

INTRODUCTION

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Arbitron reports estimates of television and radio audiences for local markets throughout the country. Arbitron Television uses diaries to measure all counties in the continental United States plus some counties in Alaska at least four times a year, with major markets surveyed by diaries as frequently as seven times a year. Arbitron Radio conducts four surveys annually, the largest in the Spring when over 200 local markets are measured. Each survey period, radio or television, generally consists of four consecutive weeks with a separate sample selected for each week of the survey period. In Radio, the estimates we produce are averages across the weeks measured; in Television, we produce both weekly and four-week average estimates. Our estimates are used by radio and television stations, advertisers and their agencies who use them to make programming decisions and to buy and sell advertising time.

THE DIARY

Arbitron uses seven-day diaries in the measurement of both radio and television audiences. For the measurement of radio, the diary, available in English or English and Spanish, is a personal one. Each individual in the sample is asked to carry the diary wherever he or she goes during the survey week and to make listening entries as listening occurs. There is a page for each day in the week beginning with Thursday. The diary is open-ended; respondents write in the start and end of times of their listening along with station identification (generally radio station call letters). The respondent also checks boxes for each entry to indicate whether the station is on the AM or FM band and whether the listening was done at or away from home. A circle is provided at the bottom of each day's page for the respondent to check when no listening takes place on that day. The diary concludes with questions on sex and age of respondent as well as zip code, county and state of the respondent's residence. Comments are also elicited.

Arbitron Television uses a household diary available in either English or Spanish. Rather than collecting the viewing of respondents wherever it occurs, the television diary is designed to collect all viewing which takes place in the household (whether by household members of visitors) and so, unlike radio, enables us to estimate the number of households in which television is in use, as well as estimates of the number of people watching. To accomplish this, one diary is sent for each television set in the household.

The seven days of the television diary are time-formatted by quarter hour from 6AM to 2AM, beginning Wednesday. The diarykeeper indicates for each quarter-hour time period whether the set is off or on. For those time periods when the set is on, the diarykeeper is asked to indicate the call letters, channel number, and title of the program to which the set is tuned, as well as the persons (household members or visitors) who are watching, if any. A box is provided for the diarykeeper to indicate when a set was not turned on at all on a given day.

In the back of the diary, there is a page with a number of questions pertaining to the size of

the household, the employment status of women in the household, and whether the set is color and/or UHF. A very important question relates to whether the set is connected to a cable system and if so, the name of that system; this information is required to properly credit stations which may be moved to another channel position by the cable company, as well as to enable us to separately weight cable and non-cable households which are known to view differently and return diaries at different rates. Also included are questions about the time zone in which the individual lives and the race/nationality of the household, the latter for purposes of returned-sample weighting. At the end of the diary, there is a page for comments and a page for respondents to write in the names of favorite programs they might have missed. The intention here is to discourage people from writing in the viewing pages of the diary shows that they did not actually watch.

THE SAMPLE

Arbitron's sampling frame is largely telephone-household based. In most metropolitan areas, this includes both telephone directory samples and non-listed telephone numbers derived through a random digit dialing technique modified to produce a high yield of working residential numbers. In non-metropolitan areas, where the incidence of unlisted telephone homes is somewhat lower, the listed telephone frame is used alone.

FIELD PROCEDURES

Arbitron's basic means for delivery and return of diaries is through the mail -- roughly 85% of our annual respondent diary records are obtained in this way.

The process begins with a letter to those homes in the listed telephone sample (we do not have names and addresses of our unlisted telephone sample respondents). This letter informs the household of an upcoming telephone call by our interviewer. Our original research on this letter, conducted in 1969, found it increased the rate at which households agreed to be in the survey by about five percent. Interestingly, the use of the letter also improved the return of diaries from those agreeing to be in the survey by about three percent.

About three days following the planned arrival of the letter at the household, our interviewer calls, identifying her or himself as Ann Clark or John Mason, and asks the household to participate in the survey. Our focus groups among survey participants have shown that the use of the interviewer name is a powerful incentive for diary return -- people are likely to keep commitments made to a person rather than to an anonymous voice. Most interview calling is done by interviewers locally in the market being surveyed. We do maintain a WATS facility in our Beltsville production center which is used to do diary placement calling in those areas where we have historically had difficulty in assembling a local interviewing staff. At present, the facility places diaries in non-metropolitan areas in 15 states.

