World Health Organization

Differential Item Functioning DIF-Analysis Continued

Rasch Technical Training 12

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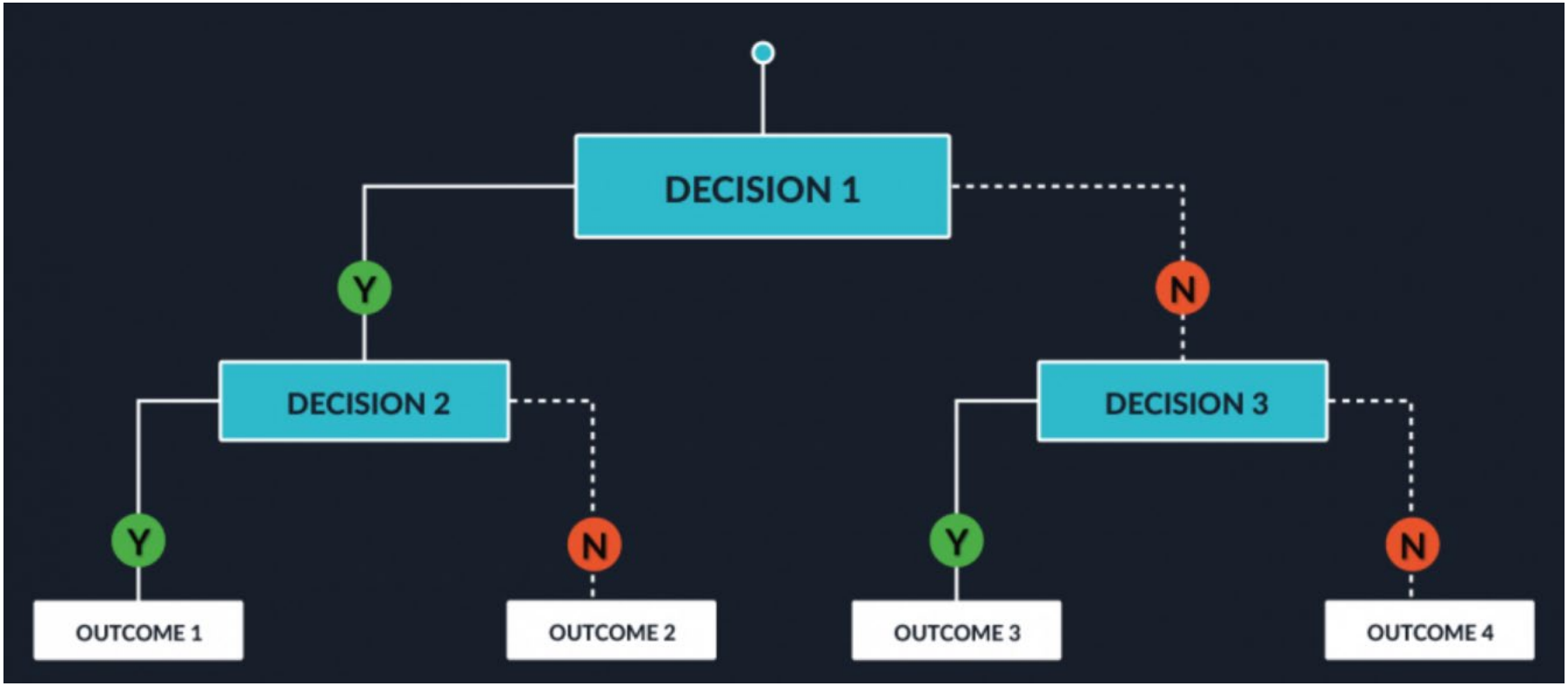
Differential Item Functioning Continued

The Rasch model assumes the construct measured is valid across subgroups.

Differential item functioning tests if item are invariant across sample subgroups.

