruits and fruit juices, etc." The detailed heading on the Control diary may direct the respondent's mind away from fruits other than fresh fruits, because the classifications mentioned seem to refer to all fruits in their natural form. Conceivably, more apple products could be elicited by the Nonspecific diary, even though apples are not mentioned. The heading on the Nonspecific diary does not hinder the respondent's thought process. The cuing technique used there allows the respondent to think more freely about fruits purchased by using only packaging as cues. The vegetable EC has a similar presentation in that the Nonspecific has more inclusive cues than the Control diary.

5. LEVEL OF ANALYSIS AND METHOD OF MEASUREMENT

In order to examine differences in classification reporting levels, the data were examined at the UCC level. As was stated earlier, the Specific diary is designed listing each UCC. Items on the Nonspecific and Control diaries were clerically coded with census item codes. Census item codes are more detailed breakdowns of the UCC codes in most cases. Therefore, census item codes were collapsed to equate them with the UCC codes of the Specific diary. In cases where the census item codes were not adequately detailed to fit into a UCC, a decision was made as to which UCCs they would be classified with or whether to include that census item code in the analysis at all.

The examination of the data at the UCC level is crucial to our purpose. Although the differences in reporting levels discussed in the following sections may be visible at the less detailed EC level, the reasons for the differences may be lost in the EC totals.

Two measures of expenditure reporting levels were used in this analysis at the UCC level. They are the reporting rate and the median of all nonzero dollar amount expenditures. Examining both of these measures is somewhat comparable to examining mean expenditures but is not so sensitive to rare or outlier expenditure values. The reporting rate is the proportion of respondents who reported expenditures for a given UCC at least once in a diary week. That is, a reporting rate of .15 means that 15 percent of the completed weekly diaries in this study reported the given UCC at least once. Reporting rates were calculated for each UCC of all three diary types. The second measure is the median of all nonzero dollar expenditures reported. In general, differences in medians were not observed. Only where differences were observed were medians discussed. Note that with very little difference in medians observed across diary types, any differences in mean expenditures can probably be attributed to differences in the reporting rate.

The mean number of entries reported was not used for this analysis. This is because the definition of an "entry" differed by diary type. For example, the UCC "Biscuits, rolls and muffins" would show one entry on the Specific diary if biscuits and rolls were both purchased on a given day. However, if the respondent listed biscuits and rolls on separate lines of the Nonspecific diary, then the diary would show two entries.

Mean dollar expenditures were not used because of potential skewness of the distributions for many UCCs. An unusually large expenditure may have been reported on one diary type but not another. At the UCC level of analysis, this would lead to a distorted value for the mean expenditure on the diary with the outlier. For example, one diary type might have one respondent purchasing a side of beef. If the other diary types did not have a similar purchase, differences would be seen in the mean dollar expenditures for the UCC "other beef and veal", solely produced by the outlier.

6. CLASSIFICATION ISSUES

The process by which items are classified into the UCCs is quite different by diary type. For the Specific diary, the respondent is required to indicate which UCC most accurately describes the item. For the Nonspecific and Control diaries, the respondent is required to describe the item. Based on this description a census item code is clerically assigned, as discussed in Section 5.

Assigning census item codes and collapsing these to UCC codes for the Nonspecific and Control diaries are very complicated and detailed processes developed by economists at the Bureau of Labor Statistics. In order to avoid any differences between classification on the Specific diary and the other diaries, the respondents would basically have to replicate these processes in determining where to classify an item. This is not a reasonable assumption. Respondent's perception of how to classify items will vary, some items are difficult to classify

(i.e., the "correct" UCC is ambiguous), and in some instances the classification process for certain items appears to be counter-intuitive.

Differences in classification for the above reasons are considered misclassifications on the Specific diary and reduce the number of correct classifications. If the descriptions on the Specific diary include the type of packaging or other pertinent details about the items that should be classified in the UCC, then this would increase the number of correct classifications. Misclassifications can also occur on the other diaries: If the detailed information required for the Nonspecific and Control diaries to classify an item is not provided by the respondent, then the item may be classified incorrectly in the processing. For example, this can occur when the type of packaging is omitted or other details, known or unknown to the respondent, are not provided.

