Annex A

Comparative Analysis of Network Types

This Annex provides an analysis of the network simulations conducted to explore the adoption dynamics of scientific methods across different network structures. These results highlight the influence of network type, size, and communication frequency on the spread and eventual dominance of both simple and complex methodologies.

Two Method Simulations

In the complete network simulations (Figures A1 and A2), Method B becomes dominant as the network size increases. Smaller networks with fewer than 30 scientists initially favor Method A, but as the network grows, belief in Method B increases significantly. In networks with 50 scientists or more, Method B becomes predominant, especially with longer sharing timeframes, which facilitate a quicker transition to complex methods. This indicates that larger and fully connected networks support the rapid acceptance of more sophisticated methodologies.

The cycle (Figures A3 and A4) and wheel networks (Figures A5 and A6) exhibit different dynamics. In cycle networks, the adoption of Method B is slower but steady as the network size increases. Smaller networks initially favor Method A, but Method B gains traction in larger networks with extended sharing periods. In the largest network (100 scientists), Method B reaches high levels of belief, like in the complete network simulations. Wheel networks show a strong initial preference for Method A, but as the network size grows and sharing intervals lengthen, Method B starts to dominate. This pattern also emphasizes the influence of network structure and sharing timeframe on method adoption, with larger, interconnected networks favoring complex methodologies.

Three Method Simulations

Overall, in simulations with three methods across different network types, Method C becomes dominant with increasing network size. In complete networks, smaller networks initially favor Methods A and B, but as the network grows, Method C gains traction with longer sharing timeframes. Cycle networks show a steady shift towards Method C with increasing network size, achieving full dominance in larger networks. Wheel networks exhibit a strong initial preference for Method A in smaller communities, but Method C gradually becomes dominant in larger networks with longer sharing intervals. Smaller networks favor simpler methods, but larger networks and extended sharing timeframes facilitate the adoption of the more complex Method C. The main difference lies in the speed and manner of adoption, with complete networks showing a gradual shift, cycle networks demonstrating a steady preference, and wheel networks displaying a distinct progression towards Method C in larger, centralized structures.

The introduction of a third method significantly changes the dynamics of belief adoption. In two-method simulations, Method B generally becomes dominant in larger networks. With three methods and more complex ones, time sharing is more crucial in larger network belief acceptance. This shift indicates that the presence of a more complex method can alter the adoption dynamics, making it more likely for complex methodologies to be adopted in larger networks. The longer sharing timeframes also facilitate this transition, allowing for more thorough acceptance of complex methods.