Decision Trees

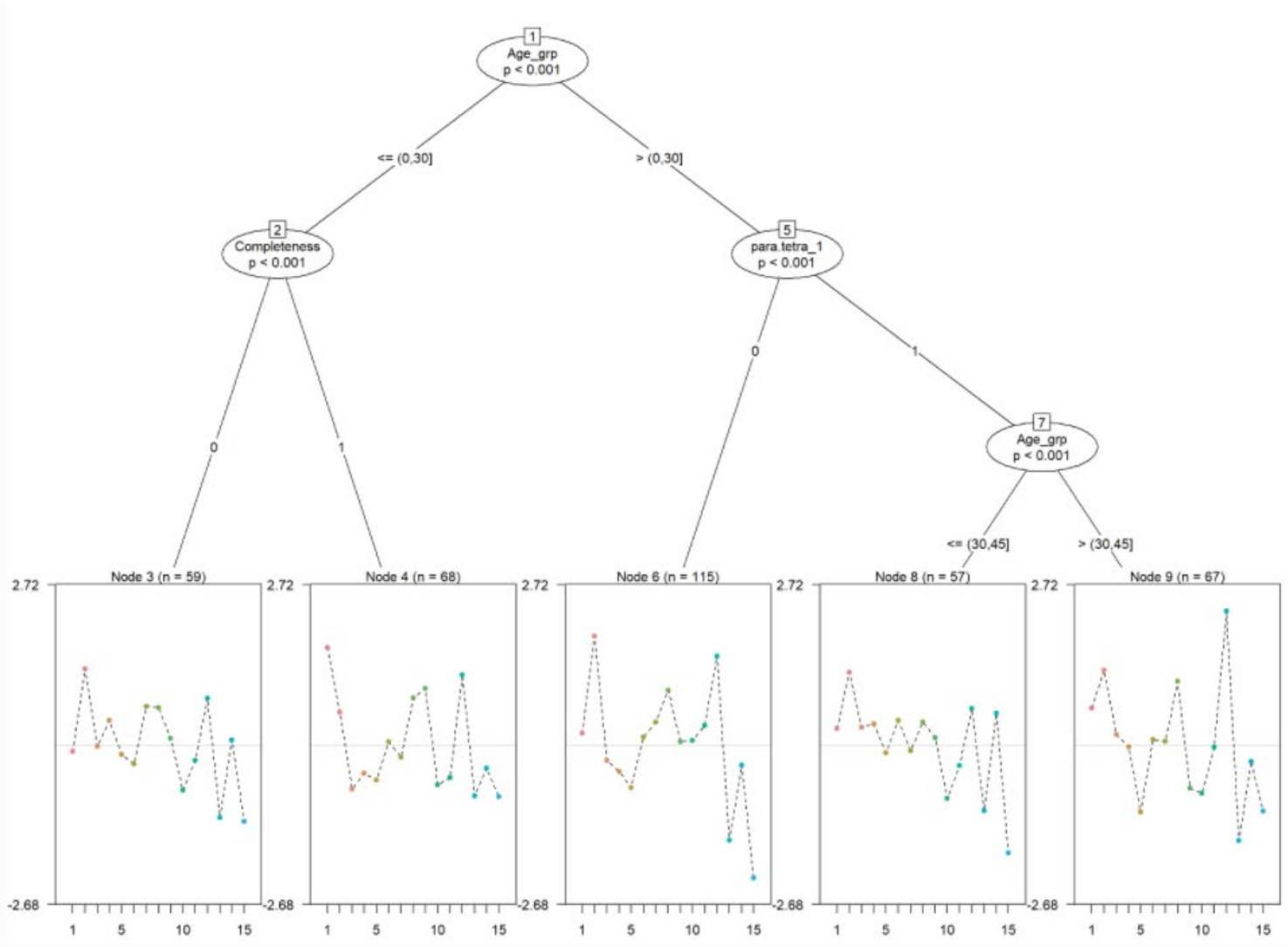


Differential Item Functioning
Rasch Tree

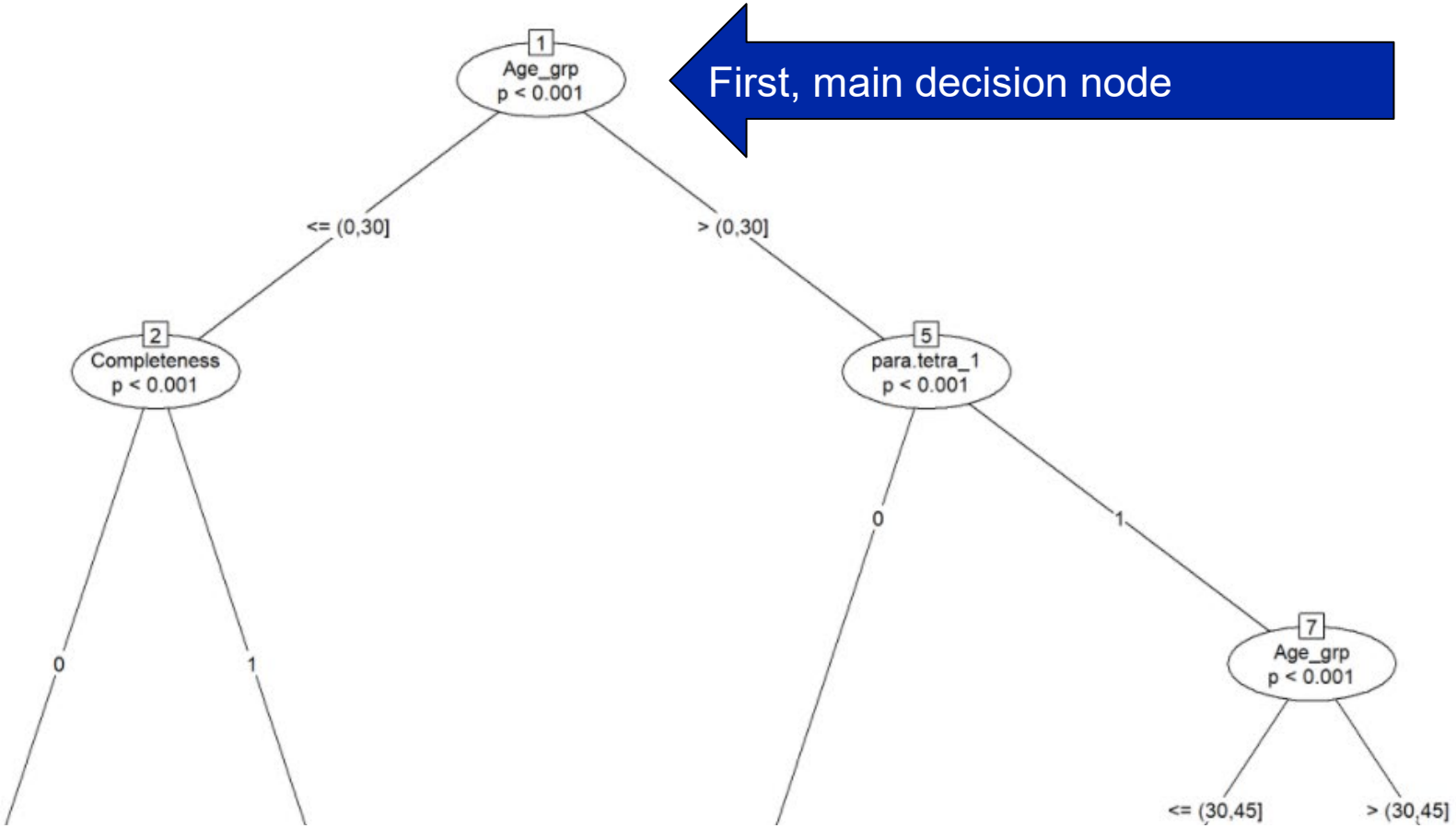
For creating a Rasch tree, four basic steps are repeated:

(1) estimating item parameters of a joint Rasch model,
(2) testing for parameter instability for DIF-variables
(3) selecting the best splitting DIF-variable and cutpoint
(4) splitting the sample accordingly until a stopping criterion is reached (no more significant effects, minimum sample size in node)

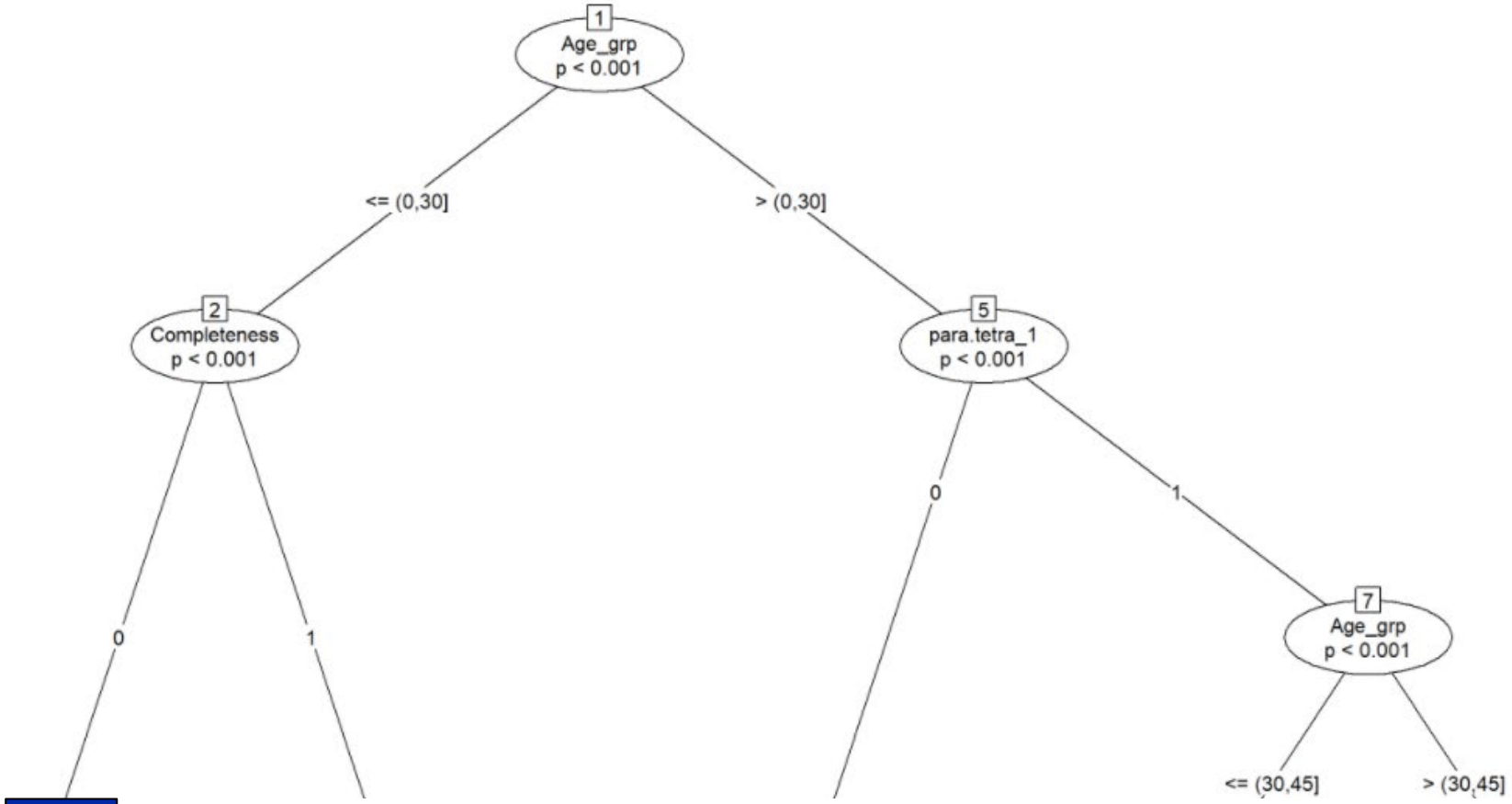
Differential Item Functioning Rasch Tree