7. COMPARING THE UCCS

In order to measure the success of the different diary types, UCCs were compared across diary types. Depending on how a UCC was presented on the different diary types, cognitive issues were examined. The presentation of a UCC might be that it is listed as a cue on two different diary types, listed on only one diary type, not listed at all, or listed in a more or less specific manner. All of these variations were examined to the extent possible. All comparisons should be made keeping in mind the possibility of misclassification as described in Section 6. Misclassification can lead to significant results in a direction opposite to what is expected or it can lead to results consistent with a hypothesis making the reasons for such a difference less clear.

7.1 COMPARING UCCS LISTED ON BOTH THE SPECIFIC AND NONSPECIFIC DIARIES

As a control to all other comparisons, UCCs that were listed as cues on both the Specific and Nonspecific diaries were compared. Any differences observed with these UCCs would show a fundamental difference in the reporting levels of these diaries. That is, differences would not be due to recall since these UCCs were listed as cues for the respondents on both diaries. Instead, observed differences would be attributed to the format differences of the diaries.

Twenty-nine UCCs were listed as cues on the Specific and Nonspecific diaries (see Table 1). Some of the cues were virtually identical. For example, in the EC of "Pork", the UCC "Bacon" was mentioned. This was the case on both diaries. Cues listed in the heading on the Nonspecific diary and listed as a UCC on the Specific diary were considered as identical if they were only slightly different either in wording or in the heading in which they were placed. For example, the UCC "Peanut butter" was listed in the "Fats, oils, and dressings" EC on the Specific diary, but was in the "other foods" EC on the Nonspecific diary.

Of the 29 UCCs, 10 showed a significantly higher reporting rate on the Specific diary. They are lunchmeat, margarine, soup, pet food, postage, diesel fuels, motor oil, magazines, newspapers, and pay telephone. Books also showed some evidence of a difference.

Two of the UCCs, cereal and cheese, had significantly higher reporting rates on the Nonspecific diary. No concrete explanation had been hypothesized in advance for these differences. One possible explanation is that there may be misclassification on the Specific diary by the respondent. For example, the lower reporting of cheese on the Specific may be due to respondents classifying cheese spreads in the "Nuts, Potato Chips, and other snacks" UCC or the "Miscellaneous Prepared foods" UCC. Classifications of these items were made by Census clerks for the Nonspecific and Control diaries. The 16 remaining UCCs listed on both the Specific and Nonspecific diaries did not have significant differences.

In general, for the food UCCs, there is no indication of a consistent difference in the

reporting rates when the UCCs are listed on both the Specific and Nonspecific diaries. However, for the nonfood UCCs listed on both diaries, the Specific diary has higher reporting. This might be due to longer lists of cues in the headings on the Nonspecific diary for nonfood items. The respondent might not be using these longer headings for assistance, while, on the Specific diary, they continue to use the line-by-line cues. Another possibility is that for food ECs, it is inherently clear what types of foods are being asked for; so the list is read and remembered. For nonfood ECs, it is not so clear, so the list is read but little is retained and this is where the line-by-line aspect of the Specific diary is most effective.

7.2 COMPARING UCCS LISTED ON BOTH THE NONSPECIFIC AND CONTROL DIARIES

To observe the effect of diary style we compared UCCs listed on both the Nonspecific and Control diaries. These two diary formats were similar for those items listed on both diaries. The major difference between these diaries was thought to be the style. By looking at UCCs listed on both the Nonspecific and Control diaries, the effect of style is measured.

There were 7 UCCs that were listed as cues for both the Nonspecific and Control diaries (see Table 2). Three showed significantly higher reporting rates on the Nonspecific diary. They were cereal, eggs, and sugar. The nonfood items show no significant differences in favor of the Nonspecific diary. One UCC, newspapers, showed some evidence of higher reporting on the Control diary.

