Memorandum 2

King *et al*.'s advice bounded and/or asymmetrical variables are transformed to approximate unbounded or, at least more symmetrical, variables before imputation. After imputation the transformations are inverted. Integer-valued variables are either rounded to the nearest integer or, in some cases, the inverted value is used to set the probabilities of a uniform bivariate random distribution from which the imputed value is drawn. The transformations for each variable are described below, where x is the original variable and t is the transformed variable. The operator log( ) refers to the natural logarithm. Variable numbers refer to column A in the table of variable definitions in Appendix 3.

A. Transformation: $t = \log\left(\frac{x + 0.1}{1.01 - x}\right)$.

Inverse tranformation: Rounds to nearest integer, except 12 [drawn from random distribution].
Variables: 1, 3, 4, 5, 7, 8, 12, 23, 25, 26, 27, 29, 30, 31, 34, 35, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 55, 64.

B. Transformation: $t = \log\left(\frac{x/n + 1/(2n)}{1 + 1/(2n) - (x/n)}\right)$, where n is the maximum value of a 0 to n scale.
Inverse transformation: Rounds to nearest integer.
Variables: 2, 21, 22, 24.

C. Transformation: $t = \log(x)$.
Variables: 6, 9, 13, 14, 15 [x is replaced by $1 + x$], 16, 17, 18, 28, 60, 62

D. Transformation: $t = \sqrt{x}$.
Variables: 32, 33

Transformations A and B are logit transformations with Cox's modification to allow for the fact the logit is not defined at the endpoints on the 0-1 interval (see Amemiya 1985, pp. 277-278). Once passed through the inverse transformation, imputed variables may sometimes lie outside the endpoints of the original scale. In these cases, the imputed variable is set to the nearest endpoint.