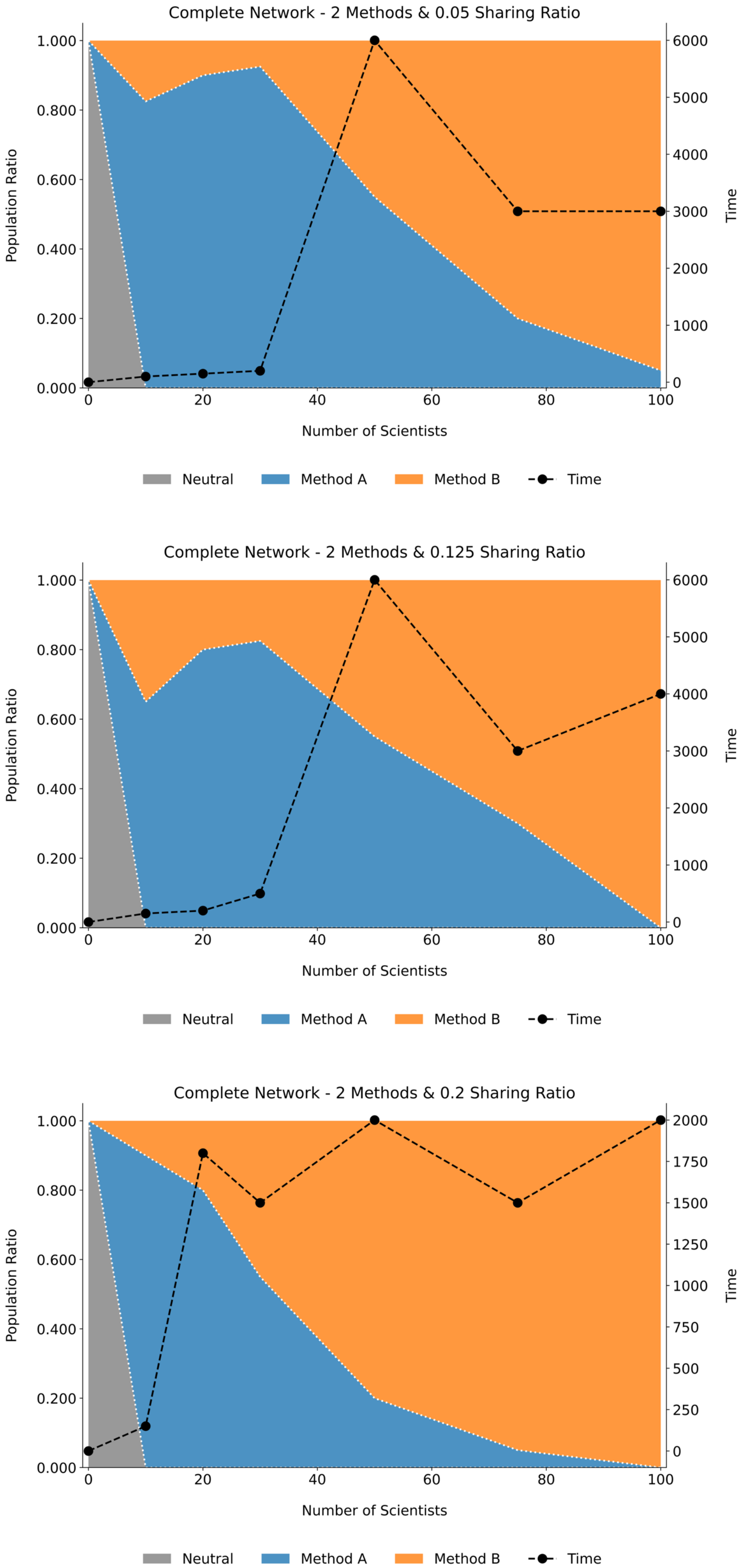

Figure A1. Result chart for population ratio belief, number of scientists and the time to reach a stable state for a scenario with two methods on a complete network (with time-sharing ratios of 0.050, 0.125 and 0.200).