With further examination, it was discovered that all three UCCs that showed significantly higher reporting on the Nonspecific diary were listed in the title of the EC as well as in the heading. This additional cue might have had an effect on the reporting rate. Also, the long list of non-food items in the Nonspecific could have negated the positive effects of style shown by the food items. The differences observed in the reporting rates can not be directly attributed to style with these possible confounding effects.

7.3 COMPARING UCCS LISTED ON THE SPECIFIC BUT NOT ON THE NONSPECIFIC DIARY

There were 18 UCCs listed as cues on the Specific diary but not on the Nonspecific diary. (see Table 3). Twelve of the 18 UCCs did show a significantly higher reporting rate on the Specific diary than on the Nonspecific diary. One of these, Cola drinks, may be significantly higher because of misclassification. For the Nonspecific diary, clerks were instructed to classify diet cola drinks into the "other carbonated drinks" UCC. It is hypothesized that on the Specific diary, these purchases would have been classified as cola drinks thus increasing the difference.

One UCC showed a higher reporting rate on the Nonspecific diary. It is "Biscuits, rolls, and muffins." "Prepared salads/ desserts" showed some evidence of a difference in this direction. In both cases misclassification on the Specific diary may be the explanation. "Prepared salads/ desserts" includes such items as tuna salad and turkey salad. It is very possible that on the Specific diary, these items were specified elsewhere on the diary such as fresh fish or fresh poultry. A more controlled experiment would be needed to examine this possibility. The "Biscuits, rolls, and muffins" UCC could also be affected because for this analysis, a reporting of "rolls" on the Nonspecific diary was classified into this UCC. In practice, packaging for this response would be imputed and some responses of "rolls" would be classified into the "Frozen, and refrigerated bakery products" UCC.

The general conclusion here is that listing individual items was helpful. In this case, items that are either produce or beef are better reported when the actual produce or beef item is mentioned. This conclusion is also seen when one contrasts these results with those in Section 7.1 where no difference was seen between these diaries for food items listed on both.

7.4 COMPARING UCCS LISTED ON THE SPECIFIC BUT NOT ON THE CONTROL DIARY

Similarly, there were 46 UCCs that were listed on the Specific diary but were not listed on the Control diary (see Table 4). Although this comparison may be confounded by an effect due to style differences (which could not be determined in this experiment) it may still indicate a part list cuing effect. Note that UCCs listed on both the Specific and Control diaries were examined, but similar to the comparison between UCCs listed on the Nonspecific and Control diaries, no conclusions could be drawn. Of the 46 UCCs listed on the Specific but not on the Control diary, 39 had significantly higher reporting on the Specific diary than on the Control diary. Three UCCs had higher reporting rates on the Control diary. They were "olives, pickles, sauces, gravies," "Prepared salads/desserts," and "Pay telephone calls." Possible misclassifications on the Specific diary can be seen in the first two UCCs. Items such as ketchup and mustard are intended to be classified in "Olives, pickles, sauces, and gravies." It is possible that respondents completing the Specific diary may have put these purchases in the "Salt, seasoning, spices, condiments, and vinegar" UCC because of the cue of condiments. The "Prepared salads/ desserts" UCC has been seen earlier as a possible misclassification problem. The third UCC with higher reporting on the Control diary is "Pay telephone calls." Looking at the median expenditures for this UCC (32.56 for Control and 0.7 for the Specific) leads to a conclusion that phone bills are being reported on the Control diary. This is further seen from what is used as a cue on the Control diary, "Rent, utilities, phone, household fuel." The intent of this UCC was actually different on the Control and Specific Diaries. It was the intent of the Control diary to pick up phone bills. This intent was not carried over to the experiment.

The remaining 4 UCCs showed no significant difference in reporting rates on the Control and Specific diaries. They are "Biscuits, rolls, and muffins," "Cheese," "Frozen prepared food," and "Baby food." The first two have been discussed earlier in terms of possible misclassification. Frozen prepared foods may also have this problem on the Specific diary. For example, frozen turkey dinners, shrimp dinners, and frozen Mexican food might all have been placed elsewhere by respondents on the Specific diary. No explanation is given for the lack of difference for the UCC "Baby food" between the two diaries.

