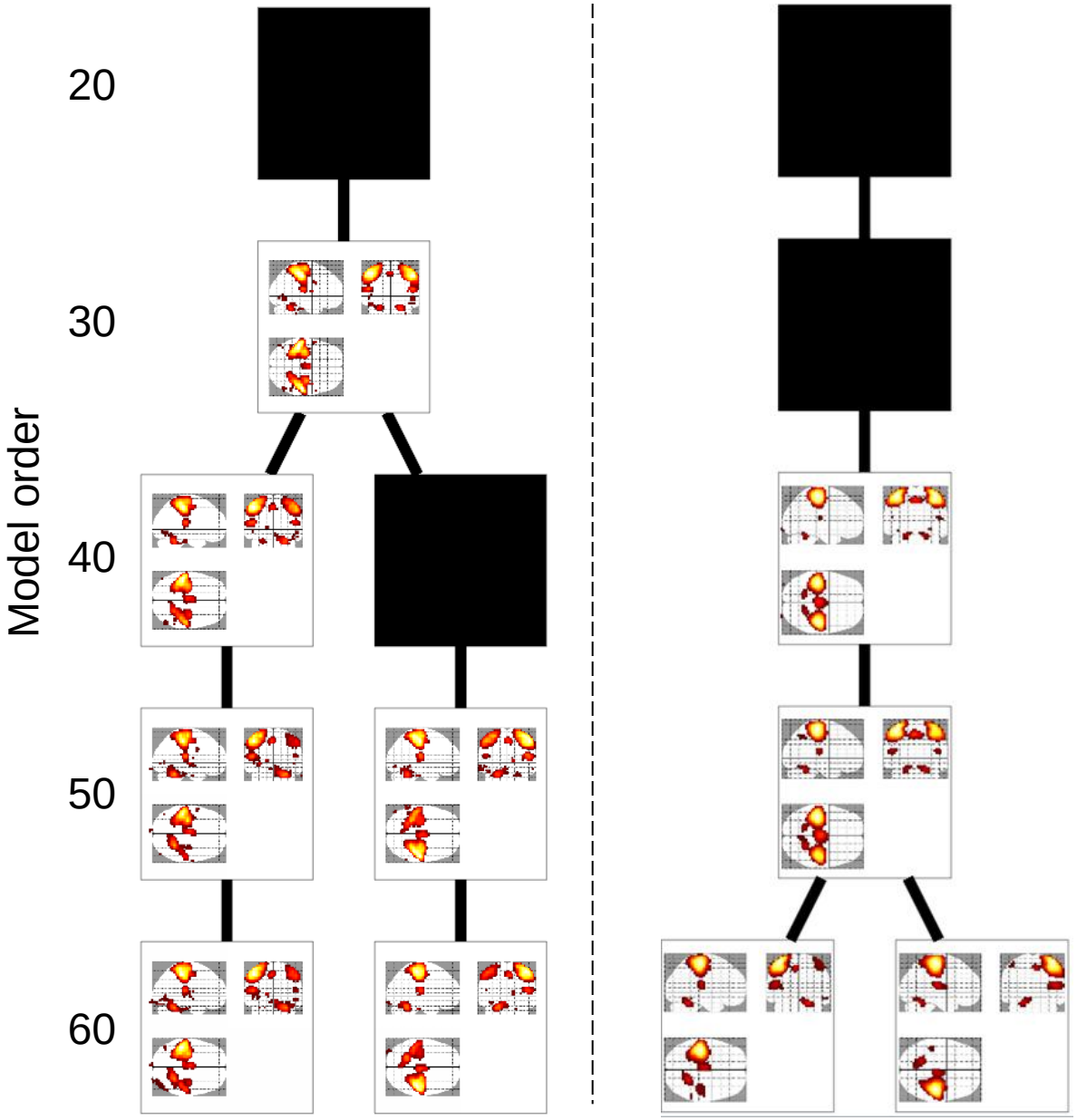
Missing-link trees

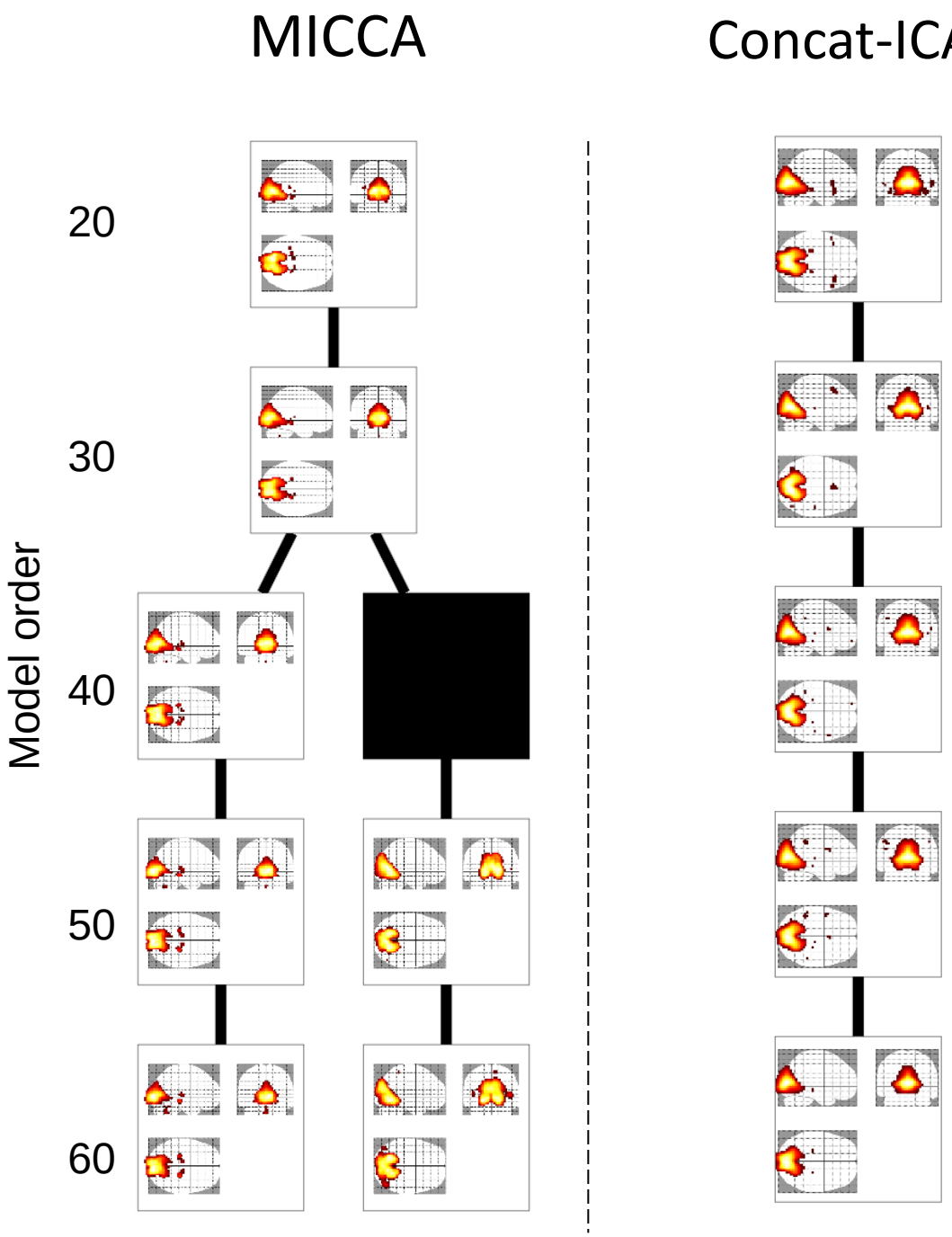
- Here we present supplementary result of the submitted manuscript “A novel group ICA approach based on multi-scale individual component clustering: Application to fMRI resting-state data from a 310-subject cohort”.
- Method overview :
  - A total of 310 healthy young adults (152 women, 158 men) aged 18–57 years (27 ± 8 years, mean ± SD) participated in this study.
  - Spontaneous brain activity was monitored using BOLD-fMRI while the participants performed an 8-minute resting state condition. Prior to the fMRI session, high-resolution 3D T1-weighted structural MR brain images were acquired.
  - The fMRI data were corrected for slice timing differences and motion; normalized to the MNI stereotaxic space (4x4x4 mm^3 voxels); spatially smoothed (Gaussian 6 mm FWHM); regressed from time series for white matter, cerebrospinal fluid, and the six motion parameters; temporally band pass filtered (0.01 - 0,1Hz).
  - Using both Concat-ICA and MICCA, we performed a multilevel model analysis with five model orders (number of estimated components), ranging from 20 to 60 by a step of 10. The repetition factor was set to R=25, and we reported clusters of independent components which were detected in more than 50% of the repetitions.
  - We present a hierarchical representations of the results across different model orders as proposed by Abou-Elseoud et al. (2010).
- In this presentation, we focus on missing-link cases, i.e. when a component is not detected at one model order while it is at higher and lower model order.