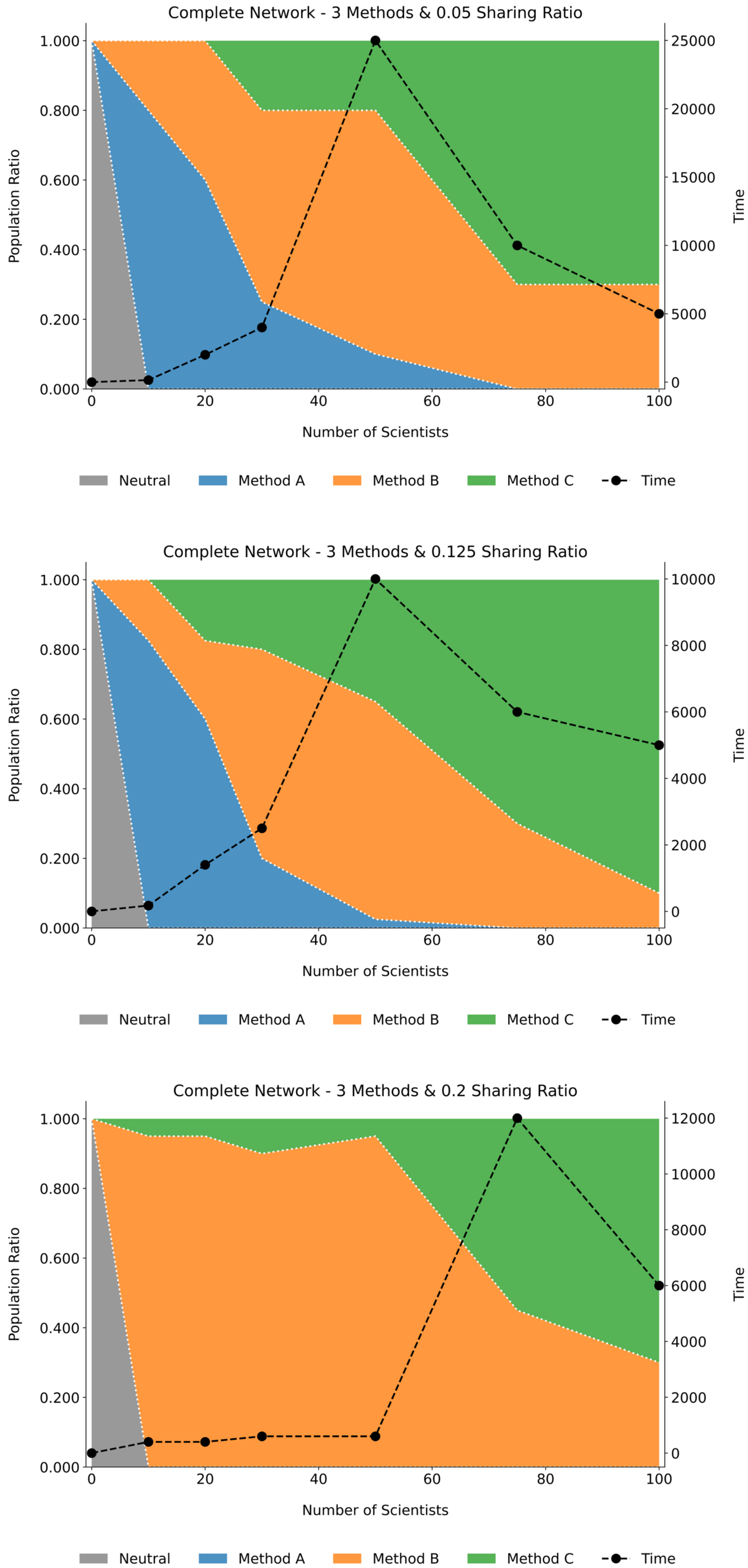

Figure A2. Result chart for population ratio belief, number of scientists and the time to reach a stable state for a scenario with three methods on a complete network (with time-sharing ratios of 0.050, 0.125 and 0.200).

