As described in Singleton et al. (Appl. Environ. Microbiol. 67:4374), the p-values calculated by LIBSHUFF do not correct for experimentwise error, and so are not suitable for multiple comparisons of libraries. For multiple hypotheses tests, the experimentwise error rate is the probabilty that at least one null hypothesis is rejected when in fact all null models are correct. Although a single application of the LIBSHUFF procedure yields a valid p-value, the repeated application of the procedure provides more opportunities to falsely reject the null hypothesis. Moreover, our definition for the Cramer-von Mises test statistic is not symmetric, so X versus Y comparisons are different from the Y versus X comparison. The application even these two comparisons yields overestimates of the significance. The Bonferroni correction is a simple approach for controlling the experimentwise error rate. This approach is conservative if the hypothesis tests are not independent (as is the case, when making X vs. Y and Y vs. X comparisons, or all possible pairwise comparisons among libraries X,Y,Z,...), so that this will underestimate the significance.

The tables below provide guides to applying the Bonferroni correction to LIBSHUFF results.

Table 1. Critical values for LIBSHUFF to obtain an experimentwise p value of 0.05. When comparing multiple libraries, a LIBSHUFF p-value $\leq$ the critical value for any individual comparison insures that at least one of the libraries is different with p = 0.05.[a]

Number of libraries	Lowest p-value from LIBSHUFF
2	0.025
3	0.0085
4	0.0043
5	0.0026
6	0.0017
8	0.00092
10	0.00057

[a]Calculated from the relationship: $p = 1-(1-a)^{k(k-1)}$ where p is the experimentwise p value of 0.05, a is the p-value from LIBSHUFF, and k is the number of libraries.

Table 2. Critical values for LIBSHUFF to obtain experimentwise p-values for comparisons of two libraries.

Experimentwise p-value	Lowest LIBSHUFF p-value for XY and YX comparisons
0.10	0.05
0.05	0.025
0.025	0.0125
0.01	0.005
0.005	0.0025
0.001	0.0005