MICCA missing-link



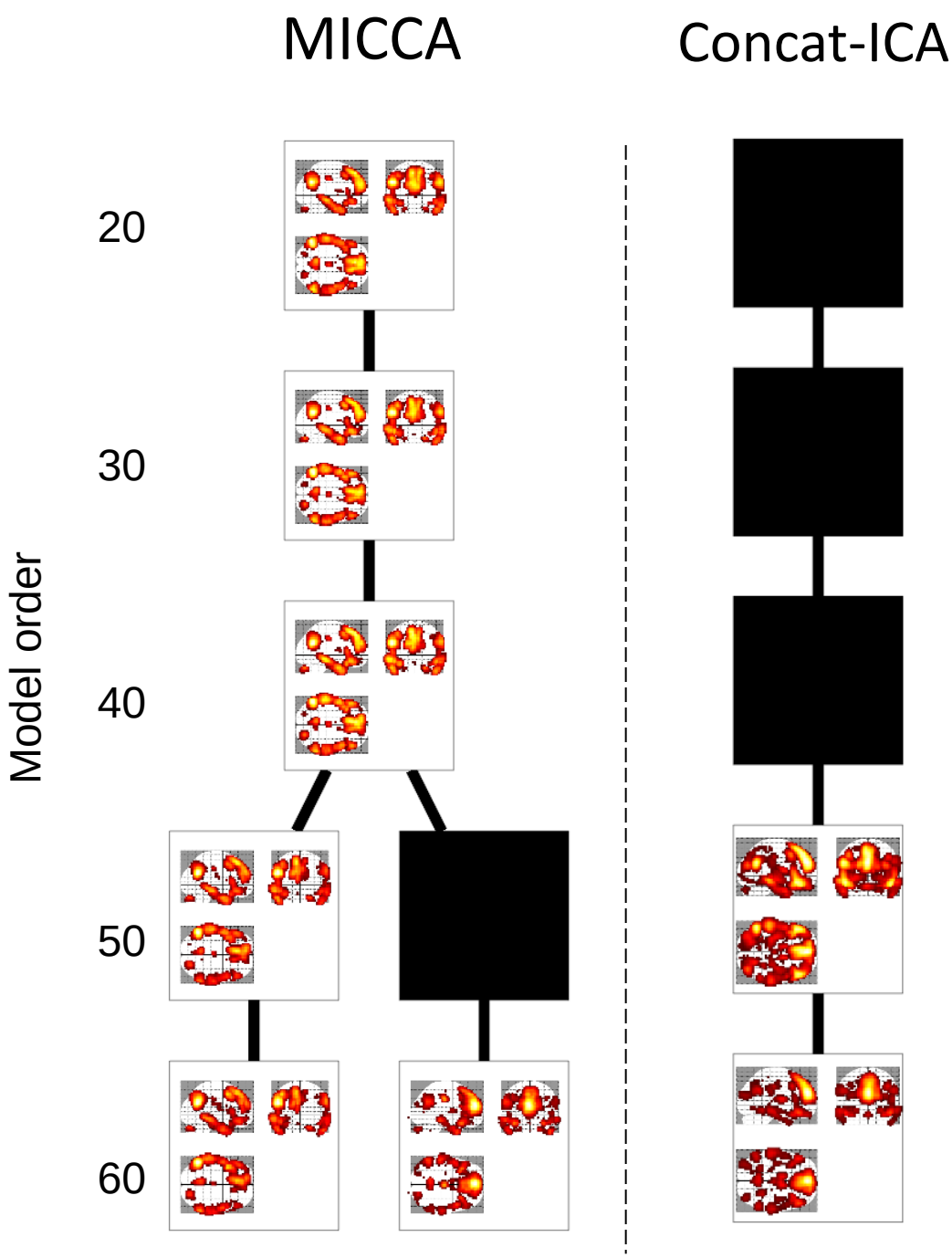
MICCA : bilateral network at model order 30, then network split into two lateralized sub-networks. However, model order 40 missed the right part of the network.

Concat-ICA : bilateral network at model order 40 and 50, then split into two sub-networks at model order 60.



MICCA : the component split into 2 components at model order 40. MICCA missed the most anterior sub-network at model order 40.

