**Generating missing values with R-function ampute  
Rianne Schouten**

Missing data are a ubiquitous problem for everyone working with data. To evaluate the performance of methods dealing with missing data, researchers perform simulation studies. An important aspect of these studies is the generation of missing values in complete data (i.e. the amputation procedure).

Missingness occurs with all sorts of underlying mechanisms. In this talk I will introduce the three types of missingness: MCAR, MAR and MNAR mechanisms. And I will explain how these missingness mechanisms create difficulties for statistical analyses.

Then, I will show how to generate legitimate missingness to evaluate the performance of missing data methods. Until recently, missing values were generated one variable at a time. Especially when it is the intention to make multiple variables incomplete, this stepwise univariate amputation approach is not always sufficient in creating reliable missing data problems.

We implemented a multivariate amputation procedure into R-function ampute (available in R-package mice). ampute enables the generation of missing values in multiple variables, based on multiple variables, with any desired missingness percentage and much more. With ampute, we have an efficient amputation method to accurately evaluate missing data methodology.

**Performing Multiple Imputation with R-package MICE**

**Rianne Schouten**

Missing data are a ubiquitous problem for everyone working with data. A general and statistically valid technique to analyze incomplete data is multiple imputation: a method where every missing value is imputed multiple times. The procedure results in multiple datasets where the observed data is similar in every dataset, but the imputed data is different. The statistical model of interest is then performed on every dataset, resulting in multiple statistical estimates. These estimates are combined with statistical rules developed by Rubin, giving one final result.

R-package MICE is specifically developed to make it easy and straightforward to perform multiple imputation in R. In this workshop, we will walk through the necessary steps to go from one incomplete dataset to multiple imputed datasets to one final statistical result.

The 90 minute workshop will have three parts of each 10 minute explanation and 20 minute exercises. The parts are ordered as follows: 1) The Imputation Model, 2) Checking Convergence of the Model and 3) Analyzing and Pooling. At the end of the workshop, you will have a basic understanding of multiple imputation and how it can be done with R-package MICE.