

Reply to Ripps

John Stewart
Paul Bourguine

CNRS

Responsible Network of Excellence
“Enactive Interfaces”

COSTECH

Département Technologie et Sciences
de l’Homme

Centre Pierre Guillaumat

BP 60649

60206 Compiègne Cedex

France

It is quite correct, as Ripps points out [1], that catalysis is a local process and thus cannot depend on the topology of the membrane as a whole. Our reason for positing that the reaction $A + A \rightarrow B$ occurs inside the volume enclosed by the membrane is this: We imagined that the C molecules in the membrane are asymmetric, and that only the inner surface is catalytic. (This implies that if the membrane were turned inside out, to form an “inverse micelle,” catalysis would only occur on the *outer* surface, an arrangement that would obviously not be viable.) Actually, in the equations as they stand, catalysis of the reaction $A + A \rightarrow B$ is indeed independent of the topology of the membrane (this is why, in Model 1 where B molecules are confined within the putative volume of the automaton whatever the size of the holes, the automaton will regenerate even if there is only a small fragment of membrane). We did not, however, make explicit our assumption about the asymmetry of the C molecules, and thus Ripps’ comment is quite justified.

In any event, as Ripps also points out in the second part of his comment, it would make practically no difference if the outer surface of the membrane did also catalyze the reaction $A + A \rightarrow B$. In this case, exactly as Ripps says, the B molecules would simply diffuse away; it is only inside the volume enclosed by the membrane that they can accumulate.

Reference

1. Ripps, D. L. (2005). Comment on Bourguine and Stewart’s “Autopoiesis and Cognition.” *Artificial Life*, 11(3), 363–364.