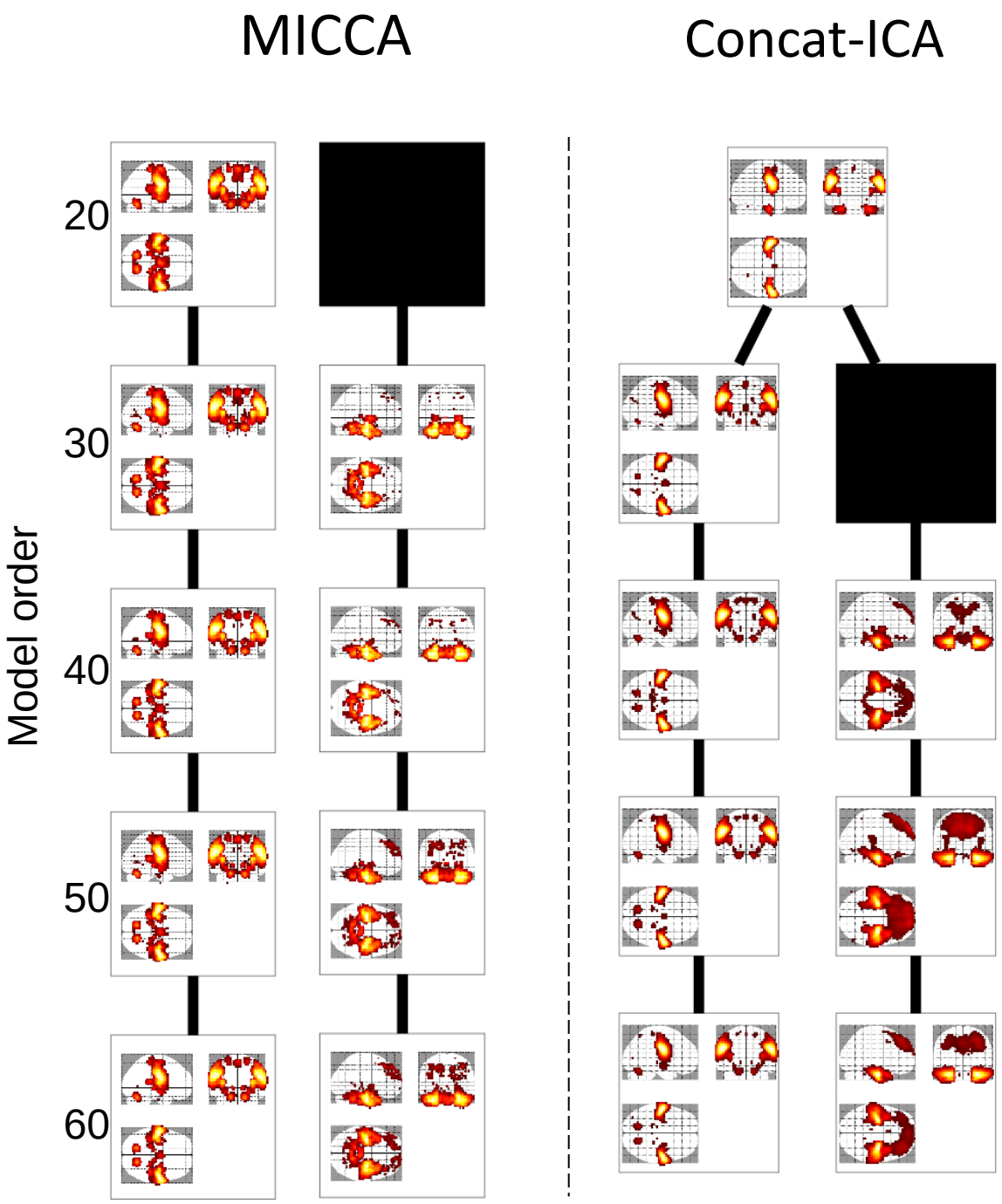
Concat-ICA : well-formed tree



MICCA : missed the frontal most weighted sub-network at model order 50.

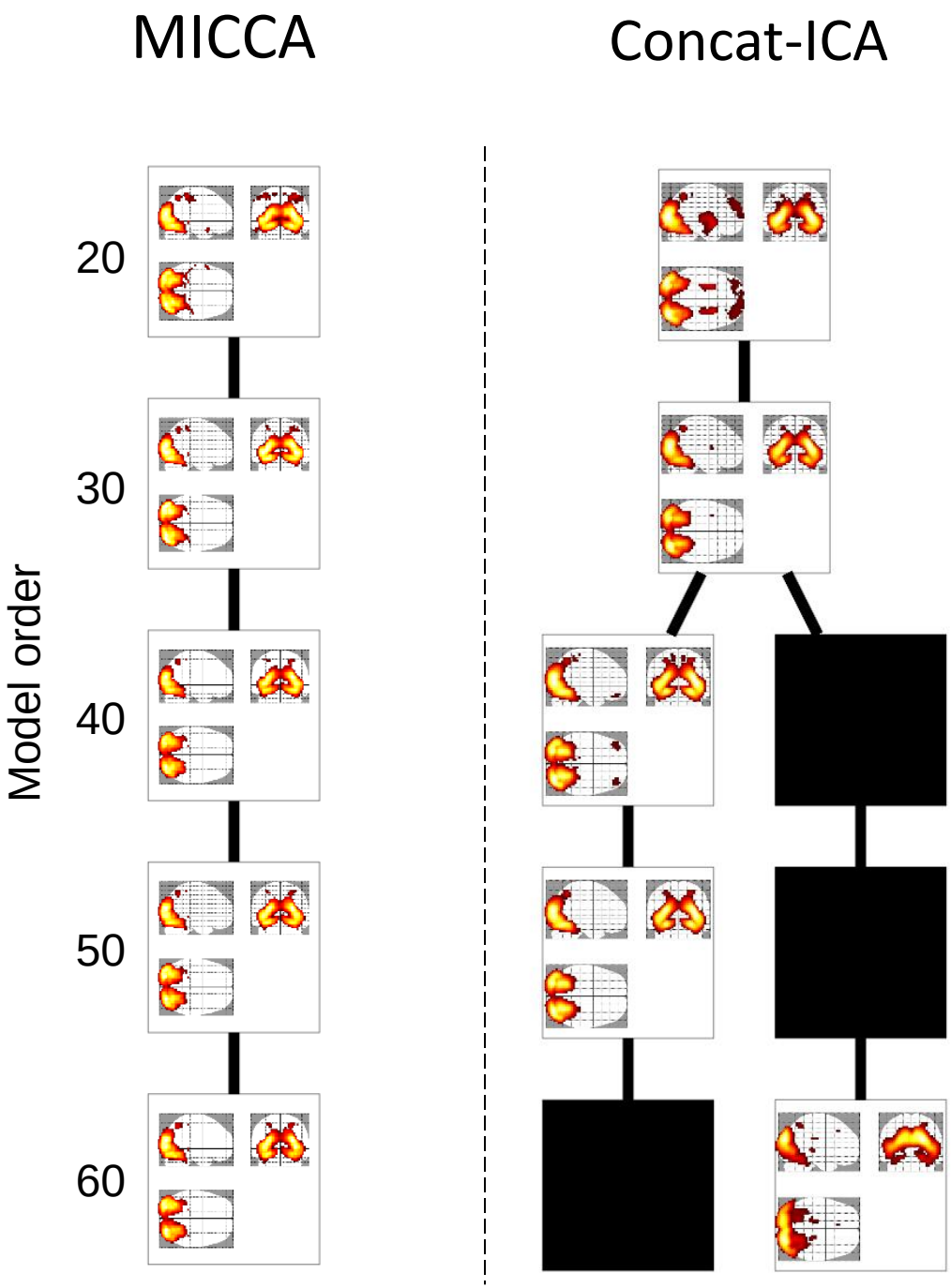
Concat-ICA : this network was not detected until model order 50. The network encompassed mainly the frontal most weighted part.

