Getting the Facts on the Census Correct: A Response to Brunell

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As the initial results of the 2000 Census were made public, the December 2000 issue of PS was published. In that issue, articles by Lynne Billard (2000), Thomas Brunell (2000a), and by us (Anderson and Fienberg 2000a) explored the technical innovations for adjusting the census to ameliorate the effect of the differential undercount and the political controversies surrounding the implementation of some of those innovations in the 1990 census. We commented on Brunell (2000a) in Anderson and Fienberg (2000b). Brunell (2000b) responded to our article on mythmaking, which focused on the implication for apportionment of a computer error in the proposed adjustment. This is our response to Brunell's comments on our original article about census adjustment and apportionment in 1990. In particular we point out that Brunell misread both our tables and our discussion about the computer error. In his comments, Brunell (2000b, 2000c) also raises new issues about adjustment. We respond to these, albeit briefly.

Technical Questions of How Census Adjustment Works

Capture/recapture methodology, or dual-systems estimation (DSE) as it is known in the census context, is not necessarily a familiar counting technique for political scientists, despite its widespread use in the sciences and statistics. Billard's (2000) article explains DSE. Nevertheless, we find disturbing differences between Billard's and Brunell's treatments. DSE in a census context permits the evaluation and measurement of both omissions and erroneous enumerations, and the methodology assumes that both the census and the sample survey contain omissions. Brunell's discussion of DSE on page 777, however, states that only people in N_{11} are "correctly enumerated." Billard notes, page 770, that people in cell N_{12}, whom Brunell calls "unresolved," are also "correctly enumerated."

Brunell collapses two processes in his discussion (c.f., Billard 2000, 770). Erroneous enumerations must be removed from the census total N_{1+} before the creation of the 2x2 table and the calculation of the adjustment factors. Billard's piece should be accepted as the authoritative description of the technique.

More generally, the measurement of erroneous enumerations—such as people duplicated in the census, fictitious people, or people counted in the wrong geographic location—is a major technical challenge for census taking, and arguably adds as much error to the census as does the undercount. These errors in the census vitiate its role as an accurate mechanism to apportion political representation or to define geographic boundaries of election districts. Such errors have proved to be very important in the interpretation of the results of Census 2000 (see Anderson and Fienberg 2001), and we suspect that the issue of erroneous enumerations will maintain its prominence in 2010 and beyond.

The "computer error" described in our "Mythmaking" paper was an error associated with the tabulation of the number of erroneous enumerations, and it affected the numbers of matches, cell N_{11} in Brunell's table. Correcting this error led to the lowering of the estimated net undercount by about 0.4%. The principal question we answered in our paper is what would have happened had this error not occurred. We discredited as myth the widely cited "fact" that two seats in Congress would have erroneously shifted had the original "uncorrected" adjusted results been used, and we provided the corrected adjusted state totals.

Brunell's Misreading of "Mythmaking" and the Myth

Brunell must have misread our article on mythmaking, as his remarks on it totally confuse what we argued. We submitted the piece to *PS* because we wanted a venue to explain the issues surrounding the census and apportionment to a readership we expected to be able to appreciate them. We repeat the basic issues:

1. The census numbers are one of four variables determining the apportionment of Congress. The other three are: (1) the apportionment formula; (2) the number of seats to be apportioned; (3) the number of states to receive seats. Changing any one of these variables may shift a seat in Congress.
2. Changing the census numbers thus may change the apportionment of Congress. Census adjustment in 1990 would have shifted two congressional seats from Wisconsin and Pennsylvania to Arizona and California. This is not "malapportionment" (Brunell's term) unless one believes that the census numbers are the "true" figures. (We noted parenthetically that in 1990, the apportionment count, which

Editor's Note

The December 2000 issue of *PS* explored the Census and the political issues surrounding its interpretation with a set of articles by Margo Anderson, Stephen Fienberg, Lynne Billard, and Thomas Brunell. It was perhaps foolhardy to expect to capture all the nuances of the controversy and to arrive at a shared understanding with a single set of exchanges. For this reason, we are extending the debate between Anderson and Fienberg on the one hand and Brunell on the other so that all the parties can fully explicate their positions.