7.5 COMPARING UCCS NOT LISTED ON EITHER THE SPECIFIC OR NONSPECIFIC DIARY

Sixteen residual UCCs were examined (see Table 5). Of the 16, 2 showed significantly higher reporting on the Nonspecific diary. They are "other fresh milk and cream," and "Miscellaneous prepared foods." A third UCC, "other carbonated drinks" showed evidence of significantly higher reporting on the Nonspecific diary. However, this UCC is effected by the possible classification problem mentioned in Section 3.5.1 with cola drinks.

There appeared to be a switch in responses between the Specific and Nonspecific diaries in the UCCs "Fresh whole milk" and "other fresh milk and cream." The Specific diary shows reporting rates of .459 and .294 respectively for these UCCs. The Nonspecific diary shows reporting rates of .203 and .501 respectively. It appears as if something is being coded as "Fresh whole milk" on the specific diary by the respondent while it is being classified as "Other fresh milk and cream" on the Nonspecific diary. Further investigation has shown that for the sake of comparison, a response of "milk" on the Nonspecific diary was classified into the "Other fresh milk and cream" UCC. If many of these "milk" entries are truly "fresh whole milk" then this could explain the reason for differential reporting rates.

The higher reporting rate on the Nonspecific diary for "Miscellaneous prepared foods" might be due in part to the accessibility problem.

However, this is another classification that might be lower on the Specific diary due to misclassification into other UCCs. "Miscellaneous prepared foods" includes items such as canned beef, canned chili, and canned poultry. These items, if reported at all, may have been reported in the other meat UCCs.

Three UCCs have significantly higher reporting rates on the Specific diary. They are "Other roast," "Other steak," and "Other meat and game." A fourth UCC, "Other pork" showed some evidence of higher reporting on the Specific diary. This may be due to the misclassifications mentioned above with the "Miscellaneous prepared foods" UCC for this analysis. Also these differences may be attributed to the fact that we did not include responses such as "roasts" in the "other roasts" UCC in our comparisons. The same is true for responses of "steaks".

As described in Section 4.1, these comparisons were supposed to get at the effect of accessibility. The above results show that the accessibility problem was not observed in this study. This may be due to confounding effects. It might also be the case that the accessibility problem does not exist with the Specific diary. Perhaps the cues that are present are assisting, not hindering, in the reporting of other classifications for which there are not specific cues.

7.6 COMPARING UCCS MORE INCLUSIVELY LISTED ON THE NONSPECIFIC THAN ON THE CONTROL DIARY

The fruit and vegetable ECs were used to compare UCCs that were listed with varying levels of specificity. There are 11 UCCs involved in the Fruit and Vegetable ECs (see Table 6). Out of the 11 UCCs examined, 7 showed significantly higher reporting rates on the Nonspecific diary. The four UCCs that did not show a difference included fresh apples and fresh tomatoes which were both mentioned specifically on the Control diary, and fresh bananas and fresh potatoes.

All of the non-fresh UCCs showed higher reporting on the Nonspecific diary. By mentioning the packaging methods of "frozen, canned, dried, and bottled," more reporting of these items occurred. It appears that the cue on the Control, "apples, peaches, apricots, etc." may have limited the responses to fresh fruits.

8. COGNITIVE CONCLUSIONS

As an experiment to improve the data quality of the CE Diary Survey, the Diary Operational Test was somewhat successful. Both the Specific and Nonspecific diaries have shown increases in reporting rates overall from the Control diary.

The results of the cognitive research were interesting in that theories were able to be tested in a "real world" setting. In some cases the results supported the theories. The ability of respondents to classify items, was seen in the differences of reporting rates at the UCC level. The results showed in several places that there possibly was misclassification on the Specific diary. The Specific diary format requires that the respondent classify all items that are not mentioned specifically. It was observed that in some cases respondents possibly classified items in places other than where they were intended to be classified. This may not be a problem if analysis is done at the EC level. However, if different UCCs are treated differently in the uses of the data, this phenomenon needs to be controlled. The problem of misclassification on the Consumer Expenditure Diary survey is planned to be examined in laboratory experiments in the near future at the Bureau of Labor Statistics. The research may clarify the results of this experiment.