Concat-ICA missing-link



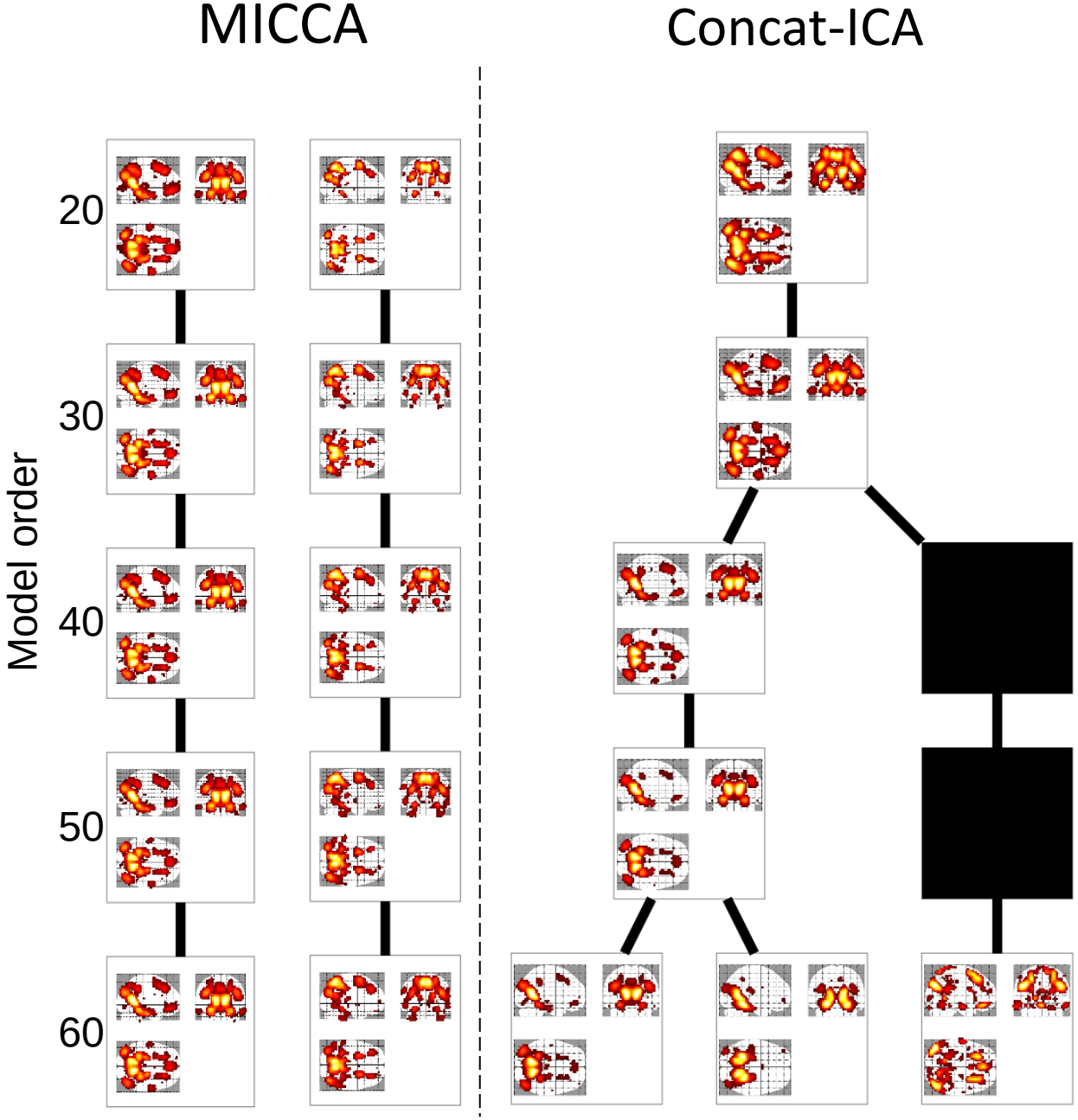
MICCA : Two different components.

Concat-ICA : Components were merged at model order 20 then, temporal poles were missed at model order 30.



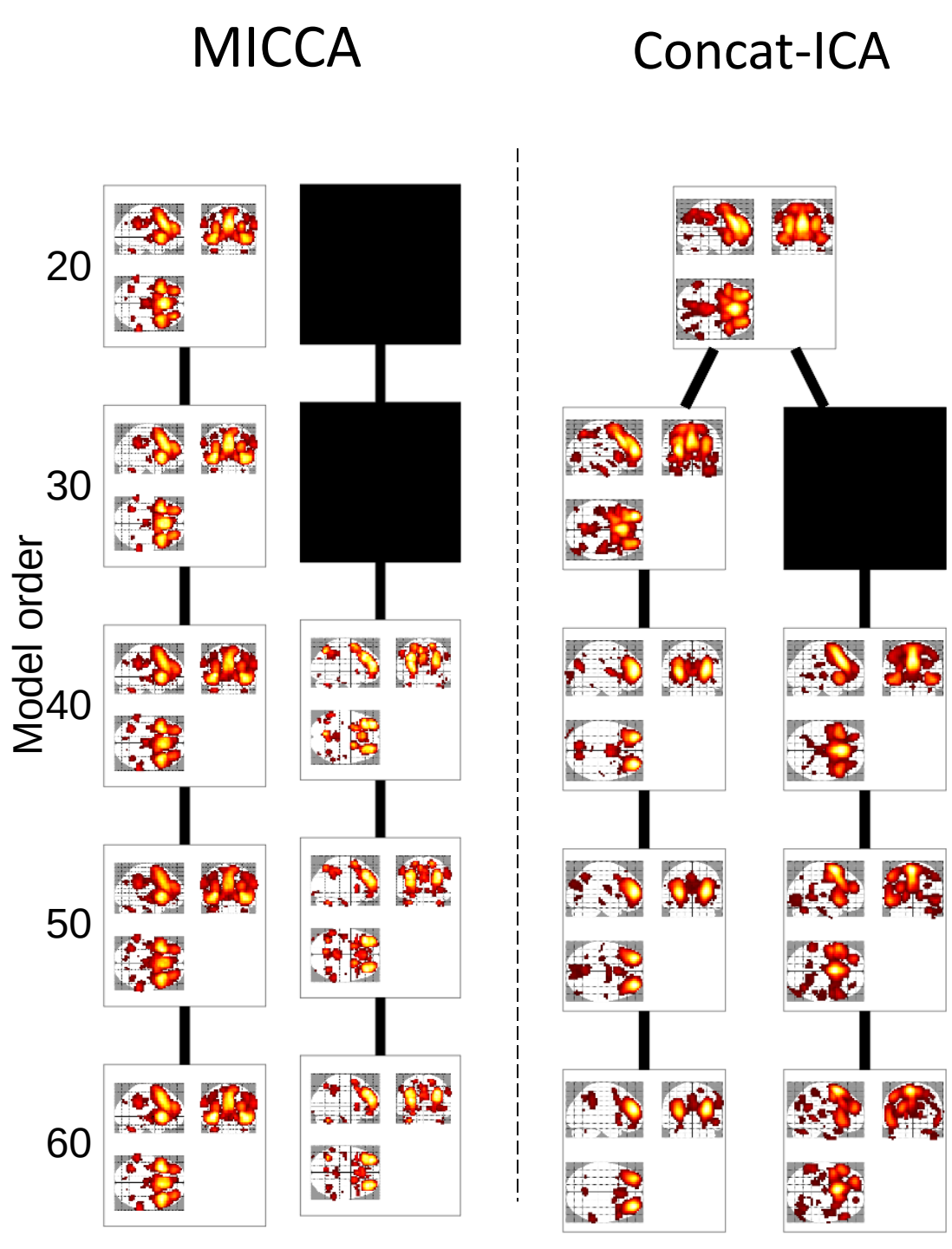
MICCA : well-formed tree.