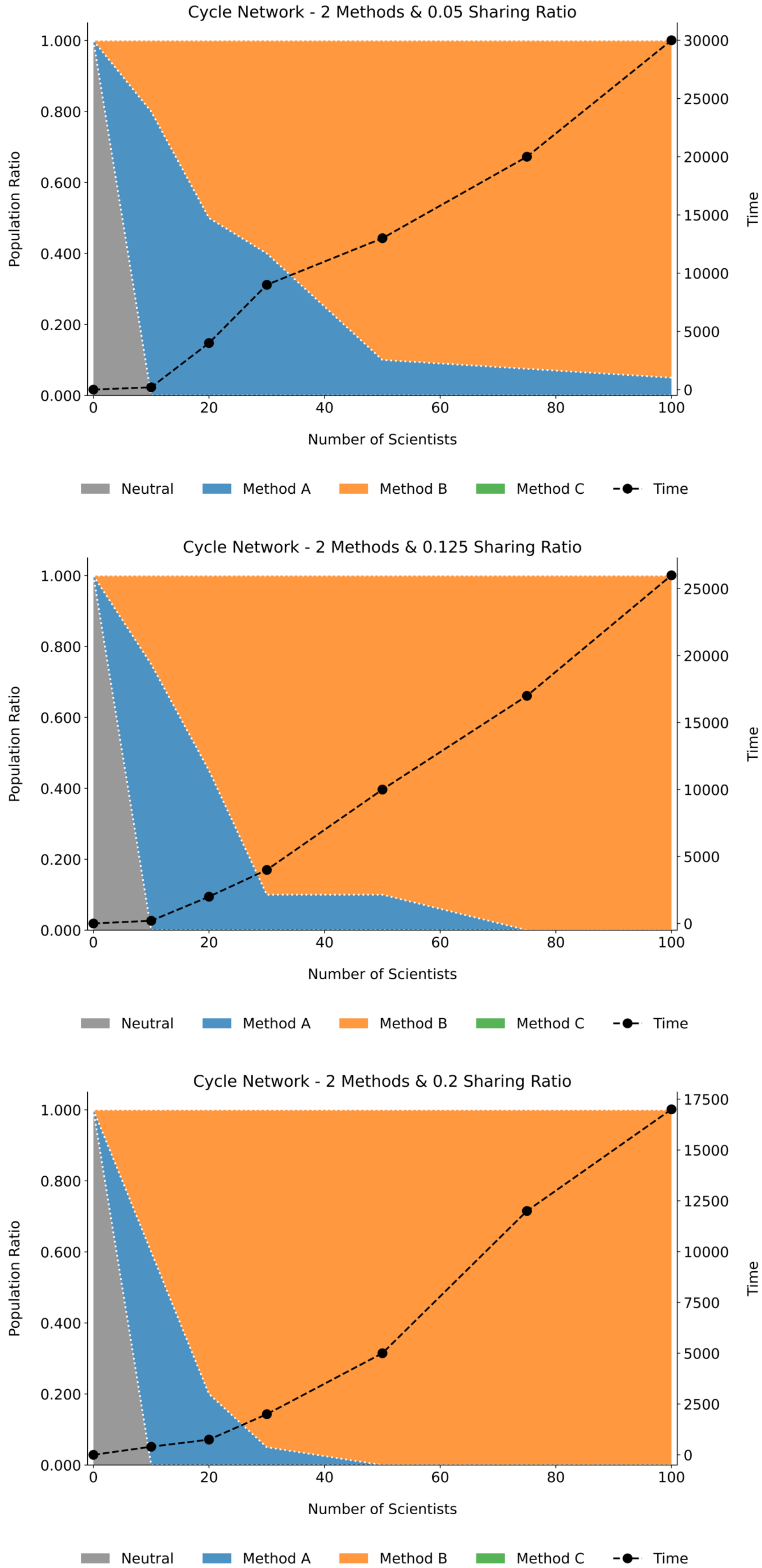

Figure A3. Result chart for population ratio belief, number of scientists and the time to reach a stable state for a scenario with two methods on a cycle network (with time-sharing ratios of 0.050, 0.125 and 0.200).