A differential effect of cues listed on both the Specific and Nonspecific diaries was seen for nonfood UCCs but not for food UCCs. Two scenarios that explain this difference are described below:

For the food ECs, the lack of a significant difference reporting rates might be attributed to the belief that, in general, respondents know what is asked of them. This would mean that the cues for the food EC played a small role in

assisting respondents. However, with less of a clear idea as to what is expected of them, respondents relied on the cues for the nonfood ECs. With a significantly higher reporting rate for the nonfood ECs, the format of the Specific diary would be considered a fundamental improvement over the Nonspecific diary. Alternatively, the amount of cues used in the headings of the Nonspecific diary may have had an effect on responses. The food ECs had shorter lists of cues in the headings than the nonfood ECs. The heading cues may have been useful except when the list of cues for a given heading was long. In this case, the Specific diary, with its line-by-line cues may have been more successful. An improvement in reporting was seen when UCCs that were not listed on the Nonspecific Diary were listed on the Specific diary. This aspect of the part list cuing effect was especially useful for the reporting of specific cuts of beef and the reporting of specific fruits and vegetables. These differences are interesting considering no difference was seen between these diaries for food UCCs when they were listed in both places.

When compared to UCCs not listed as cues on the Control diary, virtually all UCCs listed on the Specific diary were reported more often.

The other side of the part list cuing effect says that longer lists of cues make it more difficult to recall items not mentioned as cues. This effect was not seen in this experiment. The expectation was that when residual categories were compared they would have shown higher reporting on the Nonspecific diary since less cues were given there. This was not observed. The cues given on the Specific diary may have been limited enough to avoid this effect. On the other hand, our analysis of this effect may have been clouded by misclassification.

The categorization cuing effect, or the effect of presenting cues in a more comprehensive manner did seem to be present in the fruit and vegetable UCCs. Cues that described the packaging of fruits and vegetables (canned, dried, fresh, etc.) led to higher reporting than cues that described different types of fruits and vegetables (apples, onions, etc.) It was apparently easier for respondents to recall items within classifications than to recall entire classifications. Further analysis of these cognitive issues is warranted for testing the effects of misclassifying items. If the general conclusion of this analysis is to switch to a Specific diary format, more analysis of how respondents would classify items not mentioned is necessary. The effect of these possible misclassifications on computations based on this data should also be analyzed.

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Table 1

Table 2

Reporting Rates for UCCs Listed on the Specific and Nonspecific Diaries

UCC Name	Reporting Rate			
	Specific	Nonspecific	Difference	Standard Error
Flour and prepared flour mixes	.1293	.1445	-.0152	.0141
Cereal	.3035	.3471	-.0436**	.0192
Rice	.1172	.1086	.0086	.0130
Spaghetti and other pasta, cornmeal	.1892	.1887	.0005	.0161
Cookies (non-refrigerated)	.2537	.2379	.0158	.0177
Ground beef	.3104	.3243	-.0139	.0191
Bacon	.1939	.1780	.0159	.0160
Pork sausages	.1211	.1217	-.0006	.0134
Pork chops	.1233	.1057	.0176	.0131
Frankfurters (any type)	.1954	.1710	.0244	.0159
Lunchmeat (any type)	.3081	.2439	.0642**	.0183
Eggs	.3936	.3841	.0095	.0200
Butter	.1319	.1189	.0130	.0136
Cheese	.3539	.3968	-.0429**	.0199
Nondairy cream substitutes	.0513	.0402	.0111	.0086
Margarine	.2170	.1723	.0447**	.0162
Sugar	.1522	.1703	-.0181	.0151
Artificial sweetener	.0328	.0267	.0061	.0070
Peanut Butter	.0994	.0922	.0072	.0121
Soup	.2088	.1756	.0332**	.0162
Baby food	.0439	.0424	.0015	.0083
Pet food	.2277	.1827	.0450**	.0166
Postage	.2058	.1631	.0427**	.0159
Diesel Fuels	.0130	.0050	.0080**	.0039
Motor oil	.0825	.0407	.0418**	.0098
Magazines	.1840	.1157	.0683**	.0146
Newspapers	.3093	.2458	.0635**	.0183
Books	.0777	.0590	.0187**	.0104
Pay telephone calls	.0918	.0543	.0375**	.0107

**Significant at the .05 level.

*Significant at the .10 level.

