

## **Summary of:** **Reinforcement Communication Learning in Different Social Network Structures**

### **Key Points :**

- The global connectivity of a social network is crucial for driving the convergence of populations on shared and symmetric communication systems, preventing the formation of many local "dialects".
- The type of social network organization significantly influences the properties of communication systems, with random and fully-connected networks promoting more shared and symmetric communication patterns, and ring-shaped and small-world networks leading to local communication patterns.
- Higher average degrees in the social network negatively affect the consistency of agents' communication, indicating that more communication partners result in more variable signaling and listening patterns.

### **Experiment 1: Social Network Types and Word Conventions:**

They found that the global connectivity of a social network plays a crucial role in driving the convergence of populations on shared and symmetric communication systems. This prevents the agents from forming many local "dialects". Additionally, the degree of an agent in the network is inversely related to the consistency of its use of communicative conventions.

### **Experiment 2: Average Degree and Speaker Consistency**

The average degree of a social network has a negative effect on both speaker and listener consistencies. As the average degree increases, the consistencies decrease

### **Experiment 3: Proportion of Global Connections and Communication System Properties**

The results showed that high local connectivity led to the emergence of local communication patterns within the population, while more global connections forced agents to find global consensus.

### **Summary:**

In this scientific article, the researchers investigated the impact of social network structure on the development of communication systems in decentralized, multi-agent reinforcement learning communities. They found that the global connectivity of a social network plays a crucial role in driving the convergence of populations on shared and symmetric communication systems. This prevents the agents from forming many local "dialects". Additionally, the degree of an agent in the network is inversely related to the consistency of its use of communicative conventions.

### **Future Scope:**

1. Explore the impact of different social network structures on the properties of communication systems emerging in decentralized multi-agent reinforcement learning communities.

2. Investigate the role of social network connectivity on the convergence of populations on shared communication systems.