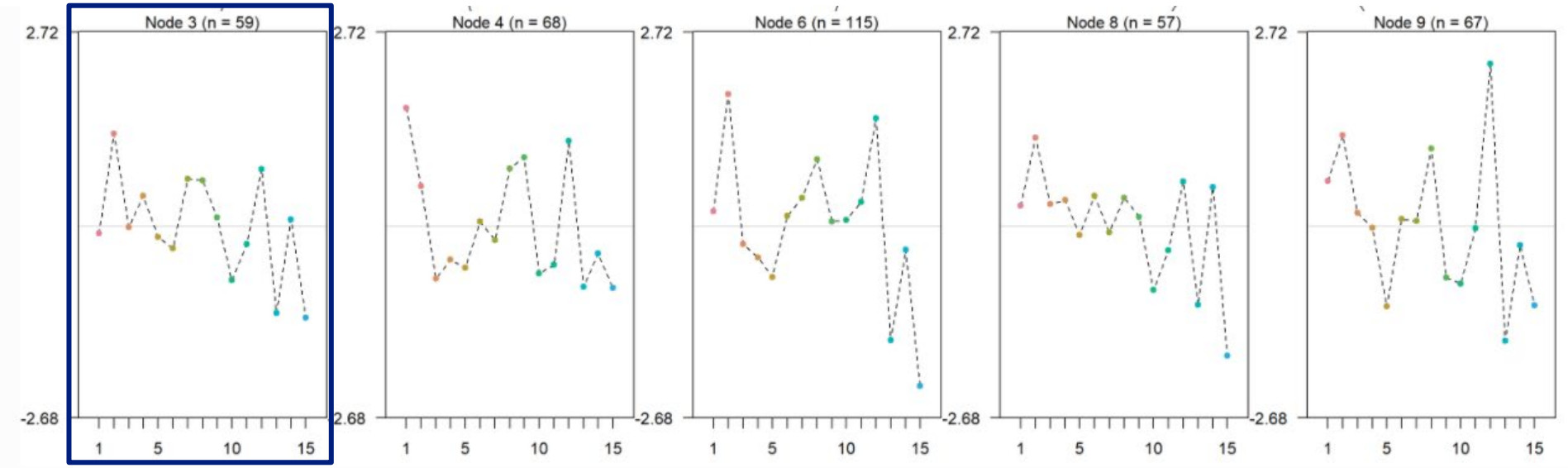
Differential Item Functioning Rasch Tree