So that the appropriate number of diaries can be sent, the interviewer determines the number

of sets in the household for television surveys, or the number of persons 12 or older in the household for radio surveys. In radio, we also determine if the individual is black or Hispanic for weighting purposes in certain metropolitan areas. In these metropolitan areas, households identifying themselves as black will be surveyed using a special technique designed to increase their response rate. Five attempts are made at different times over at least two days to contact each household in the listed telephone portion of the sample, 10 attempts for the unlisted portion.

The use of these techniques yields an overall agree rate of about 80% in both radio and television.

THE DIARY MAILING

After the return and processing of interviewer worksheets from the field, a diary package is prepared and mailed roughly three weeks after the interviewer has contacted the household. For radio surveys, the diary package contains a diary for each person in the household. Inserted in each diary is an incentive, either two quarters or a dollar bill, depending on historical response rate for the market. There is also a single letter asking the addressee to ask the other members of the household to participate. The diaries are self-mailing for return. In general, our research has shown that the use of stamped postage for diary return acts as a small incentive, typically raising the rate of return one or two percentage points. Stamp postage also speeds the rate of return by avoiding delays associated with the counting and sorting performed by the Postal Service on business reply mail.

For television, a diary is sent for each set reported to the interviewer. Unlike radio, diaries are mailed to households which do not agree to be in the survey. This includes households which we were unable to contact, which refused to be in the survey, and which told the interviewer that they did not plan to view any television the week of the survey. A single letter is enclosed, along with either a fifty-cent piece of a dollar bill. (The dollar bill is used in certain areas which have a history of poor mail diary response. In our tests, the dollar bill has produced response rates about five points higher than a fifty-cent premium). In homes with more than one set, a return envelope is provided for return, while in homes with only one set, the diary is self-mailing for return.

FOLLOW-UP

Once the diary has arrived, we want to be certain that it is opened, filled out and returned. To ensure this, we have a system of follow-up procedures which involves calls or letters just before and during the survey week. For our listed sample, most homes in metropolitan areas receive a call just prior to the survey week to remind respondents to keep the diaries, and in the middle of the week to make sure they stick with them. In non-metropolitan areas, homes which are not toll calls to our local interviewers receive one call in the middle of the week. Homes which are toll calls to the interviewers are mailed a letter from

Beltsville timed to arrive in the middle of the survey week, encouraging completion and return of the diaries. Homes which we've originally called from our WATS facility to obtain cooperation do not receive any follow-up calls but instead are sent a follow-up letter with a monetary incentive.

Our experience has shown that the rate of diary return from listed telephone homes which receive a follow-up call runs from five to ten percentage points higher than homes which receive a follow-up letter. Tests of a post card substitute for the follow-up letter have shown a non-significantly lower rate of return with the card.

Originally, we omitted any follow-up calling to homes in our unlisted sampling frame, theorizing that such persons value their privacy and would be annoyed by an additional telephone contact. Subsequent research has shown, however, that the use of one follow-up call to these respondents improves their rate of diary return by as much as 10 percentage points. Interestingly, making the call in the middle of the survey week produced a significantly higher rate of diary return than making it just before the survey.

SPECIAL PROCEDURES

Black and Hispanic households have historically been underrepresented by a mail diary technique used to measure a telephone household sample. Since the Fall of 1967, both Arbitron Radio and Television have used special procedures to measure these minority segments. Personal Placement and Retrieval of radio and television diaries is used to survey audiences in heavily Hispanic areas as identified through the 1970 Census. The technique involves personal delivery of and instructions regarding the diary; a mid-week visit for review of the diary and to answer questions; and a visit at the end of the week to review and pick up the diary. The procedure uses a modified half-open interval sampling technique so that non-phone households can be included in the frame. Our studies of these High Density Hispanic areas indicate that overall about one home in five is without a telephone -- in New York this figure is nearly 50%! Although our overall response rate using the personal technique is about the same as with the mail diary technique among the same population, the inclusion of non-telephone homes boosts our returned sample Hispanic percent more into line with Census-derived population estimates. At the same time, the technique improves the quality of response through personal instruction and review of diaries.

Telephone Retrieval of listening or viewing data is the technique used to measure audiences in heavily black areas. This is an aided, twenty-four hour recall technique in which each sample household in Census-derived High Density Black Areas is called each day of, and the day after, the survey week to collect the listening or viewing of each household member. Through use of Telephone Retrieval we obtain about a 70% response rate in these areas as compared with about 35 to 40% when the standard mail diary technique is used.