Table 3

Reporting Rates for UCCs Listed on the Specific Diary but not on the Nonspecific Diary

UCC Name	Reporting Rate			
	Specific	Nonspecific	Difference	Standard Error
Biscuits, rolls, muffins (non-refrigerated)	.2302	.2689	-.0387**	.0177
Crackers and cracker crumbs (non-refrigerated)	.1822	.1669	.0153	.0156
Chuck roast	.0678	.0347	.0331**	.0090
Round roast	.0482	.0205	.0277**	.0075
Round steak	.0633	.0445	.0188**	.0093
Sirloin steak	.0709	.0317	.0392**	.0090
Fresh apples	.2100	.1707	.0393**	.0161
Fresh bananas	.3438	.2769	.0669**	.0189
Fresh oranges	.1045	.0772	.0273**	.0118
Fresh potatoes	.2555	.1796	.0759**	.0169
Fresh lettuce	.2970	.2574	.0396**	.0183
Fresh tomatoes	.2538	.2199	.0339**	.0174
Cola drinks	.3970	.2972	.0998**	.0194
Prepared Salads/desserts	.0687	.0878	-.0191*	.0110
Whiskey at home	.0377	.0137	.0240**	.0065
Ice packs, thermometers, hot water bottles	.0055	.0049	.0006	.0029
Purchase of medical equipment such as: canes, walkers, wheelchairs	.0011	.0028	-.0017	.0018
Eye-glasses	.0139	.0035	.0104**	.0038

**Significant at the .05 level.

*Significant at the .10 level.

Table 5

Reporting Rates for UCCs That Do Not List Specific Items on Either the Specific or Nonspecific Diary

UCC Name	Reporting Rate			
	Specific	Nonspecific	Difference	Standard Error
Frozen refrigerated bakery products	.0989	.0951	.0038	.0121
Other roast	.0452	.0124	.0328**	.0069
Other steak	.1243	.0741	.0502**	.0122
Other fresh or frozen poultry	.0638	.0623	.0015	.0100
Other pork	.1035	.0823	.0212*	.0119
Other meat and game	.0790	.0435	.0355**	.0098
Other fresh milk and cream	.2938	.5013	-.2075**	.0196
Other diary products including powdered milk and fresh yogurt	.1669	.1441	.0228	.0149
Other fresh fruits	.4026	.4245	-.0219	.0202
Other fresh vegetables	.4446	.4375	.0071	.0204
Frozen prepared foods	.2597	.1409	.0188	.0147
Miscellaneous prepared foods	.1876	.2225	-.0349**	.0165
Other carbonated drinks	.2468	.2806	-.0338*	.0181
Other alcoholic beverages at home	.0385	.0412	-.0027	.0080
Other laundry and cleaning products	.2330	.2472	-.0142	.0175
Miscellaneous household products	.2651	.2627	.0024	.0181

**Significant at the .05 level.

*Significant at the .10 level.

Reporting Rates for UCCs Listed on the Nonspecific and Control Diaries

UCC Name	Reporting Rate			
	Nonspecific	Control	Difference	Standard Error
Cereal	.3471	.2774	.0697**	.0188
Eggs	.3841	.3072	.0769**	.0193
Sugar	.1703	.1343	.0360**	.0146
Pet Food	.1827	.2041	-.0214	.0160
Postage	.1631	.1558	.0073	.0149
Motor Oil	.0407	.0298	.0109	.0075
Newspapers	.2458	.2956	-.0498**	.0180

** Significant at the .05 level.

* Significant at the .10 level.

