

AN ANALYSIS OF THE EFFECT OF GROUP AWARDS ON THE ATTITUDES OF DECENNIAL CENSUS OPERATION CODERS

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ABSTRACT

Census Quality Management (CQM) is a process still being defined at the U.S. Bureau of the Census. CQM incorporates many of the fundamentals of the Total Quality Management (TQM) environment, and adopts many of the specific techniques recommended by J. M. Juran. Before the the Census Bureau began implementing CQM, the issuance of group awards was carried out at one of the decennial census processing offices. Coders from these offices were later asked to complete a Coder Attitude Survey questionnaire designed to measure their attitudes and opinions towards their job. This paper analyzes data from the Coder Attitude Survey to see if we can determine the effect group awards had on the coders' attitudes. We also discuss what implications this has for planning the 2000 Census quality assurance program.

1. INTRODUCTION

Quality assurance of data processing for the 1990 Decennial Census included awarding groups of people working as coding units on the Industry and Occupation (I&O) coding operation. Thus, at the Kansas City Processing Office (KCPO) where I&O coding was conducted, groups instead of individuals were awarded based on the work quality of the group.

We compared this group awards system to two sites (Charlotte and Jeffersonville) performing the Place of Birth /Migration /Place of Work (POB/Mig/POW) Coding where no group awards system was being used.

Both coding operations began in the fall of 1990 and continued into the spring of 1991. Respondent entries for the sample (long form) 1990 Decennial Census questionnaires had been keyed into computer files for use in automated coding. The coders then coded those responses that were not computer coded because they either did not match reference files or matched with a low level of confidence.

For the Industry and Occupation coding operation, managers awarded merchandise

to groups (coding units) of coders performing well above the operational average for the previous four week period. Each coder was assigned to a coding unit with a lead clerk and a supervisor. A coding unit consisted of about 45 to 60 coders. For the POB/Mig/POW coding operation, where no awards of any type were granted, a coding unit consisted of about 20 coders.

Awards were presented to the outstanding quality and production coding unit members at the end of each four week period beginning February 4. In addition, since there was a large buildup of staff in the early part of 1991, it was decided that an additional award would be given for the most improved unit. Since a coding unit generally consisted of a group of coders that went through training together, there was a large variation of experience between coding units.

We distributed the questionnaire to coders for several reasons. First, we wanted to get the coders viewpoint on how they perceived the operation. Previously, the only input we had regarding the progress of an operation came from headquarters staff observations and on-site managers. Second, we wanted to know how the coders viewed the group awards. Did they feel that the awards instilled a sense of "family" or "team"? Was there a sharing of ideas for better ways of doing things? Along with the data used to determine the group awards, it was also a way that we could measure the effect of the awards. Third, along with quality circles, the questionnaire allowed the coders to have input into the process.

2. THE QUESTIONNAIRE

The questionnaire that was administered to each coder consisted of 16 questions. The first ten dealt with attitudes toward their job and the last six obtained demographic and job characteristics. The attitude questions attempted to obtain the coders viewpoint on such topics as job satisfaction, affinity for the type of work they were doing, recognition for their work (both quality and productivity), fairness in how they were treated, the supervision they received, and

other areas of interest. These questions asked for responses ranging from 1 (disagree strongly or extremely dissatisfied) to 7 (agree strongly or extremely satisfied) so that higher numbered responses suggested a more positive attitude¹. The other questions obtained information on age, sex, length of time working on both the Census and their specific coding operation, shift (day or night), and date of completion of the questionnaire.

There were 4 award periods ranging from January through April 1991. The coder attitude questionnaires were administered to the coders about once a month at the midpoint of each award period. In this way, we could attempt to measure attitude changes of the coders, which we viewed as an important measure of success of the awards program.