Concat-ICA : This component missed the most dorsal part at model order 40 and 50, while the ventral part was missed at model order 60.



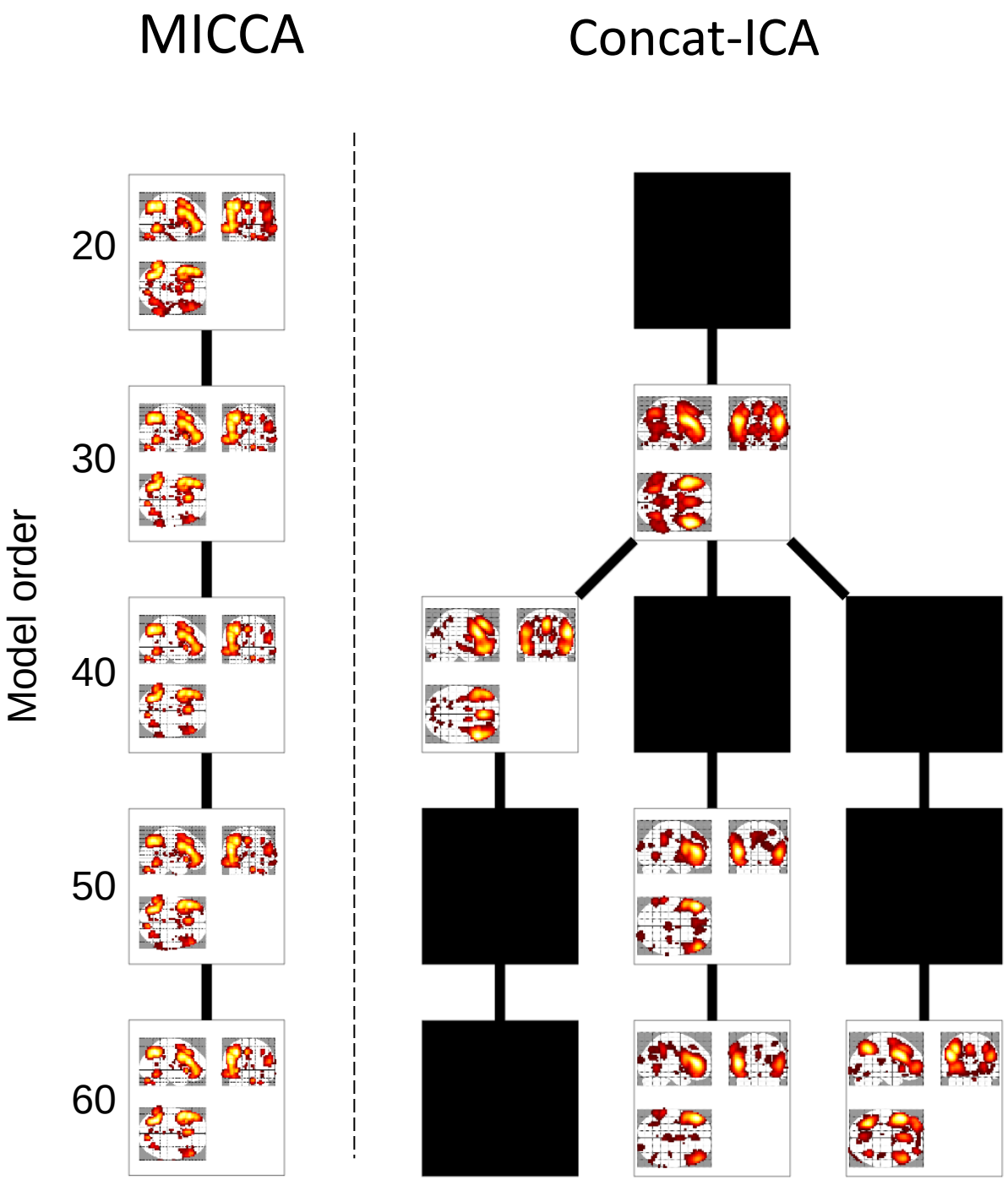
MICCA : well-formed trees

Concat-ICA : components were mixed at model order 30. At model order 40 and 50, angular giry and the frontal part of the components were missed.



