Jonathan,

First regarding equation 4 in the manuscript. This does appear to pass the Adler and Morris (A&M) definition:

Eq 4:

Two species case:

Derivatives:

🡪 Pass A&M

Second, the examples you sent in the “unlinearizable\_equations” document do not seem to pass the A&M definition… mostly.

Derivatives:

🡪 Does not pass A&M (dependent on *Nk*)

🡪 Does not pass A&M (dependent on *Nj*)

🡪 PASSES A&M (not a function of any species density)

Interpretation: Because the partial derivative of *Nj* and *Nk* contains densities of each other I think the A&M interpretation is that there is an HOI between these two species. However, there is no HOI between *Nl* and the other two species. This interpretation is odd though because the HOI between *j* and *k* seems to depend on species *l* being present. That is if we set *Nl* to zero we can redo the analysis and find that there are no HOIs between j and k.

Derivatives:

🡪 Passes the A&M criteria (is only a function of *Nk*)

🡪 Does not pass the A&M criteria

🡪 Does not pass the A&M criteria

Interpretation: (Am I making a mistake?). It looks like the first one passes the A&M criteria but the second two do not. What’s odd is that the partial derivative with respect to *Nk* does not contain the other species densities (outside of *f* at least) , but when we take the partial derivative with respect to *NJ* or *Nl* we see that they do depend on *Nk.*  This means that there is an HOI between those species and *k.* But at the same time the first partial derivative with respect to *k* suggested that there was no HOI between *k* and the other species. This is very odd. My sense is that neither the A&M nor my test are truly general in cases with more than two species.