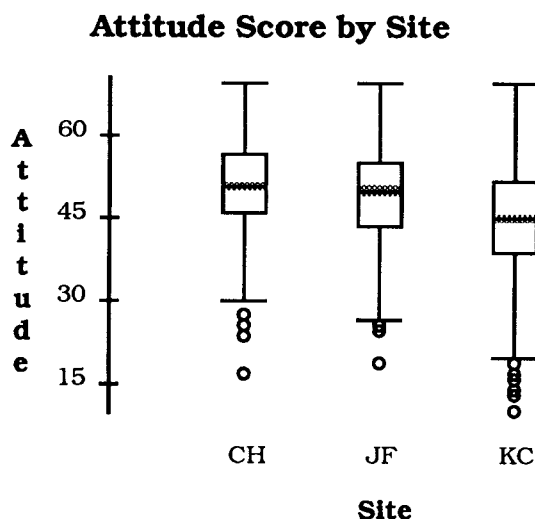
3. SURVEY RESULTS

Data from 2329 questionnaires were keyed into a computer file and used in analyzing the responses. Coders in Kansas City completed 1448 (62.2%) of the questionnaires, while Charlotte coders completed 603 (25.9%) and Jeffersonville coders completed 278 (11.9%). As mentioned in section 2 above, each coder completed up to 4 questionnaires, one for each award period.

We looked at the sum of the numbered responses in questions 1 through 10 as an indicator or score of a given coder's attitude. These 'attitude scores' were analyzed to look for significant differences within various categories. Data from all 3 sites were looked at as a whole as well as separately for each site, particularly the Kansas City site where the group awards system was instituted. In Kansas City, we try to determine what effect group awards had on the coders' attitudes.

The boxplots in Figure 1 compare the attitude scores of coders from the 3 sites. See Velleman and Hoaglin (1981) for a complete discussion of boxplots and the derivation of the shaded confidence intervals. A cursory view of the data reveals an apparent difference in attitude score among the sites. A one-way analysis of variance (AOV) on the data leads us to reject the null hypothesis that all 3 sites have the same mean attitude score, confirming our suspicion.

Fig. 1



Interestingly, the Kansas City site, where the group awards program was instituted, stands out in Figure 1 as having the lowest median attitude score. Before concluding that group awards had a negative effect on the attitude of coders, we must take into account that Kansas City coders worked on I&O coding - a more demanding operation than the POB/Mig/POW coding conducted at the other sites. Other confounding factors also may play a role, such as different management and economic climates at each of the sites, and the hiring of coders as temporary employees in Kansas City and Charlotte, versus permanent employees in Jeffersonville.

We now analyze the attitude scores by demographic and job characteristics to determine any significant differences in attitude score for the various subgroups within each characteristic.

The boxplots in Figures 2 through 6 compare the various subgroups within the categories of sex, age, length of time working on both the Census and their specific coding operation, and shift. The boxplots combine the data from all sites. When we look at each site individually, the same trends are apparent in most cases.

Figure 2 shows no apparent difference in attitude score between men and woman. This is evident both overall and for each site individually. Testing the null hypothesis of equal mean scores for men and woman fails to reject at the $\alpha = 0.05$ level of significance.

Fig. 2

Attitude Score by Sex

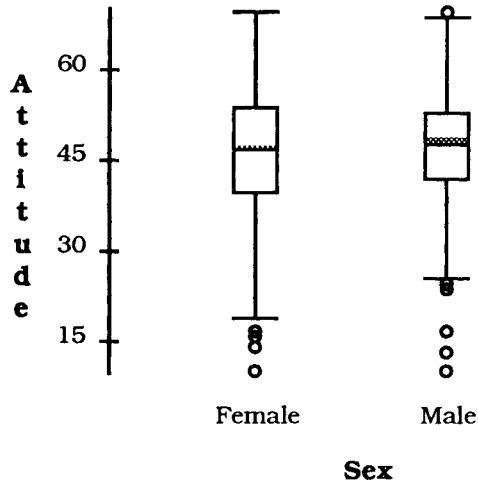


Figure 3 indicates a slight trend suggesting that older coders tended to have higher or more positive attitude scores. This result is consistent across all sites, but is most pronounced in Kansas City.