Differential Item Functioning
Rasch Tree

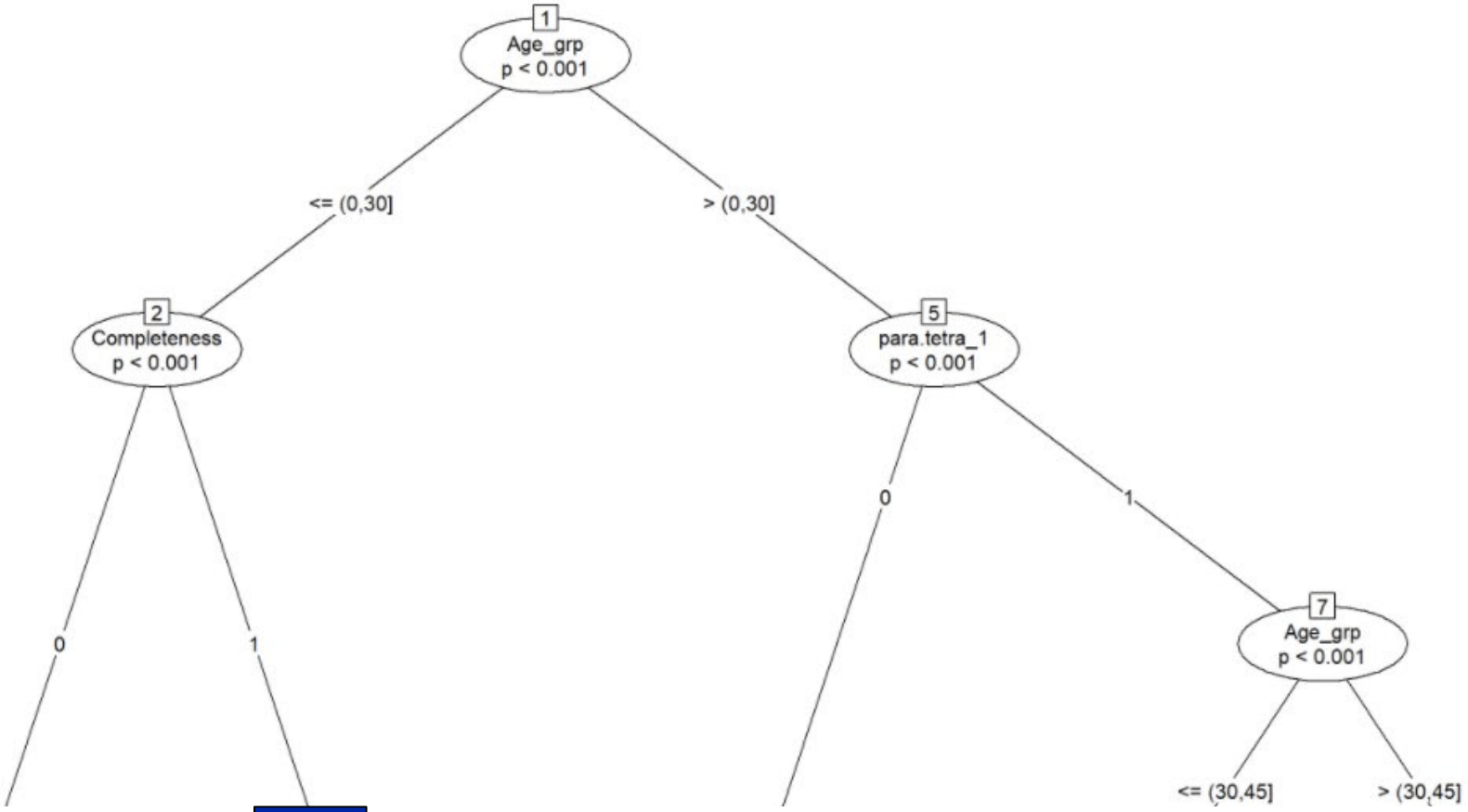


Differential Item Functioning
Rasch Tree

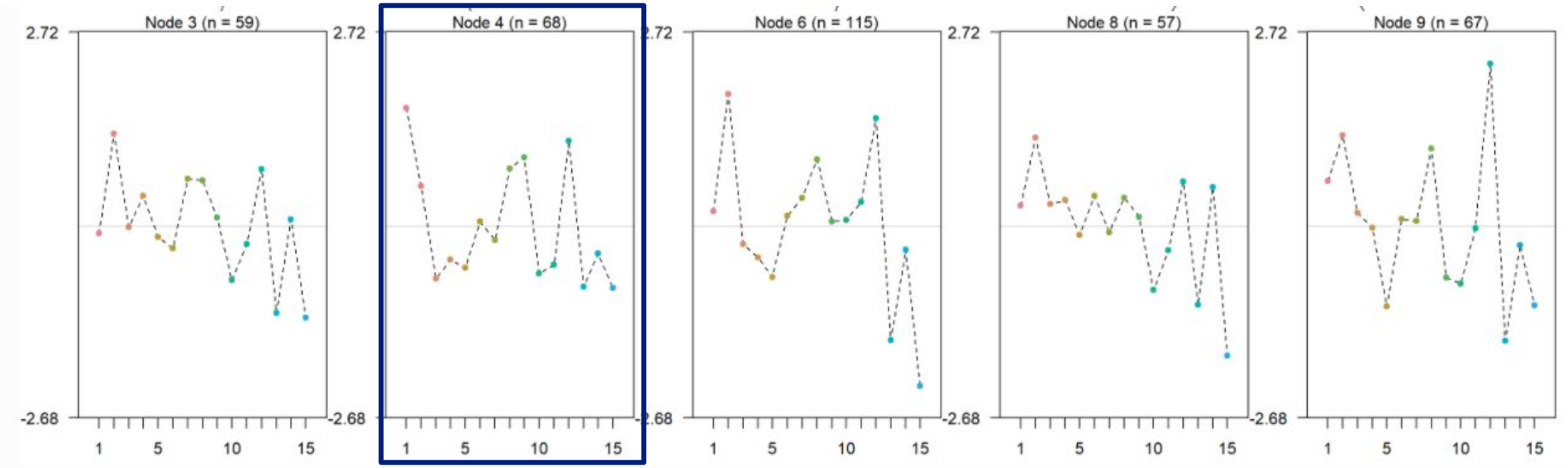


Node 3
Item
Difficulties
Age <30
Incomplete

Differential Item Functioning Rasch Tree

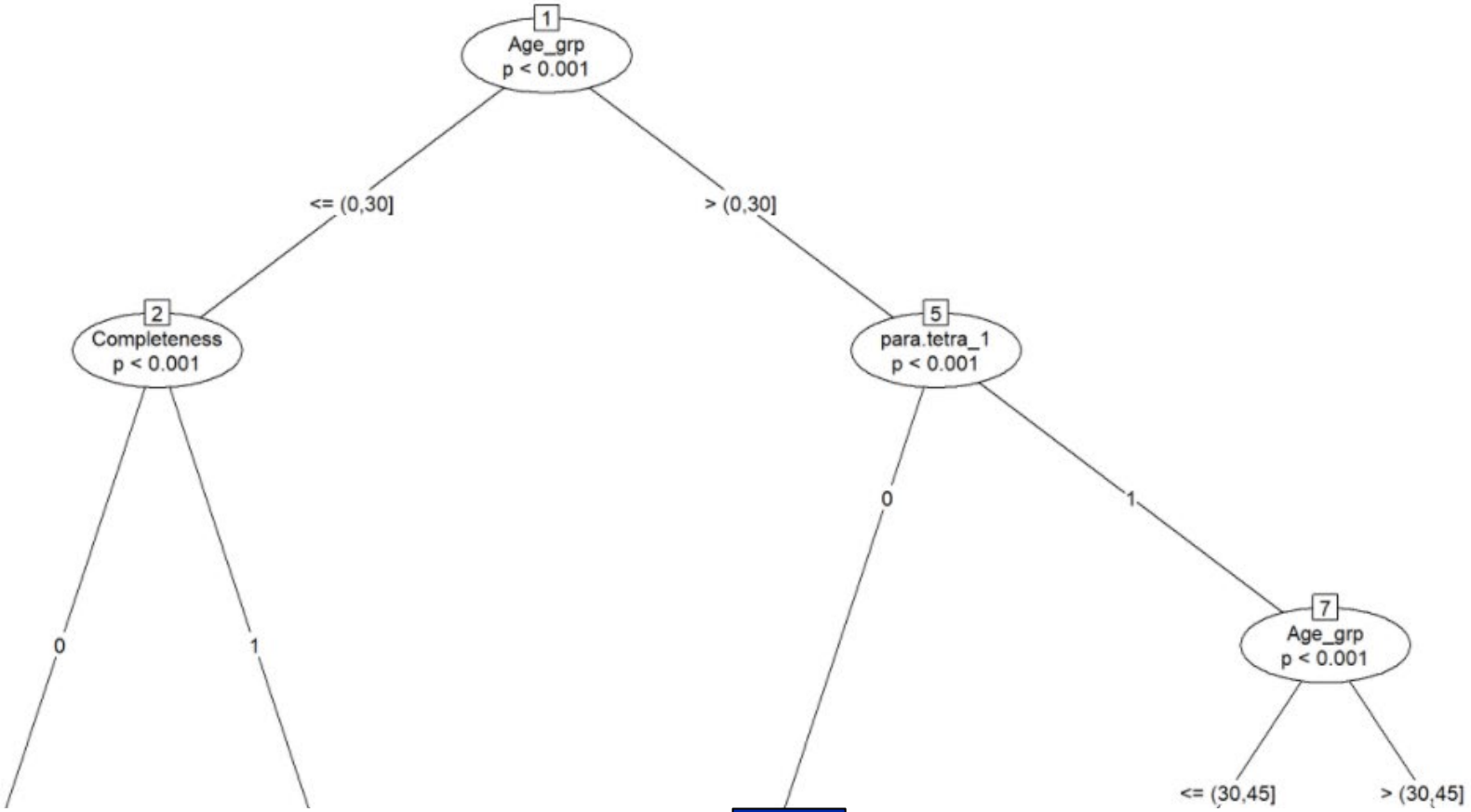


Differential Item Functioning Rasch Tree

