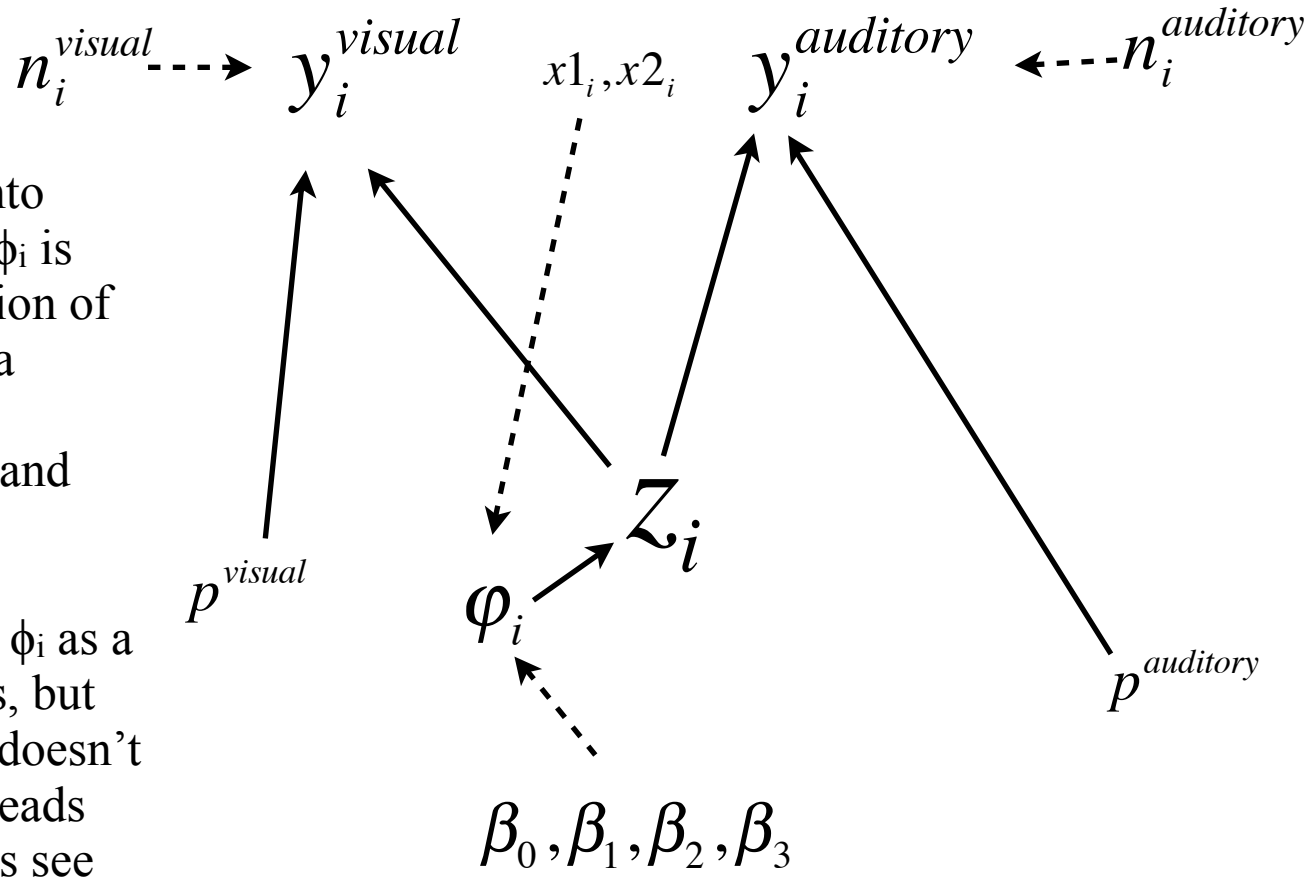
Important



Here is where you can run into trouble. (I did.) Notice that ϕ_i is simply a calculation, a function of the β's and the x's. It is not a stochastic quantity.

The relationship between z_i and the β's and the x's form the stochastic quantity. You are certainly free to estimate the ϕ_i as a function of random variables, but putting them in the diagram doesn't make sense in terms of the heads and tails of arrows helping us see the conditioning. If you want them in the diagram, use a different type of arrow indicating a calculated quantity, as I did here.