Fig. 3

Attitude Score by Age

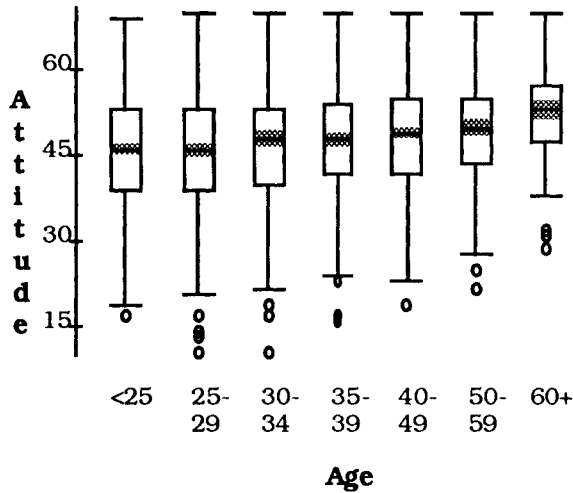


Figure 4 shows a clear trend in the other direction, suggesting that coders' attitude scores were lower for those coders working a longer time on Decennial Census activities. Given the temporary employment status for many of the coders, and the growing realization that their employment with the Census is coming to an end, this trend becomes understandable. This may be a

general difficulty in trying to measure the attitude of such employees. In Jeffersonville, where employees were permanent, the relatively small amount of data did not suggest a discernable trend in either direction.

Fig. 4

Attitude Score by Time on Job



Similarly, Figure 5 shows a downward trend in attitude score for coders working a longer time on their particular coding operation (I&O or POB/Mig/POW). All sites showed this same trend.

Fig. 5

Attitude Score by Time Coding

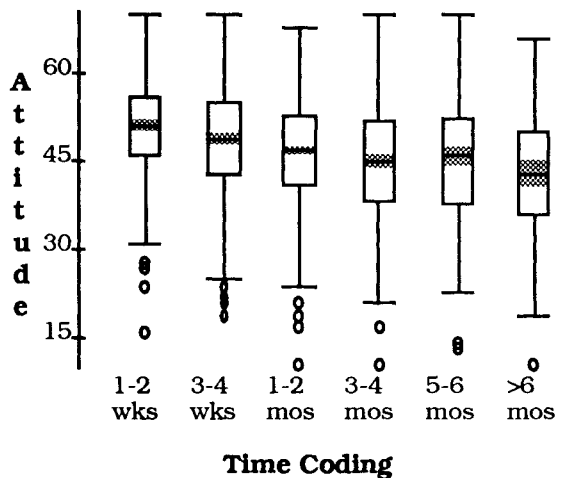
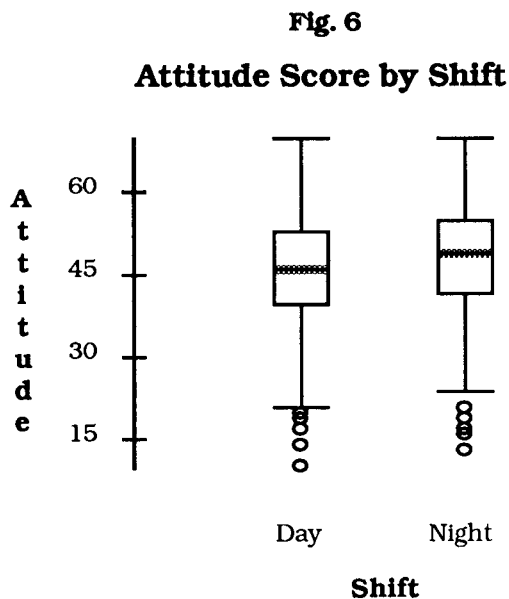