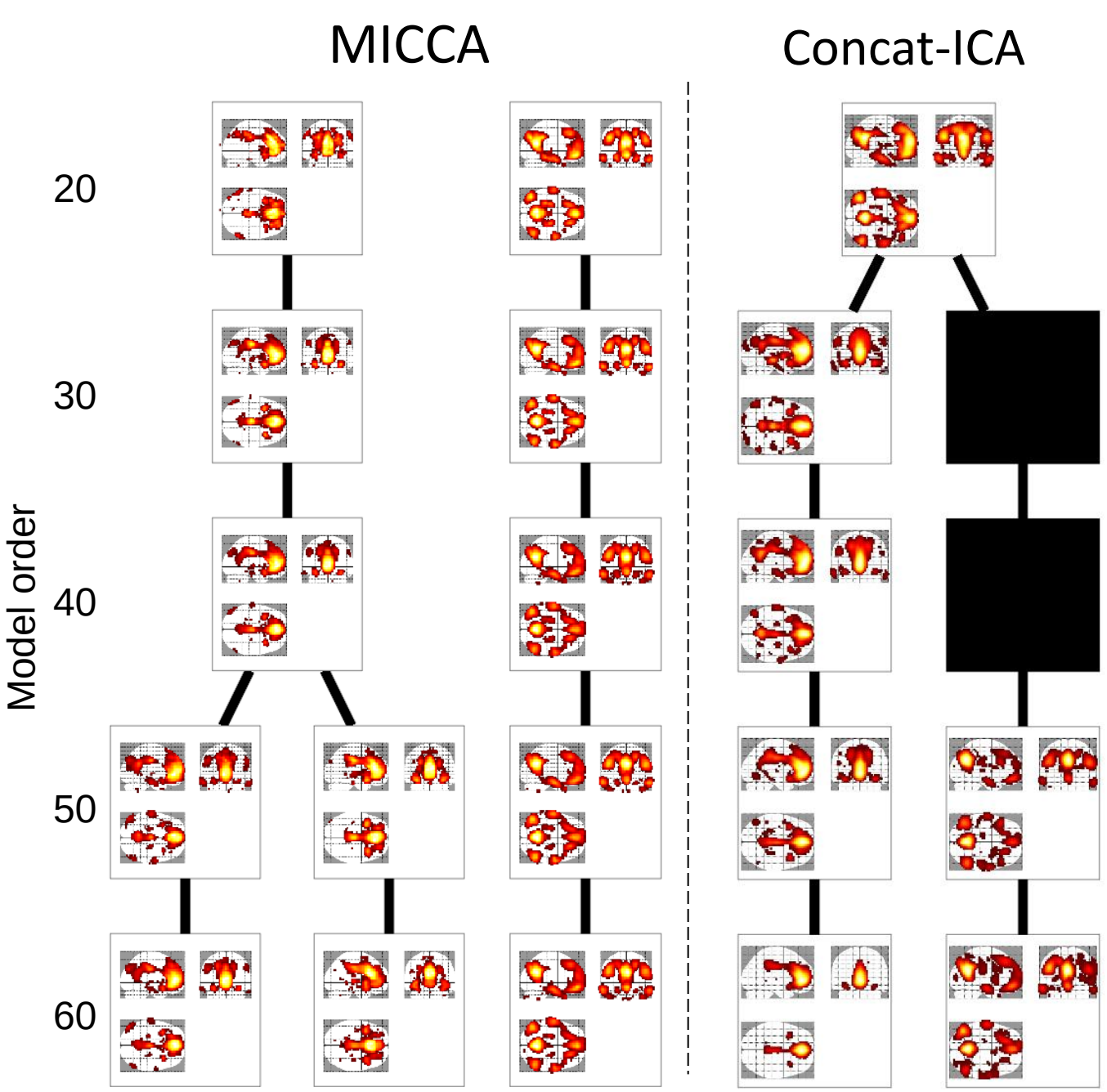
MICCA: two different networks. The right one was not-detected until model order 40.

Concat-ICA : networks were fused at model order 20. Insula part was missing at model order 30.



MICCA: well-formed tree corresponding to component detected by Concat-ICA at model order 60 (right).

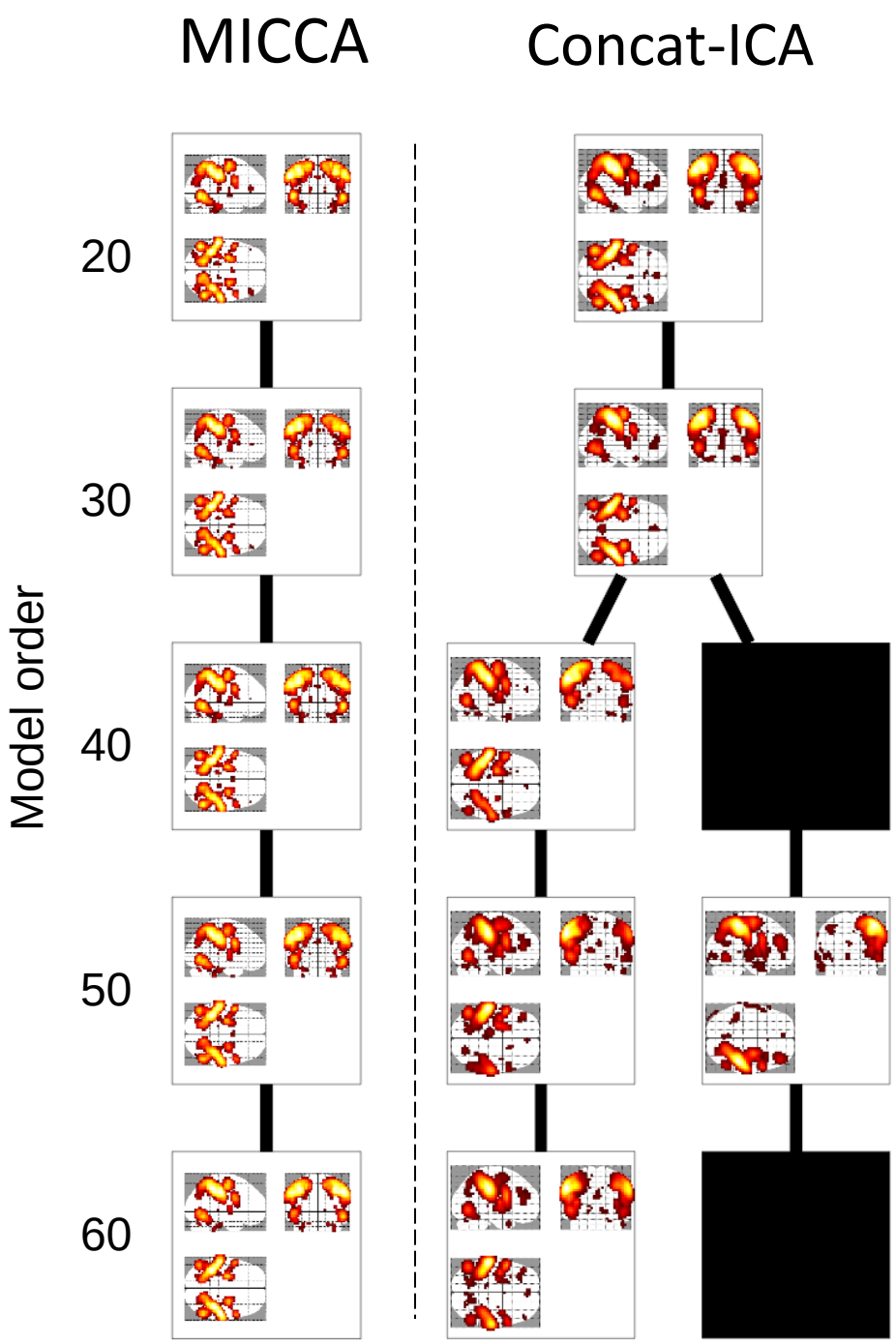
Concat-ICA : Multiple case of missing links



MICCA: well-formed tree corresponding to a mainly frontal component and the core-DMN.

