

DOES THE SUGGESTION THAT RESPONDENTS RECALL EVENTS CHRONOLOGICALLY SIGNIFICANTLY INFLUENCE THE DATA COLLECTED?

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Abstract: This paper is about estimating a salience scale for trip reporting. The measurement project began as a way of establishing the affects of methodological changes between 1994 and 1997 in the Canadian Travel Survey. This is a survey that Canada uses to study the travel of its residents. There were several changes in methodology that could be expected to influence how trips are recalled. A key change was that in 1994 the interviewers were encouraged to suggest to the respondents that they report chronologically but in 1996 and 1997 they were told not to use the prompt during interviews. It is likely that other changes resulted in response burden being higher in 1996 and 1997 than in 1994. For people reporting two or more trips, chronological reporting should result in trips being reported in random order. It was found that the order in which trips were reported changed with the change in memory cue. The change may have been exacerbated by some trips not being reported because of response burden. The data were analyzed using paired-comparison. The effect of the methodology change is found to be significant. The implications for future research as well as general implications for survey methodology are reported.

Introduction

In 1998, Auctor Consulting Associates (Auctor 1998) examined the processes and products of the 1994, 1996 and 1997 Canadian Travel Surveys. This was done to determine if there were any issues relating to the surveys that should be of concern to the Canadian Tourism Commission, CTC. A key issue was encouraging interviewers to prompt respondents to report trips chronologically. Prompting occurred in 1994 and was discouraged in 1996 and 1997.

Recognizing that prompting influenced recall salience for trips suggested the value of measuring trip-recall-salience. Chronological reporting does not follow salience order for trip reports so confirming that 1994 reporting is not ordered as in 1996 and 1997 would provide proof that responses in 1994 were different from those of the other years.

In order to understand the research done it is necessary to establish common definitions of concepts used in the analysis and to convey some background about the information used. The concept that underlies this research is salience. The critical analysis technique is scale development using paired comparisons. The data sets are the Canadian Travel Survey (CTS) for 1994, 1996 and 1999.

Salience

Salience is a property of an event that indicates how much it sticks out or serves as a focal point (Rotello, 1999; Metha, Starmer, and Sugden, 1994; Shlechter, Herrmann, and Tolia, 1990). In the context of this study trip-recall-salience (TRS) refers to the tendency to recall trips of a certain type more readily than trips of a different type. Therefore, a TRS scale is a scale such that if the value for trip type x is greater than that for trip type y then x tends to be reported ahead of y in reporting trips taken when there are no cues that disrupt recall.

Measuring salience by Paired Comparisons

In conventional paired comparison analysis a set of alternatives, or a subset of a set of alternatives, is presented a pair at a time to a subject who is then asked to specify the correct order for each pair (Titchner and Lockwood, 1991; David 1988).

Formally, let the set of alternatives be $A=\{x,y,z\}$. For the possible unordered pairs $\{\{x,y\}, \{x,z\}, \{y,z\}\}$ one wants ordering information from the respondents. When one asks a number of respondents whether x should be "ahead of" y , one gets a number $r(x,y)$, $0 \leq r \leq 1$, for each pair, (x,y) such that this number is an estimate of the probability of x being ranked ahead of y . For this study we did not have respondents compare trips but rather the order in which trips were reported defined the ordered pairs. If a person reports a trip of type x first, then a trip of type y , and last, a trip of type z , then the pairs (x,y) , (x,z) , and (y,z) become the pairs used for analysis. It is important to note that if on average x is 'ahead,' then $S > .5$.

There is an extensive literature on computing scales from paired comparison data (David, 1988). However, a very simple way to define a scale is $S = \text{mean}(r(x,y))$, for all y . This mean value is the average proportion of all alternatives that x is ahead of. It provides a scale on which the salience of every x is defined.

The CTS and Methodology changes between 94', 96 'and 97.'

The Canadian Travel Survey (CTS) is a survey by the Canadian Government in which individuals from randomly

selected households report on their trips (Statistics Canada 1994, 1996, 1997). The data are used to estimate travel volume and expenditures by Canadian residents. The surveys results are an input to planning and in determining some provincial and national policies. They are also used to measure tourism performance.

In this research we are concerned with the 1994, 1996 and 1997 CTS. A key methodology change in collecting data for the CTS was a change in a prompt given to respondents. In 1994, the CTS interviewers were encouraged to prompt respondents to report trips chronologically. In 1996 and 1997 the interviewers were discouraged from using a chronological prompt during interviews for the CTS (Statistics Canada, 1994, 1996, 1997).

The other methodological changes from the 94 to the 96-97 CTS noted by Auctor are:

- 1) Computers were used in 96-97 that in part drove the interview process.
- 2) In 96-97, more elaborate information was asked of the respondents; this increased response burden.
- 3) In 96, the odds of a person being asked to respond to the CTS were twice as great as in 94; this is correlated with a decrease in the number of trips reported.
- 4) In 94, the CTS respondents were not asked to complete other labour force survey components; in 96 there were add-ons and in 97 there were even more add-ons. This could increase the burden felt by the respondents.

A Research Hypothesis, Corollary, and their Justification.

The primary reason to focus on the lack of a prompt in the 96-97 CTS is that the literature states that the mechanism used to prompt recall affects which events are remembered (Huttenlocher, Hedges, and Bradburn, 1990). This indicates that a change in the recall prompt used in the survey will impact the trips that the respondents remember and then report to the interviewer. This leads us to our hypothesis which is that the order in which trips are reported is influenced by the switch from chronological to 'off the top' reporting.