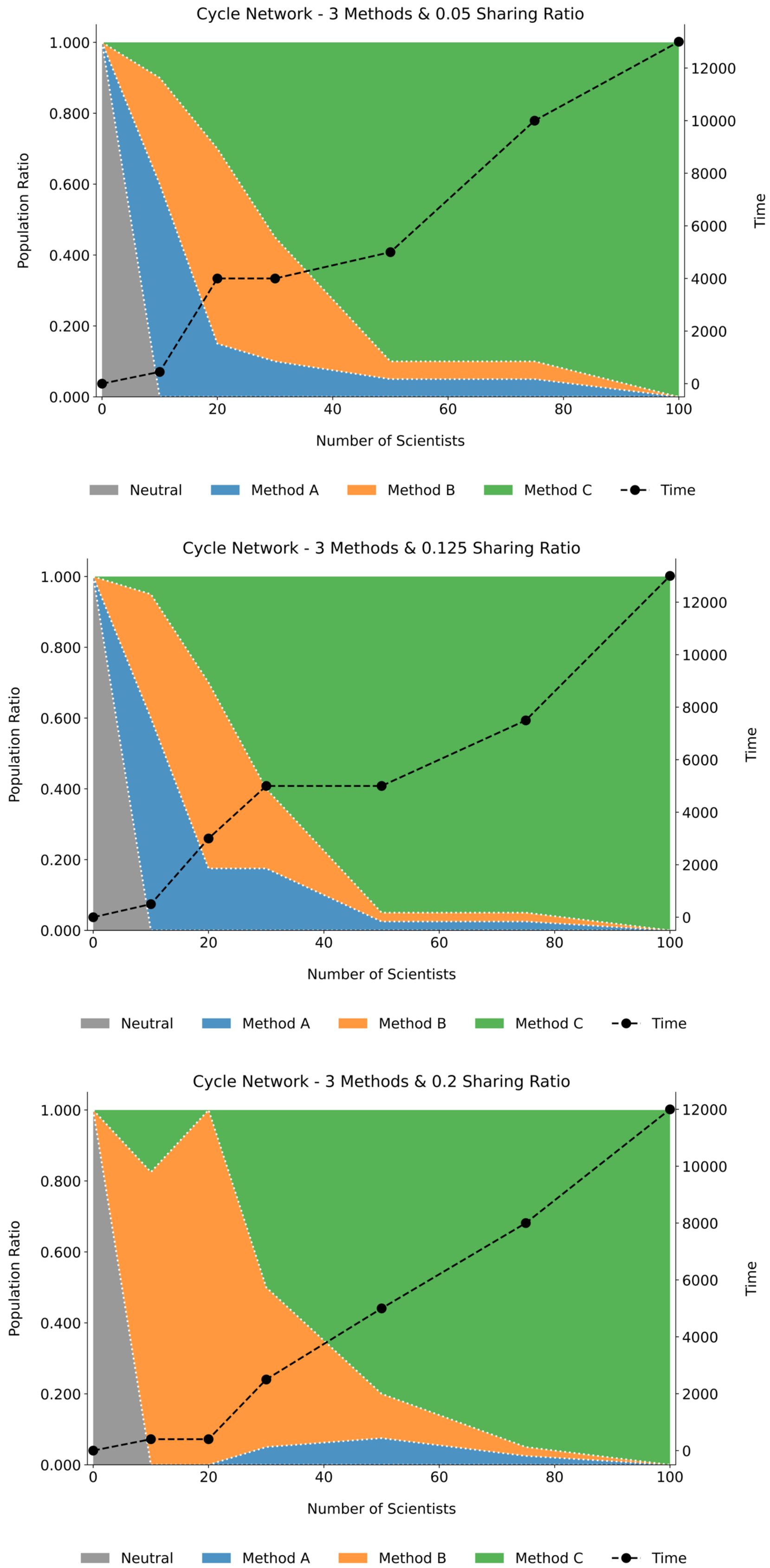

Figure A4. Result chart for population ratio belief, number of scientists and the time to reach a stable state for a scenario with three methods on a cycle network (with time-sharing ratios of 0.050, 0.125 and 0.200).

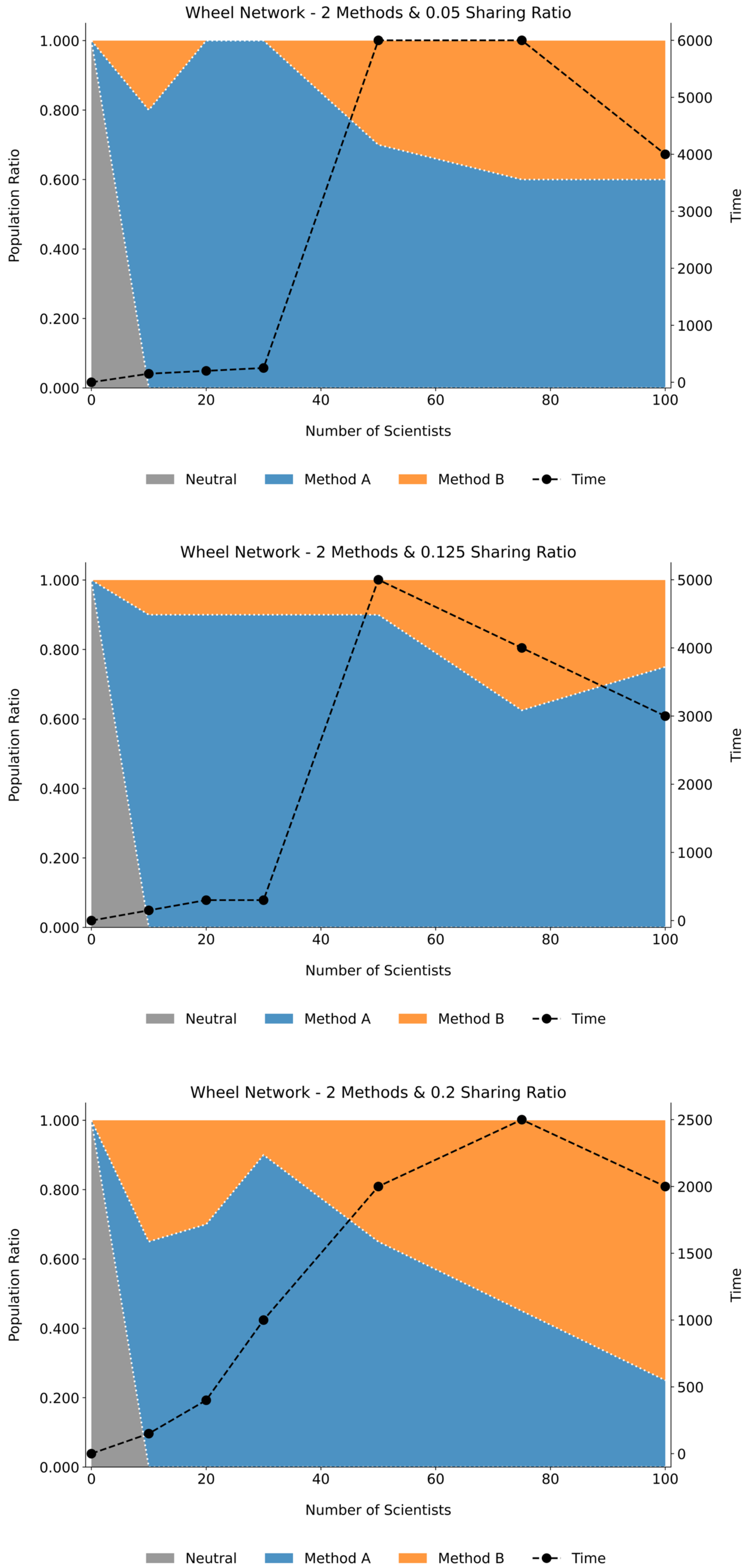

Figure A5. Result chart for population ratio belief, number of scientists and the time to reach a stable state for a scenario with two methods on a wheel network (with time-sharing ratios of 0.050, 0.125 and 0.200).