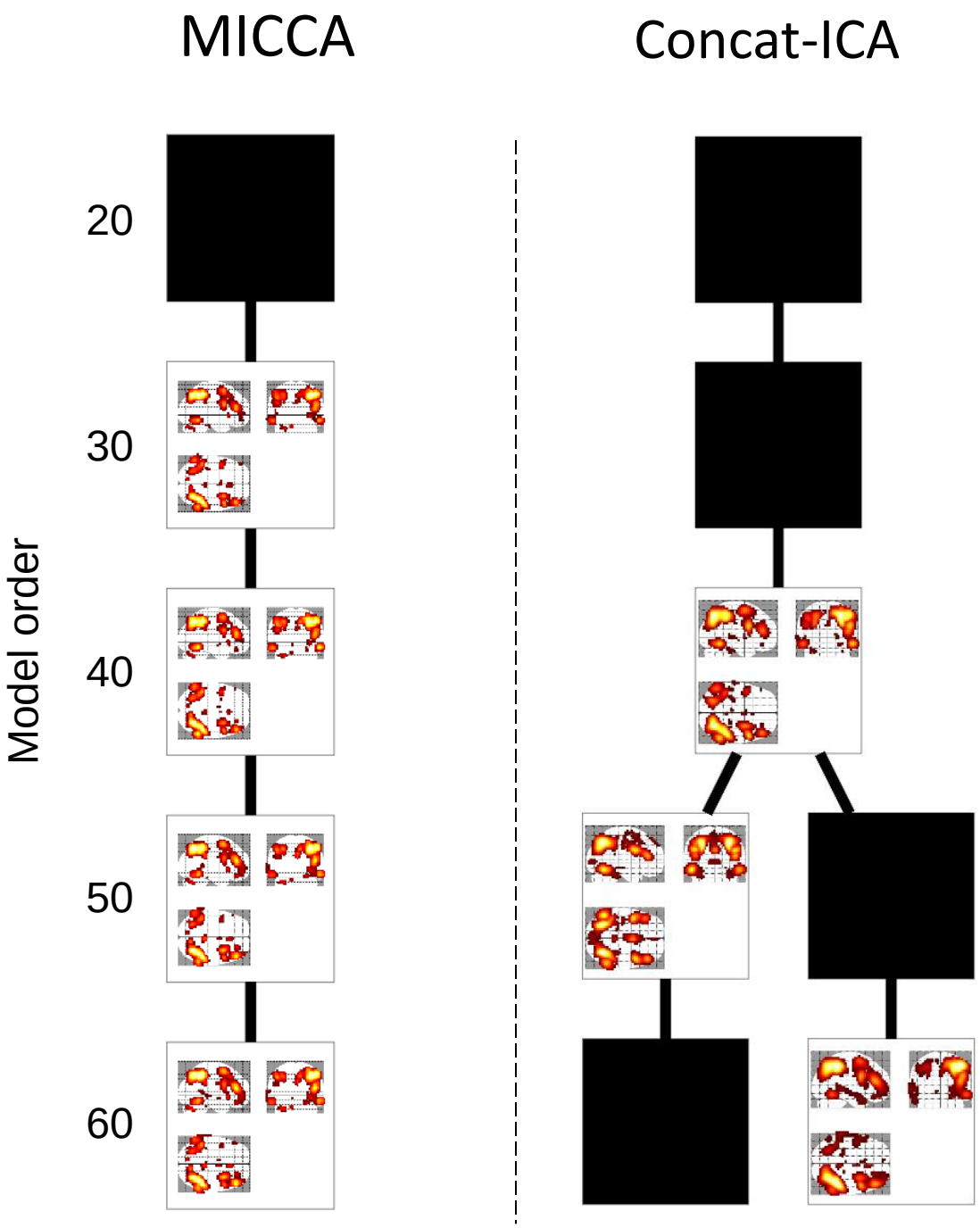
Concat-ICA : the core-DMN component was not detected at model order 30 and 40.

Rem : Trees presented on figure 10



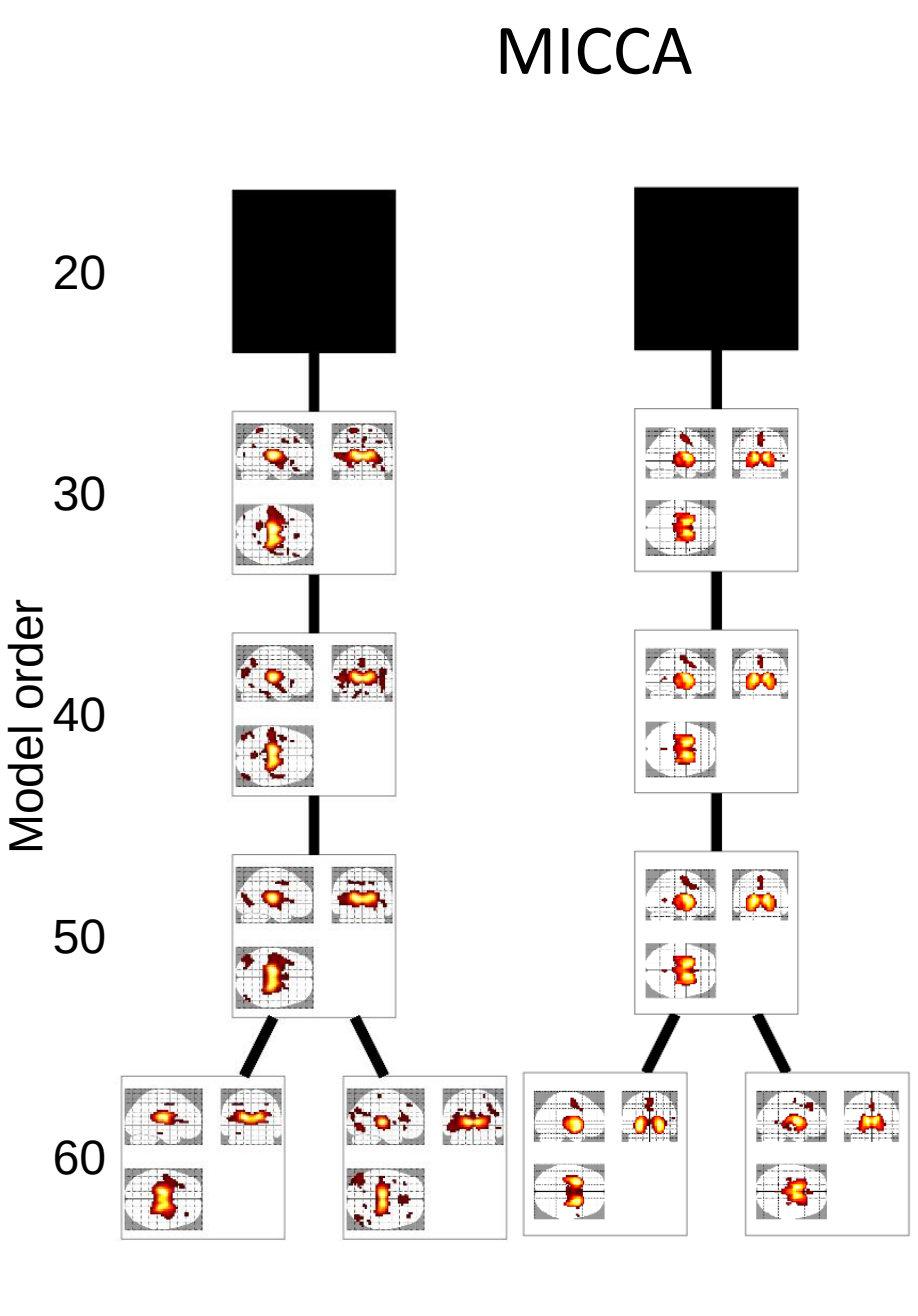
MICCA: well-formed tree without branching

Concat-ICA : The network split into 2 components at model order 40 (but miss the right part of the network at model order 40).
At model order 60, the 2 sub-networks were merged again.