The format of this extended debate will be the following: in the September issue of *PS*, Anderson and Fienberg will respond to the Brunell essay that appeared in the December 2000 issue. Thomas Brunell will have an opportunity to respond to Anderson and Fienberg in the December 2001 issue. Anderson, Fienberg, and Brunell will have a final exchange in March 2002. The length of the author's responses will be in predetermined decrements.

After the March 2001 issue, any further discussion of the Census and the politics surrounding it will be covered only on PSOnline. The original Anderson/Fienberg, Billard, and Brunell essays can be found on line at http://www.apsanet.org/PS/dec00/.

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included the overseas military, shifted a seat from Massachusetts to Washington and that Massachusetts thought the numbers without the overseas military were the "true" figures. They litigated this issue in court, and lost.) Our commentary on Brunell's other article pointed out that the census numbers are far from true. It is widely acknowledged that the gross error rate (the sum of omissions plus erroneous enumerations) was about 25 million in 1990, or roughly equal to 10% of the total population in the country. The count of gross errors in 2000 was similarly large, although it appears to have been smaller as a percentage of the total population (see Anderson and Fienberg 2001).

3. After 1995, the critics of census adjustment conflated the question of the adjustment with a second issue, claiming that the correction of a "computer error" in the originally published adjusted census numbers resulted in a different—third—apportionment of Congress. Our paper pointed out that this claim was false, a myth. The point of our article was to explain how the myth arose and then to put it to rest.

As it seems that Brunell failed to understand the captions on our tables, we repeat them here for clarity. Tables 1 and 2 describe the population figures and the apportionment results for the original count; Tables 3 and 5 describe the adjusted counts as originally produced by the bureau; Tables 4 and 6 describe the corrected adjusted counts. Finally Tables 7 and 8 describe the corrected counts after the methodology was changed for postcensus estimation in 1992 (Hogan 1993). It is true that adjustment would have moved two seats (see the changes from Table 2 to Table 5), but fixing the computer error still changes the same two seats (see Table 6). In our view, which many others share, this switch would have been the consequence of improved population figures (i.e., adjustment works). The same two seats change without and with the correction for the computer error.

Thus, in misreading our paper, Brunell tried to promulgate the myth, much in the same way as have the politicians who refer to it without understanding it or the calculations that underlie apportionment process.

Small-Area Estimates

Brunell introduces new issues in his comment on our work, and these issues too have come to take on the proportion of myths. For instance, he refers to the PL 94-171 law that authorizes the Census Bureau to release small-area data to the states for redrawing the boundaries of congressional districts and state legislatures.

The Census Bureau released the PL 94-171 files at the lowest levels of geography, the census block, but this level of detail is not required by law. For the comparable adjusted counts, the Bureau needed to apply to all the blocks nationwide the adjustment factors it computed. This introduces to the adjustment an additional source of error—synthetic error—which is the result of not directly computing the adjustments in every block. However, neither in 1990 nor in 2000 was there evidence that it had any appreciable impact on the comparison between adjusted and unadjusted counts (see Griffin and Malec 2001). We excerpt from our comment on Brunell: "No statistical analyses [in 1990] showed that the [unadjusted] counts were superior to the adjusted counts at any level of geography for either distributive or numerical accuracy." Recent reanalyses of the 1990 data show the remarkable result that, at the block level, where the adjusted data appear to have large errors, so too do the original census counts. If anything, the evidence suggests that the adjusted data are superior at the block level (e.g., Mulry, Davis, and Hill 1997).

Finally, as a critique of adjustment and apportionment in 1990, Brunell's invocation of the ecological fallacy is completely misplaced. The ecological fallacy is a familiar concept to political scientists, but we cannot determine how it applies in this context. The census is designed to produce population counts for ecological aggregates (states, minor civil divisions, wards, tracts, blocks). The smallest ecological units—blocks—are literally building blocks for larger geographic aggregations, such as congressional districts. At this latter level of aggregation in 1990, and again in 2000, adjusted data proved to be superior to the unadjusted counts (e.g., Navarro and Asiala 2001).

There remain technical statistical disputes about how to evaluate methods for adjusting census results, and differences of opinion on what to conclude from these evaluations. Our goal is not to hide these, but simply to point out the continuing factual errors in Brunell's accounts of the adjustment debates, in the context of his comment regarding our paper on the computer-error myth.

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