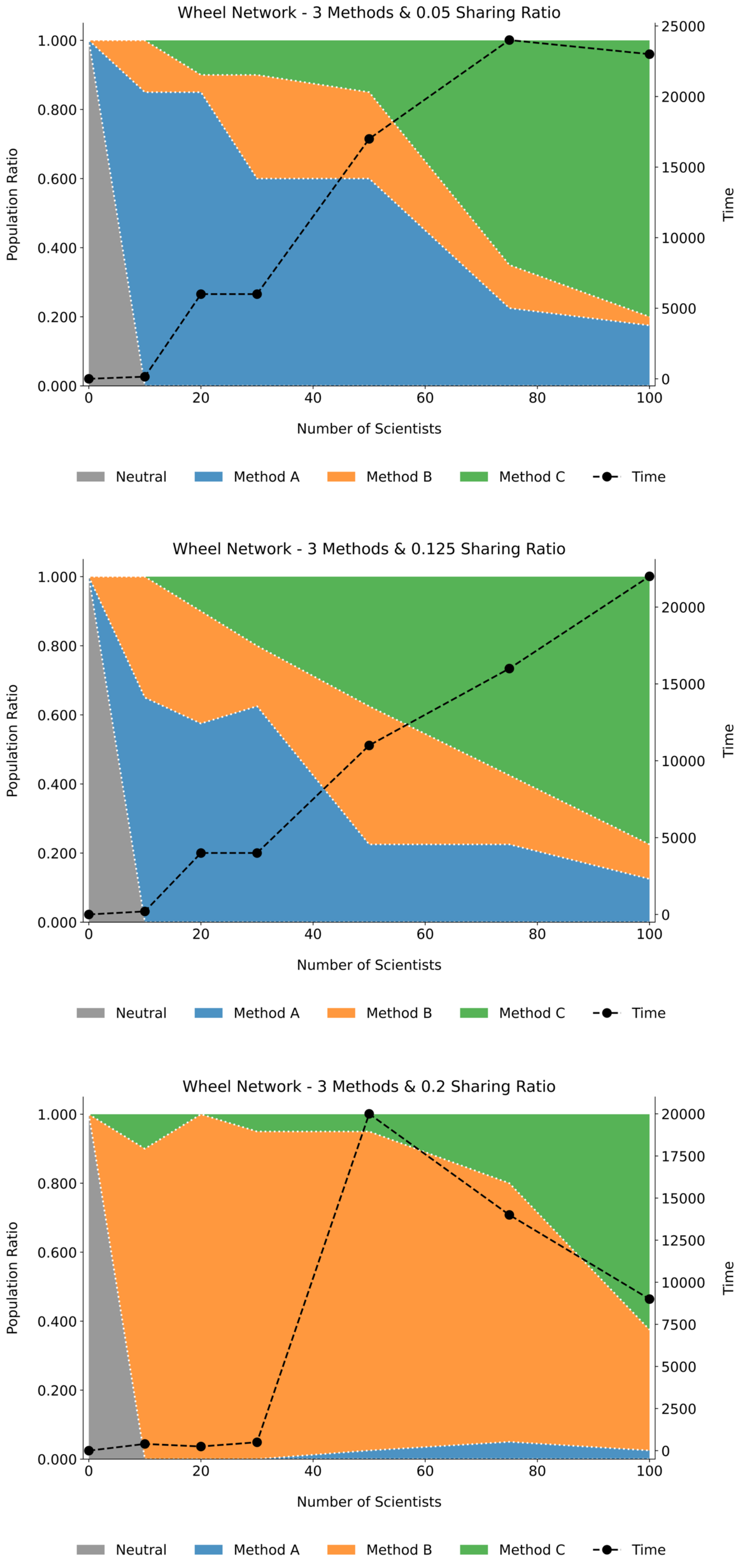

Figure A6. Result chart for population ratio belief, number of scientists and the time to reach a stable state for a scenario with three methods on a wheel network (with time-sharing ratios of 0.050, 0.125 and 0.200).