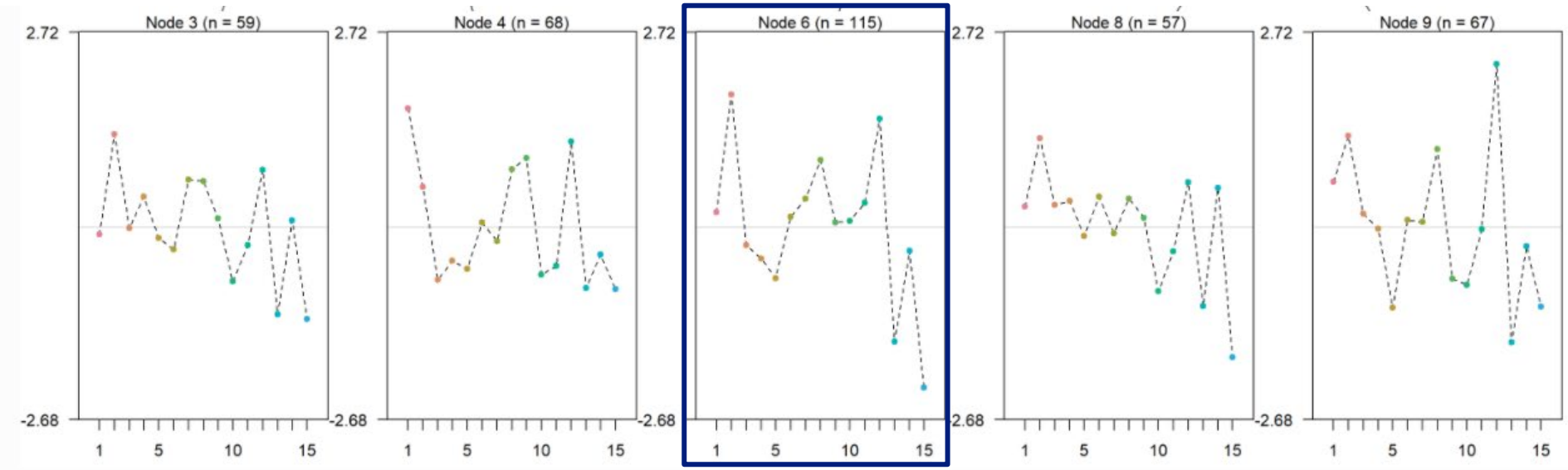


Node 4
Item
Difficulties
Age <30
Complete

Differential Item Functioning
Rasch Tree

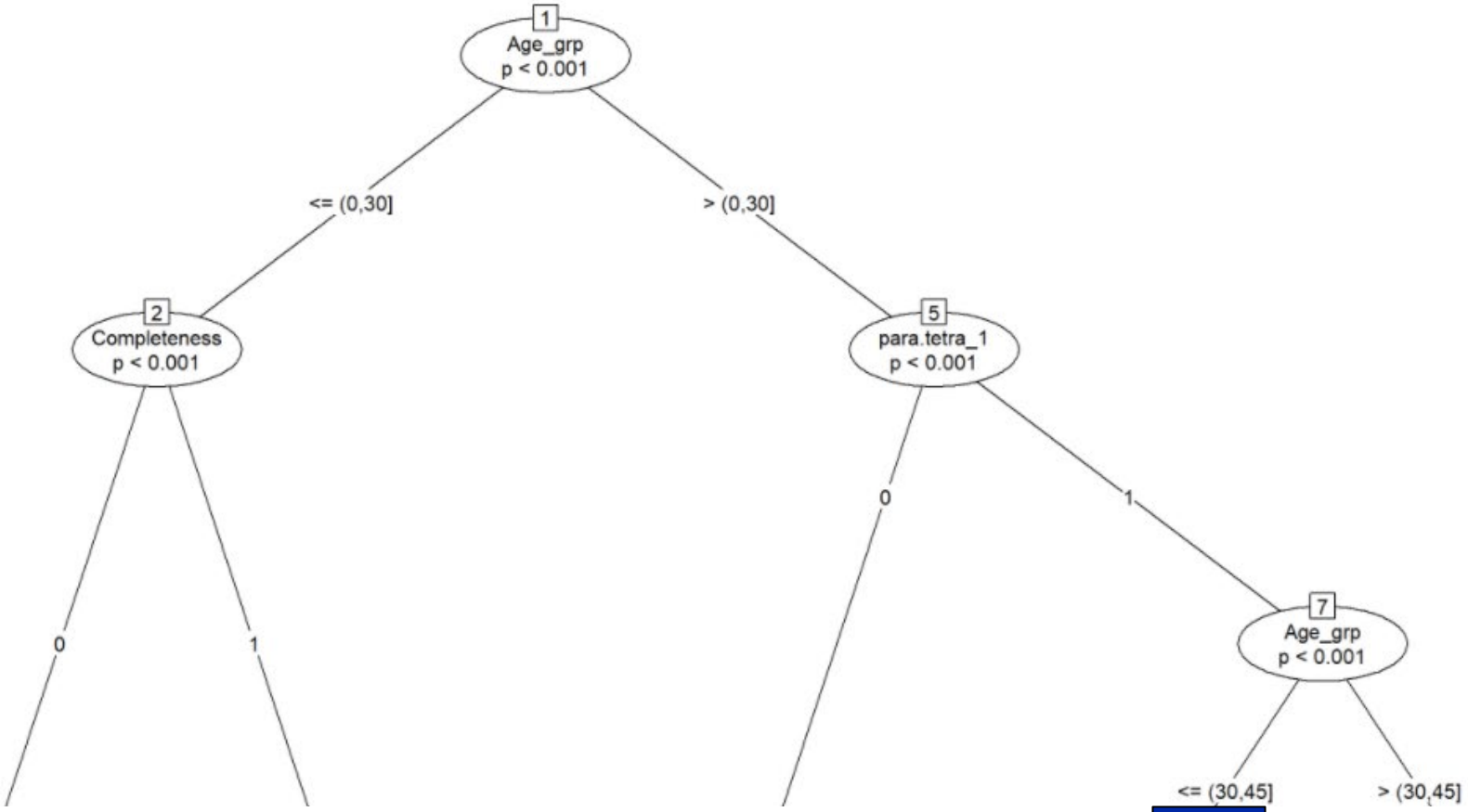


Differential Item Functioning Rasch Tree

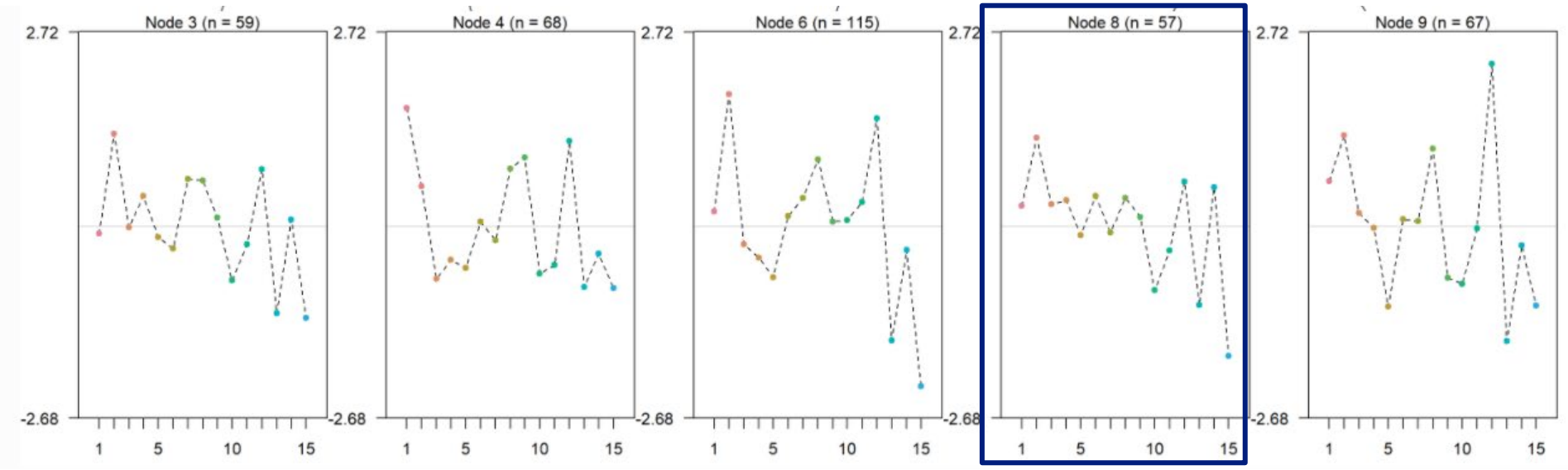


Node 6
Item
Difficulties
Age >30
Tetraplegia

