

Mixed models contain at least one fixed and one random factor. Interaction terms in a mixed model can be either fixed (fixed crossed with fixed) or mixed (random crossed with fixed). The former are tested, the latter are not. The latter often appear as the denominator in correctly nested tests of fixed effects. For the example circled, fill out the variable table and write the model. Examples are from Cobb 2014 *Design and Analysis of Experiments*.

1. Dreaming of shrews. Three kinds of sleep were of interest: light slow-wave sleep LSW, deep slow-wave sleep DSW, and rapid eye movement sleep REM. Heart rate drops during slow-wave sleep; it goes up and down during REM sleep. The subjects were 6 tree shrews. Heart rate of each shrew was measured under all three conditions. Cobb (p249) reports a single number in each subject in each treatment.

Variable	Symbol	Response or explanatory?	<u>Explanatory variables</u>	
			Fixed or Random?	Crossed or Nested?

Model

2. Finger tapping. Scott and Chen (1944, *J. Pharmacol, Exptl Therapy* 82:89-97) reported the results of a study to compare the effects of caffeine, theobromine, and a placebo. Cobb (p268) reports a single number for each treatment for each subject.

Variable	Symbol	Response or explanatory?	<u>Explanatory variables</u>	
			Fixed or Random?	Crossed or Nested?

Model