

Introduction to structural equation modelling - advanced modelling techniques

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29.10.2021

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- Interactions

- Interactions
- Latent variables

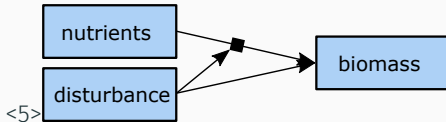
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- Temporal autocorrelation

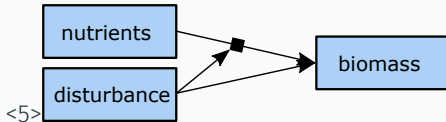
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- Spatial autocorrelation

Interaction questions (Moderation)



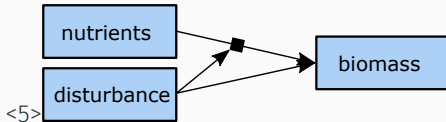
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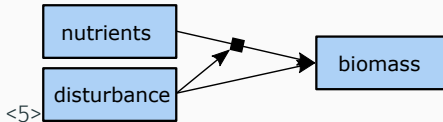
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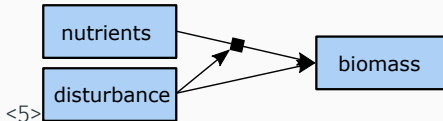
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- In nature, things often are contingent on each other.
- For instance, the effect of nutrients on plant growth, may depend on how disturbed the environment is.
- Such a behaviour is called an interaction, which indicates that the effect of the two main effects are different when combined.
- Both positive and negative interactions are possible.
- In regression, the interaction is represented by a coefficient that estimates the effect of the product of the two predictors.

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- 2) Composites

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- We will first use multigroup fitting.
- This allows coefficients to vary among groups.
- Lavaan offers the “group” argument to specify for which groups coefficients should be estimated.
- Importantly, groups have to be of categorical nature.

```
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Interactions (Moderation)

Lavaan allows to introduce equality constraints on various aspects via the `group.equal` argument:

```
mod <- sem(model, group = "age_class", group.equal =  
c("regressions"), data = dd)
```

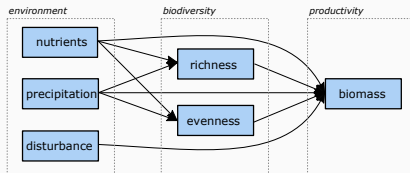
Additional constraints could be:

```
group.equal=c(  
  "intercepts",  
  "means",  
  "regressions",  
  "residuals",  
  "residual.covariances")
```

- Even more control by having the same name for different parameters:

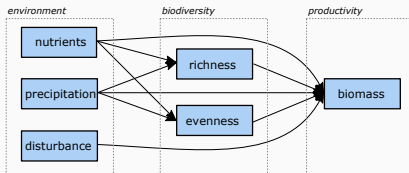
Same coefficients for all but the effect of x_1 on x_2 .

Revisiting the meta-model



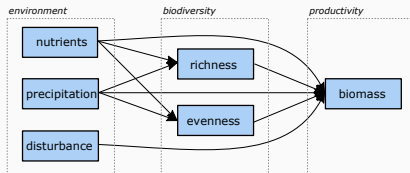
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Revisiting the meta-model



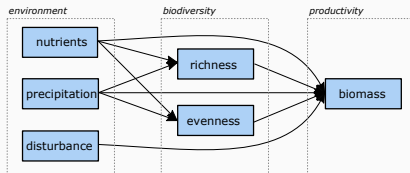
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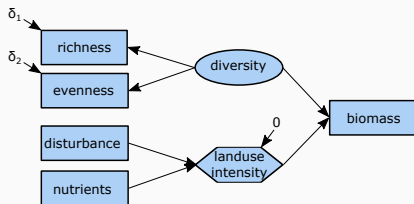
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- This is because they represent an abstract, multifaceted concept (e.g., intelligence).

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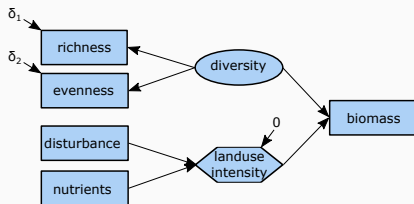
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- This is where latent and composite variables are needed.

Latent variables



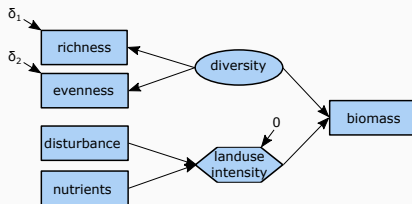
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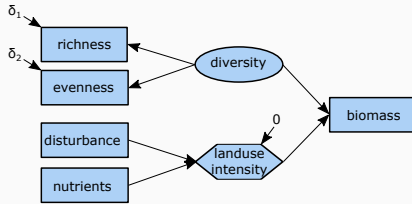
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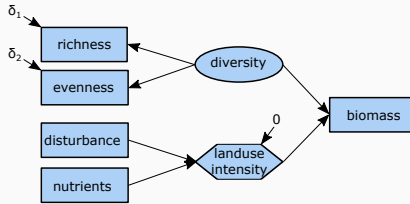
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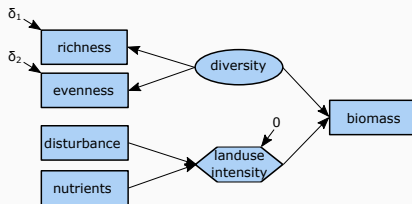
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- Latent variables are often represented by an oval node shape.

Composite variables

Composite variables specify the influences of collections of other variables (examples)



Questions?