MICCA : well-formed tree beginning at model order 30.

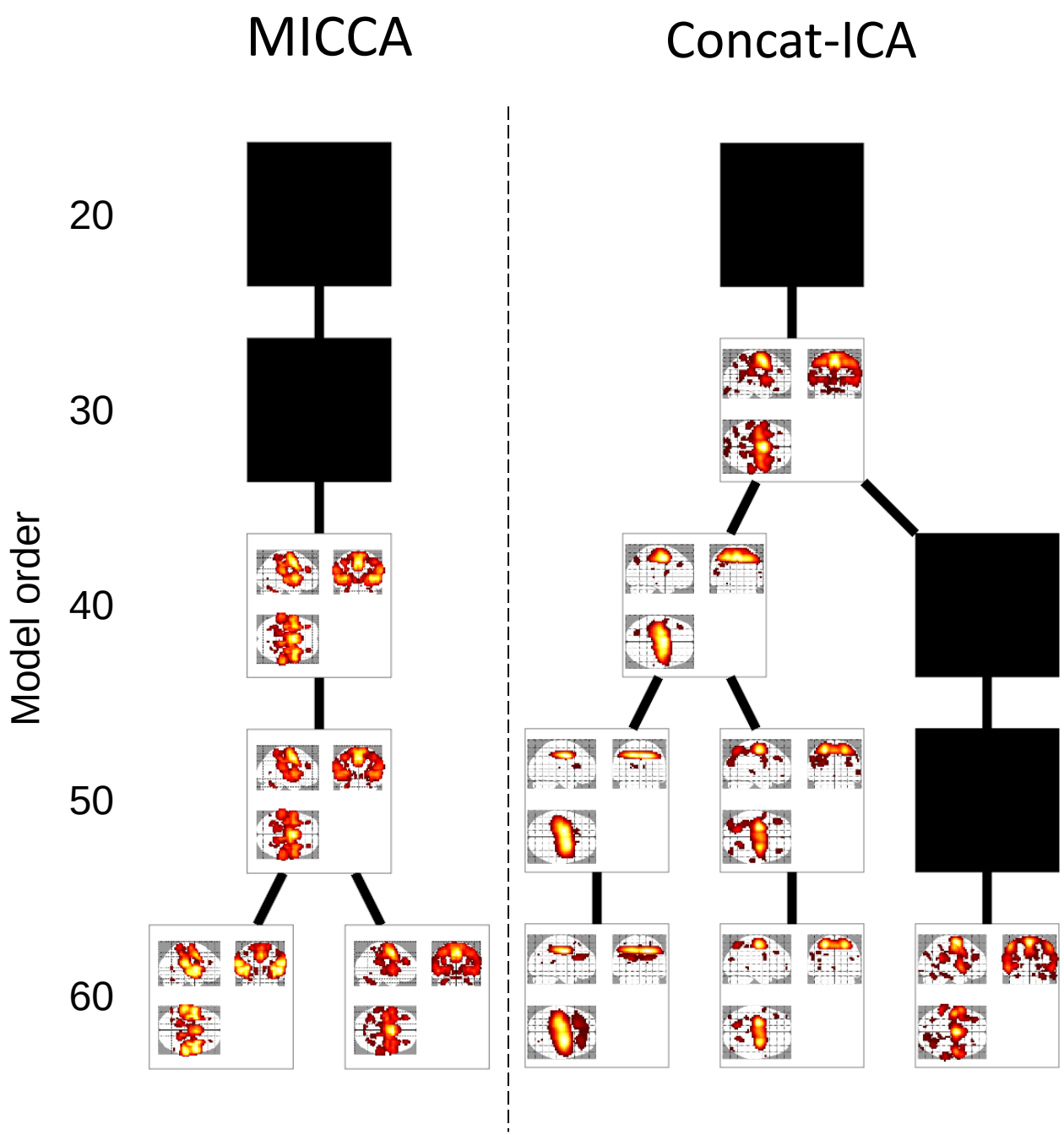
Concat-ICA : this network was right lateralized at model order 40, bilateral at model order 50 then right lateralized again.



MICCA : well-formed trees beginning at model order 30 and branching at model order 60.

Concat-ICA : one component is missing at model order 40.

Rem : At 4x4x4 mm^3 spatial sampling it's difficult to differentiate caudate from CSF.

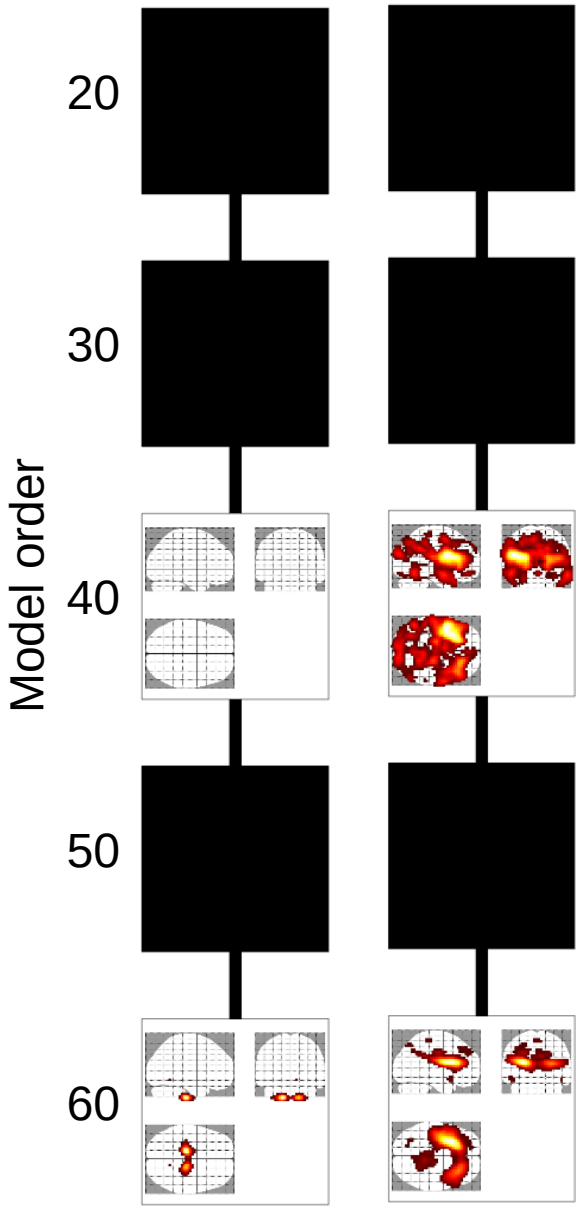


MICCA : well-formed trees beginning at model order 40 and branching at model order 60.

Concat-ICA : a sensory-motor network was detected at model order 30 and 60 (right). This network was missing at model order 40 and 50. Artefacts spatially close to this network were detected instead. At high model order (60), both artefacts and sensory-motor network were detected.

MICCA

Concat-ICA



Only detected by Concat-ICA