Differential Item Functioning Rasch Tree

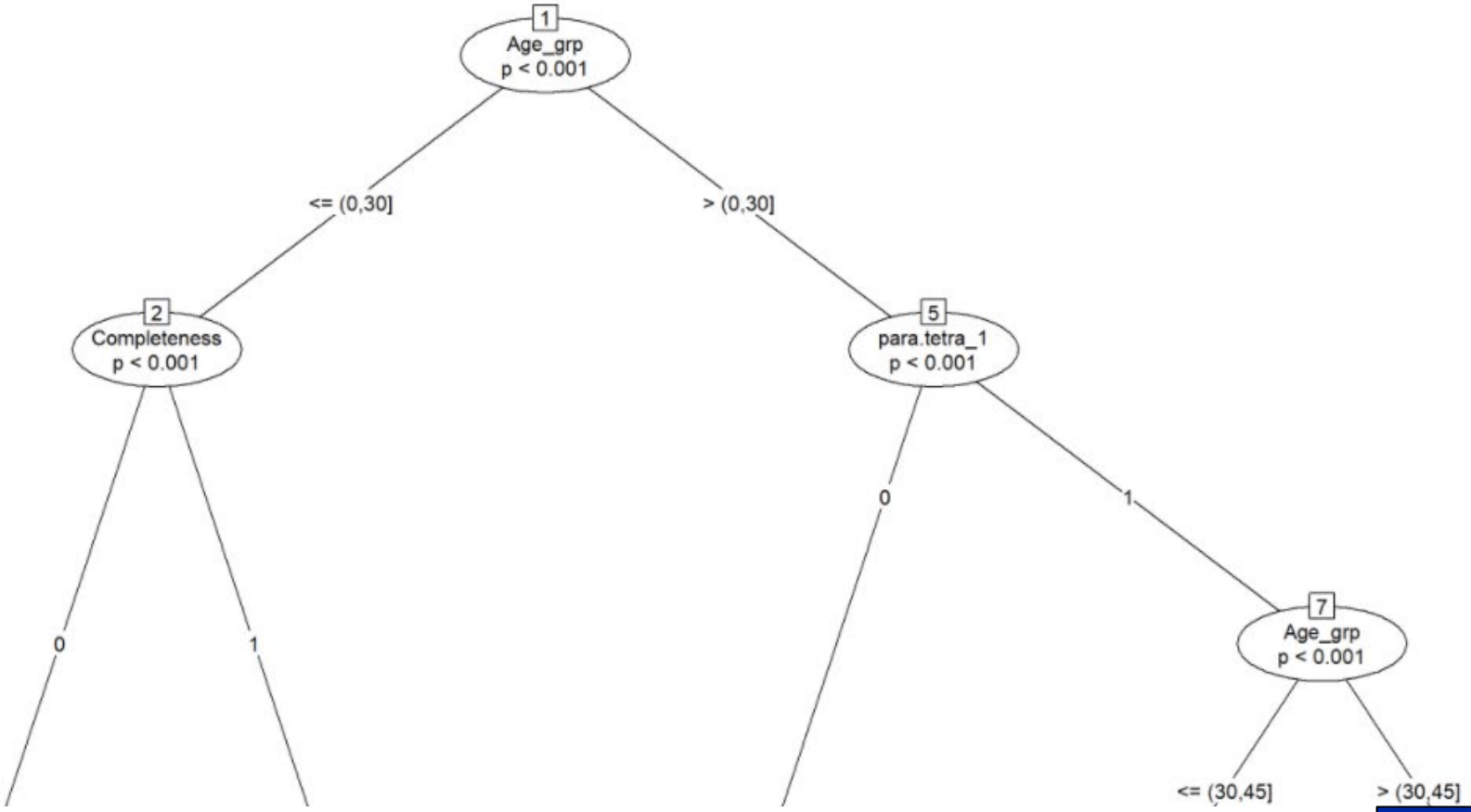


Differential Item Functioning
Rasch Tree

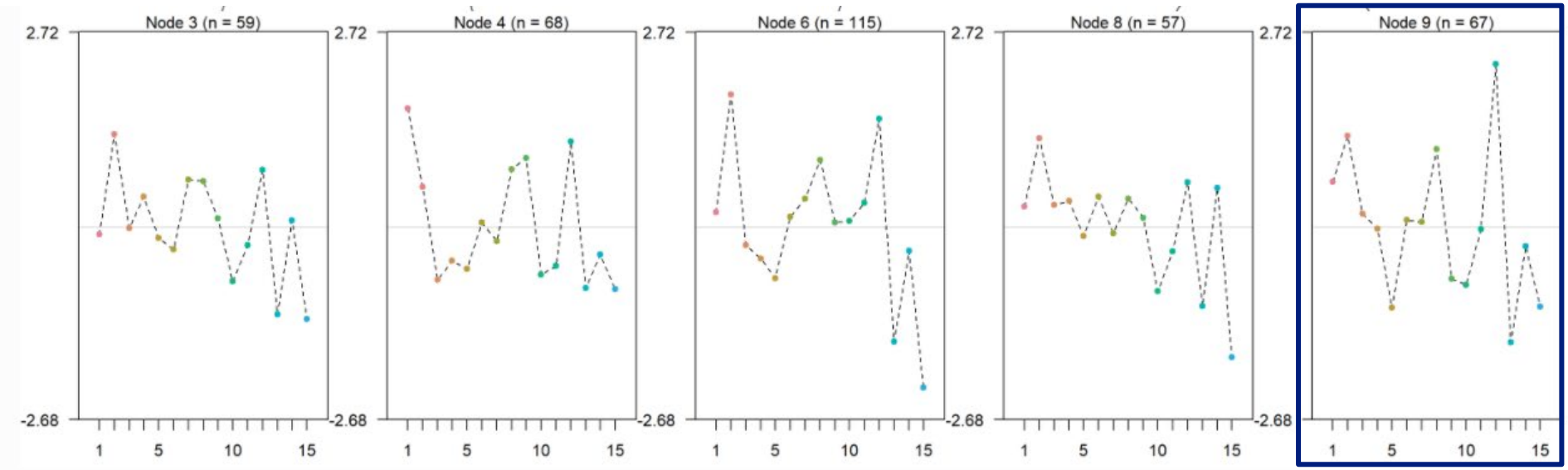


Node 8
Item
Difficulties
Age 30-45
Paraplegia

Differential Item Functioning
Rasch Tree



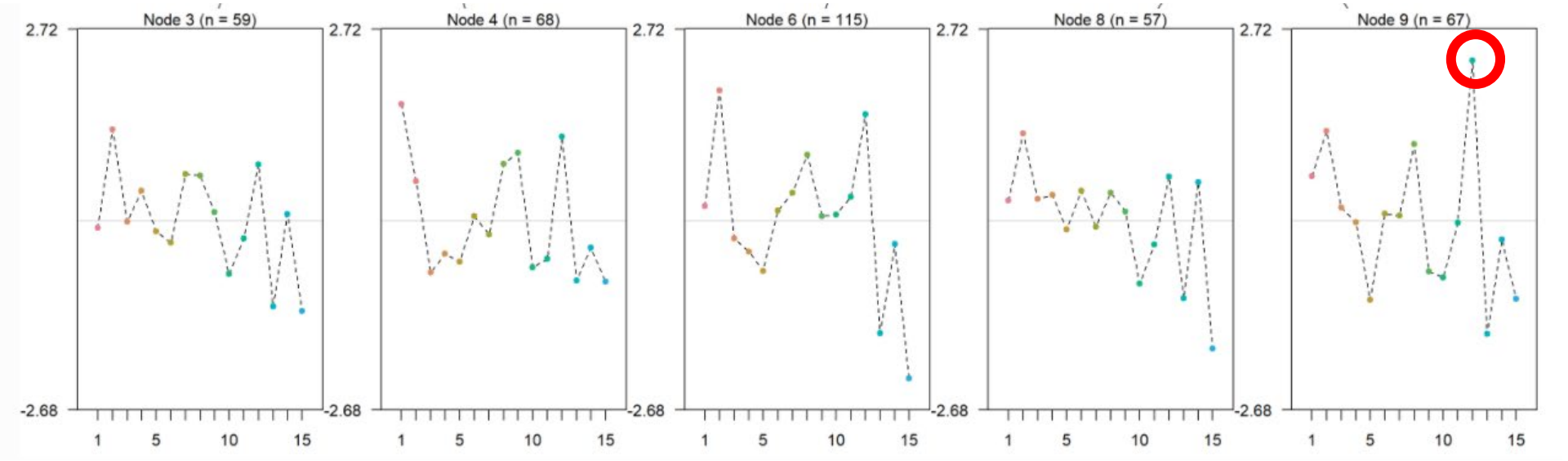
Differential Item Functioning
Rasch Tree



