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## A THEORY OF (UN)CONGENIALITY (BETWEEN BAYESIANS AND FREQUENTISTS?)

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A grand challenge in producing public-use databases is that the models/assumptions used to “clean up” the raw data cannot possibly be compatible with all subsequent models or assumptions adopted by the users of the database. This challenge requires us to rethink the usual “My model” vs. “God’s Model” paradigm, because there is a third model: the one adopted by the “data cleaner.” A concrete example of this arises in the context of using multiple imputation to “fix the holes” in raw data. Multiple imputation, in general, is best done by the data collector via posterior prediction, which properly takes into account the uncertainty in predicting the missing values. Yet many users of the resulting data do not even consider a likelihood, let alone Bayesian modeling, but rather employ a design-based complete-data procedure. This talk first reviews the concept of congeniality (Meng, 1994, *Statistical Science*) for embedding the user’s procedure into a Bayesian model and hence making it possible to study the incompatibility (i.e., uncongeniality) between the Bayesian imputation model and the frequentist analysis procedure. We then present a newly established theoretical framework for quantifying the impact of uncongeniality on the resulting multiple imputation inference: an offspring of the uncongenial but necessary marriage between Bayesian (via the imputer’s model) and frequentist (via the user’s analysis procedure) machineries. (This is a joint work with Xianchao Xie of Harvard University.)