Table 4

Reporting Rates for UCCs Listed on the Specific Diary but not on the Control Diary

UCC Name	Reporting Rate			
	Specific	Control	Difference	Standard Error
Rice	.1172	.0637	.0535**	.0117
Biscuits, rolls, muffins (non-refrigerated)	.2302	.2207	.0095	.0171
Cakes and cupcakes (non-refrigerated)	.1469	.0990	.0479**	.0134
Cookies (non-refrigerated)	.2517	.1921	.0616**	.0170
Crackers and cracker crumbs (non-refrigerated)	.1822	.1437	.0385**	.0151
Chuck roast	.0678	.0188	.0490**	.0083
Round roast	.0482	.0178	.0304**	.0073
Other roast	.0452	.0143	.0309**	.0069
Round steak	.0633	.0393	.0240**	.0090
Sirloin steak	.0709	.0246	.0463**	.0087
Other steak	.1243	.0570	.0673**	.0117
Bacon	.1939	.1114	.0825**	.0146
Ham	.1008	.0571	.0437**	.0110
Pork sausages	.1211	.0788	.0423**	.0122
Pork chops	.1233	.0772	.0461**	.0123
Other pork	.1035	.0637	.0398**	.0113
Frankfurters (any type)	.1954	.1142	.0812**	.0147
Lunchmeat (any type)	.3081	.2106	.0975**	.0178
Other meat and gravies	.0790	.0374	.0416**	.0096
Butter	.1319	.0863	.0456**	.0127
Cheese	.3539	.3335	.0204	.0194
Ice cream, frozen yogurt, and related products	.3364	.2146	.1218**	.0181
Margarine	.2170	.1412	.0758**	.0156
Fresh bananas	.3438	.2641	.0797**	.0187
Fresh oranges	.1045	.0553	.0492**	.0111
Fresh potatoes	.2555	.1786	.0769**	.0168
Fresh lettuce	.2970	.2192	.0778**	.0178
Candy and chewing gum	.3156	.2107	.1049**	.0179
Artificial sweetener	.0328	.0151	.0177**	.0063
Oil, salad dressing, shortening, and mayonnaise	.2542	.1761	.0781**	.0167
Peanut Butter	.0994	.0541	.0453**	.0109
Soup	.2088	.1583	.0505**	.0158
Frozen prepared food	.1597	.1402	.0195	.0146
Nuts, potato chips and other snacks	.3763	.2527	.1236**	.0189
Salt, seasonings, spices	.2210	.1735	.0475**	.0163
Olives, pickles, sauces, gravies	.1920	.2446	-.0526**	.0168
Prepared salads/desserts	.0687	.0953	-.0266**	.0112
Baby food	.0439	.0317	.0122	.0079
Cola drinks	.3970	.2706	.1264**	.0191
Whiskey at home	.0377	.0185	.0192**	.0068
Lawn and garden supplies (excluding machinery)	.0749	.0484	.0265**	.0098
Coolant, brake fluid, transmission fluid, etc.	.0437	.0143	.0294**	.0069
Magazines	.1840	.0866	.0974**	.0139
Books	.0777	.0544	.0233**	.0102
Cut flowers and indoor plants	.0612	.0318	.0294**	.0086
Pay telephone calls	.0918	.1703	-.0785**	.0137

** Significant at the .05 level.

Table 6

Reporting Rates of UCCs With Specific Cues on the Control Diary, but more General Cues on the Nonspecific Diary

UCC Name	Reporting Rate			
	Nonspecific	Control	Difference	Standard Error
Fresh apples	.1707	.1538	.0169	.0150
Fresh bananas	.2769	.2641	.0128	.0181
Fresh oranges	.0772	.0553	.0219**	.0101
Other fresh fruits	.4245	.3723	.0522**	.0199
Frozen fruit juices and fruits, fresh/canned/bottled fruit juice	.3772	.3252	.0520**	.0194
Canned and dried fruit	.1411	.1144	.0267**	.0136
Fresh potatoes	.1796	.1786	.0010	.0156
Fresh lettuce	.2574	.2192	.0382**	.0173
Fresh tomatoes	.2199	.2119	.0080	.0167
Other fresh vegetables	.4375	.3956	.0419**	.0200
Frozen vegetable juices and vegetables, canned/dried vegetables and vegetable juices	.3404	.2830	.0574**	.0188

** Significant at the .05 level.