Hypotheses and Corollary

In formal language the null hypotheses is:

H_0 : Prompting respondents to report events chronologically causes no differences in trip reporting from simply asking that trips be reported.

If H_0 is rejected we have:

H_a : Prompting respondents to report events chronologically causes differences from data obtained without prompting.

If H_a is accepted it leads to the following corollary:

Corollary: CTS estimates will be biased because 1994 and 1996-1997 differ in the way respondents were asked to

recall travel.

What the corollary means if accepted will be addressed up in the discussion.

Consider that when respondents are interviewed, a particular type of event may appear to be reported prior to an event of another type. This tendency may depend on the socioeconomic attributes of a respondent and other factors. However, here we are concerned with this being a consequence of trip salience. The propensity to mention one event, ea , ahead of another, eb , can be attributed to a psychological process establishing a salience level designated by $O(e)$. When two trips are to be reported, salience 'disrupted' by other factors defines the reporting order.

If $O(ea) > O(eb)$, then ea tends to be reported ahead of eb .

Because in the CTS one has only some of the data needed to determine $O(e)$, this research is built on the assumption that:

$O(e) = F(A) = F(\text{duration, distance, expenditure, trip type, mode}) + \epsilon$.

where ϵ is considered to be a random variable expressing the factors including special circumstances (e.g., important family event), response disposition (e.g., something mentioned by the interviewer or respondent influencing what is recalled), socioeconomic factors, and recall factors (e.g., different response burden).

Based on variables in the data, 288 distinct types of trips were created ($288 = 4 \times 3 \times 3 \times 4 \times 2$). The variables used were: duration (recoded to 4 levels), distance (recoded to 3 levels), expenditure (recoded to 3 levels), trip type (recoded to 4 levels), and mode of travel (recoded to 2 levels).

Analysis, Results, and Discussion

Steps in Analysis

The first step was to determine the 288 trip types used. The second step in the analysis was to compare the possible pairings. The third step was to separate the trips into the years that they were taken. The fourth step was to compare the years and see if there was a difference in how trips were reported.

The initial SAS program produced estimates of salience. A second program was used to determine the implications of the scale. For every trip type pair (x, y) the program determined if $S(x) > S(y)$. If the response order was (x, y) then the pair was judged a success and if the order was (y, x) the pair was a failure. These scores were used to produce the summary results.

When the SAS program was run it was found that there were 55,000 trips for comparison. Table 1 shows some characteristics of CTS data. First, the number of trip report records are indicated for 94', 96' and 97'. The second line shows the number of

individuals reporting two or more trips. The third line shows the number of 'comparison pairs' generated

from all the trip data for persons reporting two or more trips.

Table 1. Description of 1994, 1996, and 1997 Canadian Travel Surveys.

	Year		
	1994	1996	1997
Trip Report Records	59242	79873	51598
Number of Individuals Reporting Two or More Trips	12723	16226	8480
Number of 'Comparison Pairs.'	28866	37876	15550

Results

We reject H_0 . The data show that at a 95% confidence level, the '94 data differs from the '96 and '97 data, while

the '96 and '97 data are not significantly different.

Table 2.

	Success	Total	Success Ratio	STC	95% LCI	95% UCI
94	18899	28866	0.65471	0.0052	0.64452	0.6649
96	27084	37876	0.71507	0.00469	0.70587	0.7227
97	11223	15550	0.72174	0.00583	0.71031	0.73317

Discussion

Table 2 shows is that when the chronological cue was used in the 94 data more low salience trips were reported ahead of higher salience trips. This supports the idea that 'off-the-top' reporting creates a disposition to report more salient trips first. This confirms that the TRS is effected by the chronological prompt. In contrast the 96' and 97' data collected without the chronological prompt shows no significant difference.

The corollary introduced above is readily interpreted as indicating that accepting H_a implies that CTS estimates will be biased in the sense that there will be a difference between Total trip estimates for 1994 and 1996 that can be attributed to the change in the way that trips are reported. However, proof that reporting differs between 1994 and 1996-97 does not provide proof that this has a consequence on estimated values. It only encourages one to believe that this is likely.

Providing proof that the methodological changes that influenced trip-recall-salience actually result in a bias in estimates of total numbers of trips, total expenditures or other estimates, requires building a link between salience and such estimates.

So what?

If estimates are biased and the influence on accuracy of bias is unknown, the usefulness of the data is limited. For example, in Canada the external indicators of travel increased from 1994 to 1996-97, but the CTS showed a drop in travel. Given the fact that these two sources of information contradicted each other how do we sort out which is giving an accurate picture if we do not know the impact of changes made in the instrument? A salience scale will help to address this issue by helping to show the direction that estimates tend to be off under changing conditions.

Practical Implications

Deriving this understanding of the impacts on recall of prompts is a first step in understanding how trip attributes relate to salience and how respondent attributes influence salience. Though this is not proof that estimates such as total trips will be biased, it gives good reason for concern. This is a step in determining if estimates are biased and if these biases can be corrected.

Future Research

It would seem to be wise to conduct an experiment with a chronological prompt, a neutral prompt, and other factors such as disposition prompts. This would allow an understanding to develop of how prompts work in the travel and recreation recall context.

Conclusions

It is possible to construct a TRS scale using paired comparisons for the '94, '96, and '97 CTS data. Using the TRS scale it is possible to show that suggesting to respondents that they report chronologically has a highly significant effect on the order in which they reported trips. This is indirect evidence that estimates of numbers such as total trips will be biased.

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