Chapter 1

1. The meaning of the unstandardized weight is how much time (milliseconds) it takes to process one feature difference between A and B.

2. The problem with using a 4-point scale is twofold. First, the model is one for continuous variables because the error term is a real number, so that according to the model not just the values 1, 2, 3, 4 can be observed, but also all values in between and beyond the range of this scale. Second, the model is one for an unbounded observed variable, because the error term is unbounded, whereas the 4-point scale is bounded. A 7-point scale does not solve these problems, but it is a better approximation of continuity than a 4-point scale.

3. The random component of the LMM is a normal distribution with mean zero and an unknown variance. The link function is the identity function, $f_{link}(a)=a$. The linear component is a linear function of the predictors.

4. The variation of V_{pi} is described either by a normal distribution (for the normal-ogive model) or by a logistic distribution (for the logistic model) with mean η_{pi} and a standard deviation (σ_ε) of 1 (normal-ogive model) or approximately 1.7 (logistic model). The probability that $V_{pi}>0$ is π_{pi}. The 95% confidence interval for V_{pi} is the interval from $\eta_{pi} + 1.96\sigma_\varepsilon$ and $\eta_{pi} - 1.96\sigma_\varepsilon$. On the corresponding probability scale, this interval ranges from .95 to .05 if $\eta_{pi}=0$ (for both the normal-ogive and the logistic models). This means that the variation in V_{pi} spans a range that would correspond with the position of pairs of persons and items that are as divergent as having a .050 and .950 probability of observing a 1. For $\eta_{pi}=1$ and $\eta_{pi}=2$, the corresponding ranges are .168 to .998, and .516 to .999, respectively.
It is important to notice that σ_ε is not the standard deviation (standard error) of η_{pi} , and thus that the interval is not the confidence interval of η_{pi}. The former is the standard deviation of a distribution and the latter is the standard deviation (standard error) of its mean.

5. The symbol π_{pi} is replaced with μ_{pi} because in general, the expected value is not a probability. Only for binary variables the expected value is a probability, and then $\pi_{pi}=\mu_{pi}$.