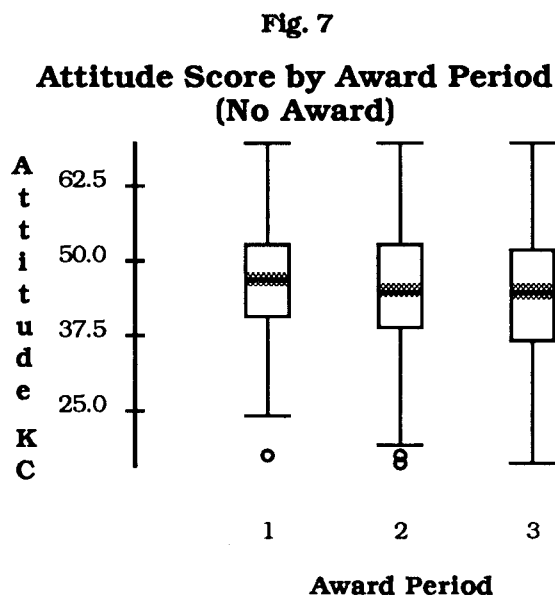
Figure 6 suggests a higher attitude score for night shift coders over their day shift

counterparts. Although not shown here, the Charlotte site showed the reverse of the result displayed in Figure 6.



The boxplots in Figures 7 through 9 and the line plot in Figure 10 include data from the Kansas City site only, where the group award system was instituted. We used the date of completion response to assign each questionnaire to a particular award period. We could reliably assign responses to only 3 of the 4 award periods due to the distribution of dates obtained from the questionnaires.

Figure 7 shows that for individual coders belonging to coding units never receiving an award², there is a slight decline in attitude score from one award period to the next. This is consistent with results discussed above (see Figures 4 and 5), which suggest a general trend of declining attitude scores over time.



Interestingly, when we look at coders belonging to coding units which were given awards, a different picture emerges. Figure 8 shows that individual coders belonging to coding units receiving an award at the end of award period 1 registered a higher attitude score the next time they completed the questionnaire. Significantly, these same coders show a marked drop in attitude score at a later date represented by award period 3 in Figure 8. Apparently, any positive effect the award may have had on coders' attitudes, as measured by the questionnaire, was temporary.

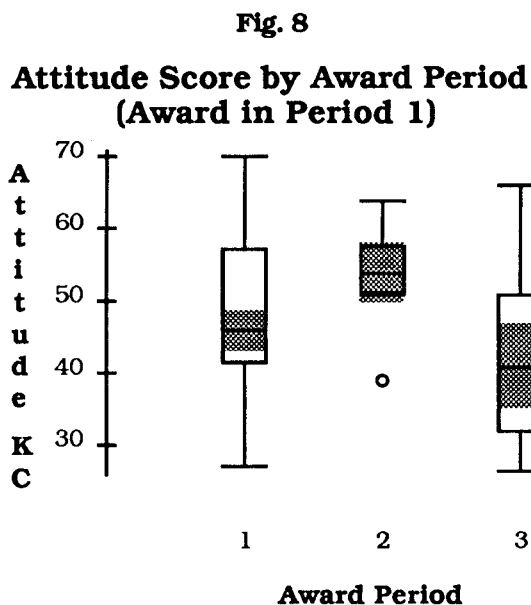


Figure 9 shows data for coders belonging to coding units receiving an award at the end of award period 2. We again observe a higher attitude score the next time they completed the questionnaire, although to a lesser extent than above (see Figure 8). No data is available to determine if these scores would drop off at a later date, as we saw in Figure 8.