Node 9
Item
Difficulties
Age >45
Paraplegia

Differential Item Functioning Rasch Tree

SRG12 … want to have some impact on the world



Node 3
Item Difficulties
Age <30
Incomplete

Node 4
Item Difficulties
Age <30
Complete

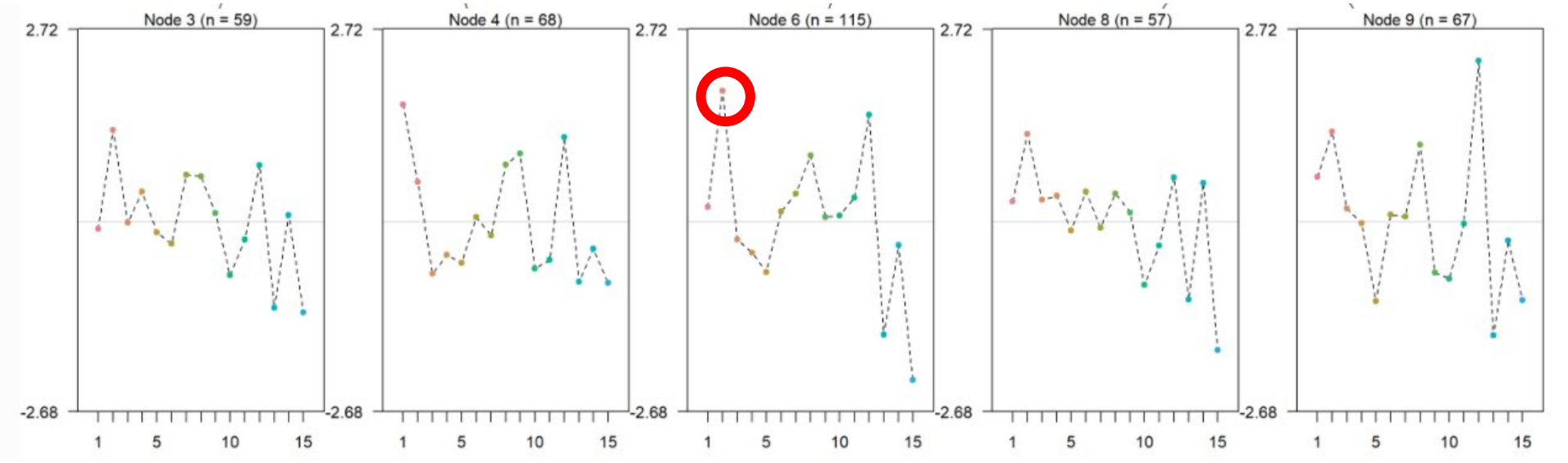
Node 6
Item Difficulties
Age >30
Tetraplegia

Node 8
Item Difficulties
Age 30-45
Paraplegia

Node 9
Item Difficulties
Age >45
Paraplegia

Differential Item Functioning Rasch Tree

SRG2 …
freer to make my
own decisions



Node 3
Item
Difficulties
Age <30
Incomplete

Node 4
Item
Difficulties
Age <30
Complete

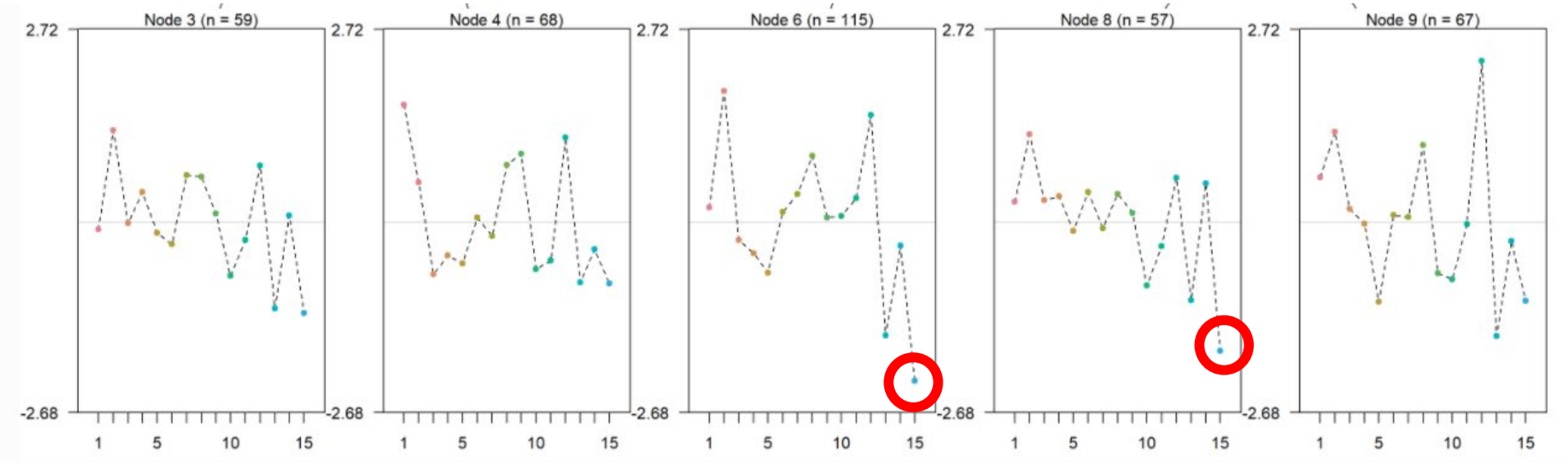
Node 6
Item
Difficulties
Age >30
Tetraplegia

Node 8
Item
Difficulties
Age 30-45
Paraplegia

Node 9
Item
Difficulties
Age >45
Paraplegia

Differential Item Functioning
Rasch Tree

SRG15 … there are more people who care about me than I thought



Node 3
Item
Difficulties
Age <30
Incomplete

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Item
Difficulties
Age <30
Complete

Node 6
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Tetraplegia

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Difficulties
Age 30-45
Paraplegia