Over the years, several advances have enabled us to attempt to better measure ethnic audiences outside of high density ethnic areas, and to do so without having to resort to the use of

multiple methodologies. Since 1973 we have been asking a race/nationality question of our sample. This permits us to do two things which were previously impossible: to identify minority groups on the diary placement call so as to use procedures with tailored incentives for difficult to measure minority populations and to weight the returned sample into proper proportion for these groups. In addition, because minorities have a disproportionately higher incidence of unlisted telephones, our unlisted telephone sampling technique (ESF) brings into our samples a considerably higher minority group proportion than a listed telephone sample alone. The thrust of our research program in ethnic measurement for both radio and television is to use these two developments, plus additional incentives, to create a mail diary technique which can measure minority population segments without being restricted to high-density ethnic areas.

DIARY ENTRY AND PROCESSING

Diaries are all returned to our Beltsville operations center where they are edited and key-entered through a key to disc system. Our twin CDC 3500 computers perform quality control checks on the data base, marginally weight the data base and merge it with other data bases containing program titles, universe estimates, station sign-on and sign-off times, time zones and other information. The result is an Arbitron Radio or Television market report.

METHODOLOGICAL CONCERNS

Non-Response Error

At Arbitron, our primary methodological concern relates to non-response error. With a response rate of 50% in Television and 40% in Radio, it is important that we understand the characteristics of non-respondents in order to protect the users of our data from the effects of non-response bias.

Studies of non-response have been conducted relating to both Radio and Television. The most recent of these, published by Arbitron Radio in 1979, indicated that responders to our Radio surveys are marginally more likely to be middle-aged, more affluent, and better educated than non-responders. In terms of their radio listening behavior, they tended to be slightly heavier users of radio -- a higher proportion listened each day and those who listened spent more time listening than non-responders.

On the television side, a similar non-response study, conducted by Statistical Research Incorporated for the National Association of Broadcasters in 1974 and 1975, came to a similar conclusion, although for only a limited broadcast time period (early fringe -- 4:30 to 7:30PM EST): "overall, there is only a modest level of non-response error [resulting in a marginally higher audience levels] in diary results for early fringe time."

Response Error

Another type of error of concern to the user of broadcast audience estimates is response error: the extent to which the diary is a complete and accurate representation of respondent radio or television usage. While our survey procedures, instructional materials and diaries are carefully designed and tested to

minimize response error (our direct cost of research and development in 1980 will be roughly \$1,000,000), there are inevitably a number of systematic patterns of response error that do appear. We have, over the years, developed a number of procedures, both manual and automated, to review and clarify information reported by diarykeepers.

In the editing phase, the usable diaries are culled from all returned diaries. About 13 to 15 percent of our diaries are deemed unusable because they are blank, incomplete, arrive early or late, or are undecipherable after applying our standard edit rules for resolution.

The usable diaries are further edited to guarantee the consistency of information. In radio, for example, entries which use a slogan to identify the station are manually switched to call letters using a file of stations and their slogans which is built from information collected from all radio stations prior to the survey. In some cases, a diarykeeper may be called back for further clarification.

Once all necessary pieces of data have been clarified, the data base is key entered on a key-to-disc system. As the diaries are entered, a second level of quality control checks takes place. For example, if a respondent has entered the call letters of a television station which, according to our information cannot be received in the county in which the diarykeeper lives, the computer will not accept the entry and the diary will be sent back to edit for clarification.

Once all the data have been key-entered and a file of all the input data has been created, a third level of edit deals with aspects of response error requiring a large computing capacity. For example, if a radio station has changed to a new set of call letters and a respondent enters the old call letters, a special routine will "flip" the entry to the station's present call letters. In television, if a respondent indicates that the set is on but neglects to enter the persons watching it, a special routine will ascribe the audience using the average probability of viewing for the particular demographic group and time of day.

The result of these steps is our final diary data base which is now ready for processing into market reports.

CONCLUSION

Of necessity, this has been a very brief overview of an extremely sophisticated and complex information retrieval and processing system. Throughout the process, from the selection of the sample to the tabulation of the diary data, there are processes designed to support what we think is the best broadcast measurement tool available: the seven-day respondent-completed diary.