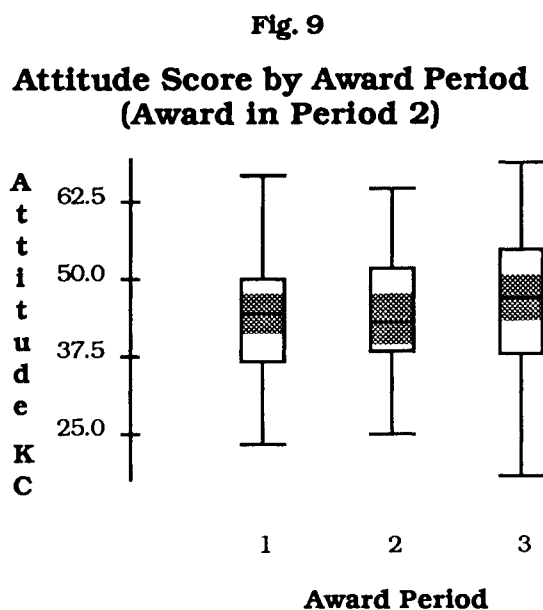
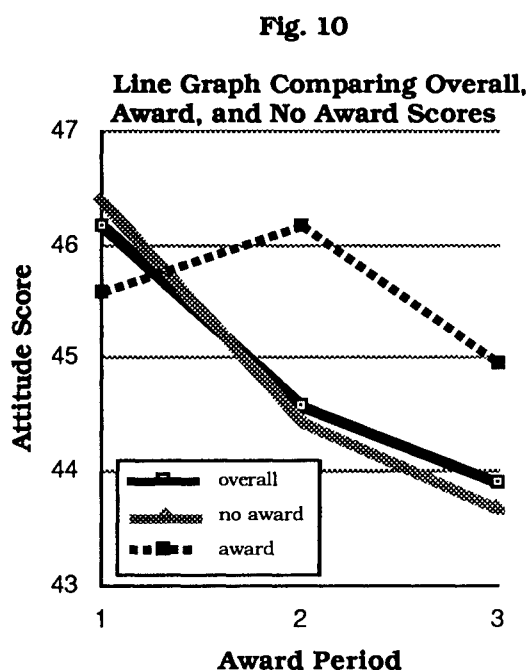


Figure 10 compares attitude score by award period for coders receiving one or more awards to coders never receiving an award. We also show the combined attitude score for all coders. The coders receiving awards have a higher score subsequent to the first award period, and, although dropping off by the third award period, maintain a higher score than the coders receiving no awards. Even still, the difference in attitude score between the groups is relatively small.



4. CONCLUSION

This paper discusses the results of an employee attitude survey administered to coders working on Decennial Census operations in three sites. Attitude scores were analyzed to look for significant differences within various categories. Combined data from all 3 sites were looked at, as well as data for each site, particularly the Kansas City site where the group awards system was instituted. In Kansas City, we try to determine what effect group awards had on the coders' attitudes.

Overall, attitude scores in Kansas City were lower than the other two sites, although the confounding factors mentioned in section 3 reduce the significance of this result. Other trends apparent from the data include:

- higher attitude score with increasing age of coder
- lower attitude score with increasing time on job and coding operation
- higher attitude score for night shift coders (Charlotte showed the reverse)

When we focus in on Kansas City, we see that group awards had no significant effect on overall coders' attitudes about their jobs.

Below, we list some possible reasons for this result:

- Most coders in Kansas City, were never part of a coding unit that received an award. Some of these coders may have felt they were penalized for being part of a "weak" team. As such, their attitude toward their job would suffer, as well as their work quality and productivity (see Deming, 1982).
- It is not realistic to expect attitudes to change markedly in the relatively short period of time covered by this survey. It is a long, difficult process requiring a refocus on the environment and the knowledge base of the individual (see Barry, 1988).
- The temporary employment status of the coders likely had an effect on their attitude, particularly as the end of their employment neared.

Given the above results, we recommend that planning for the 2000 Census quality assurance program consider other means of awarding groups or teams that take into account the limitations discussed above. Organizations with more experience in this area should be contacted for ideas based on past successes and failures.

REFERENCES

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Footnotes

* This paper reports the general results of research undertaken by Census Bureau staff. The views expressed are attributable to the author and do not necessarily reflect those of the Census Bureau.

¹ One question is an exception to this rule. The responses to this question were recoded in reverse order of the original responses for purposes of consistency for data analysis.

² Of the 1448 completed questionnaires in Kansas City, 1192 (82.3%) were completed by coders in units never receiving an award.