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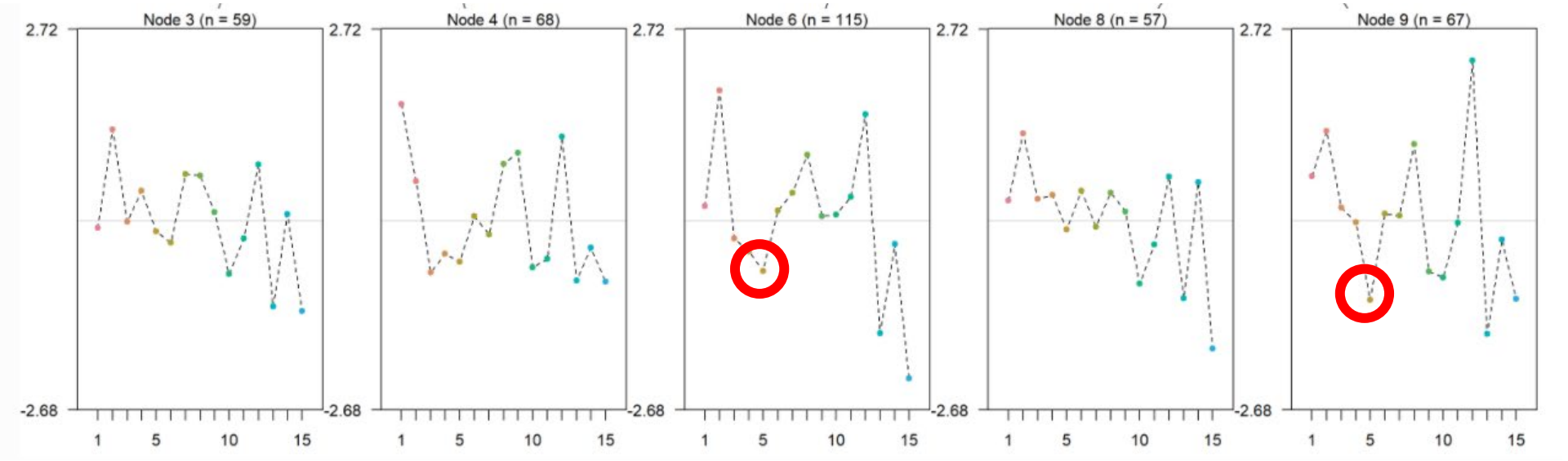
Item
Difficulties
Age >45
Paraplegia

Differential Item Functioning
Rasch Tree

SRG5 … I learned to work through models and not just give up



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Item
Difficulties
Age <30
Incomplete

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Difficulties
Age <30
Complete

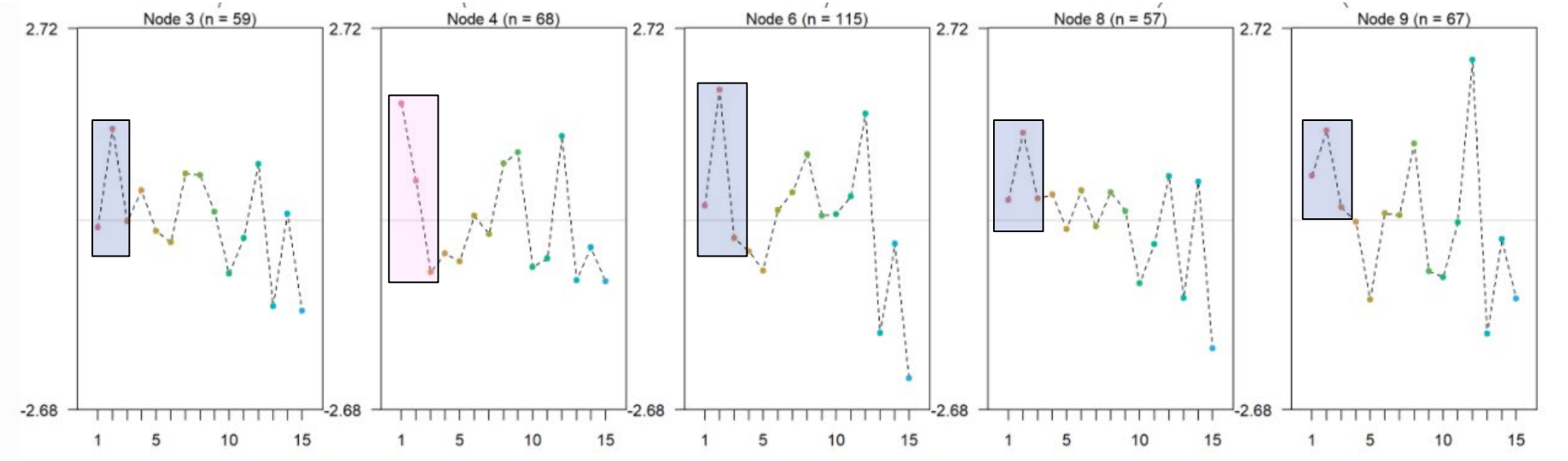
Node 6
Item
Difficulties
Age >30
Tetraplegia

Node 8
Item
Difficulties
Age 30-45
Paraplegia

Node 9
Item
Difficulties
Age >45
Paraplegia

Differential Item Functioning Rasch Tree

SRG1 I learned to be nicer to others
SRG2 I feel freer to make my own decisions
SRG3 I learned that I have something of value to teach others about life



Node 3
Item
Difficulties
Age <30
Incomplete

Node 4
Item
Difficulties
Age <30
Complete

Node 6
Item
Difficulties
Age >30
Tetraplegia

Node 8
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Difficulties
Age 30-45
Paraplegia

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Item
Difficulties
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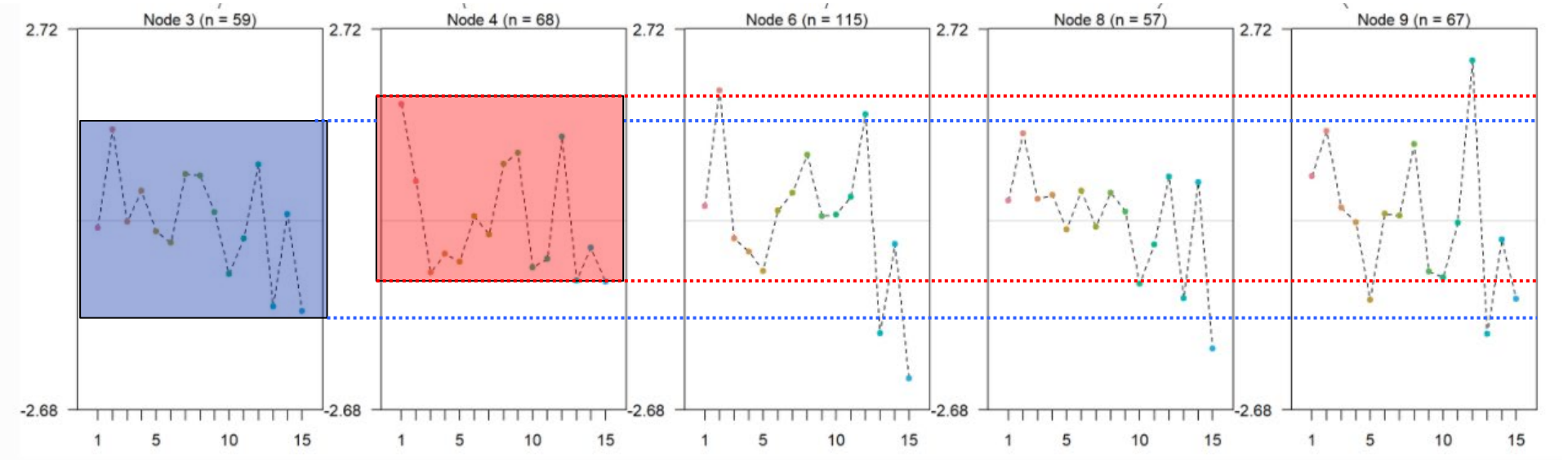
Differential Item Functioning
Rasch Tree



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Difficulties
Age >45
Paraplegia

Let’s go to R-Studio

Open the R-Script TT12_Rscript.r from Github.

Exercise

Test for DIF with the tree method using the SRG data.

- Compare trees as done before with the age groups or with the ungrouped, continuous age variable.
- Are the intuitive age group categories the same than the splits suggested by the `pctree` analysis with the continous age variable?