

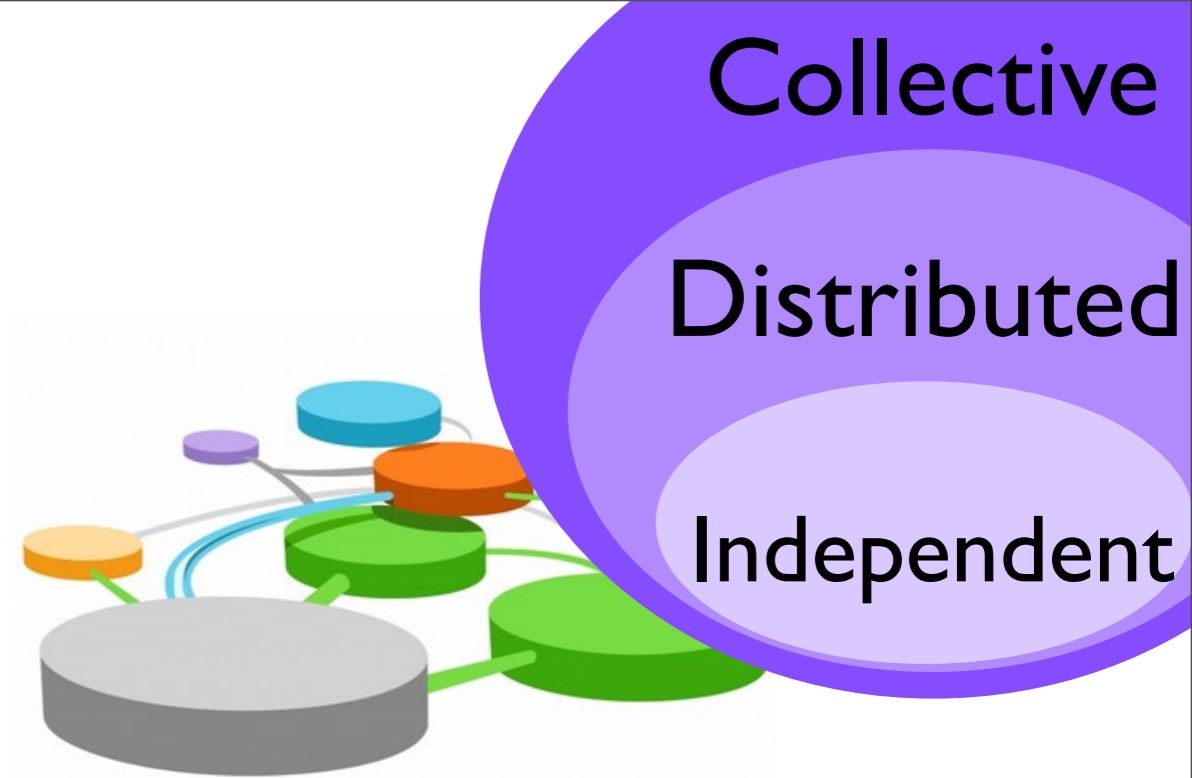
School Mathematics is largely seen as a domain of independent knowledge where students need to *show what they know* and *make sense* of concepts on their own.





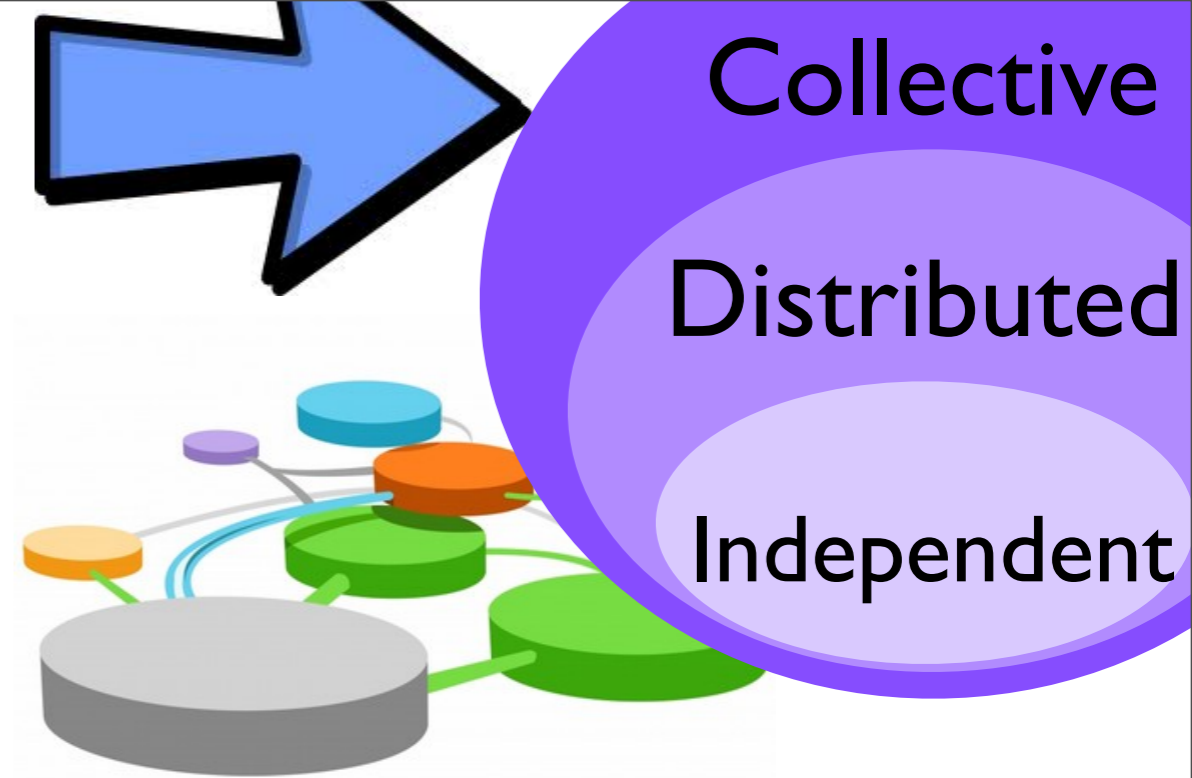
Many branches of science are now suggesting that learning takes place best in a connected and distributed environment. In other words, we make sense and we learn best from others and with others. Is Math different?



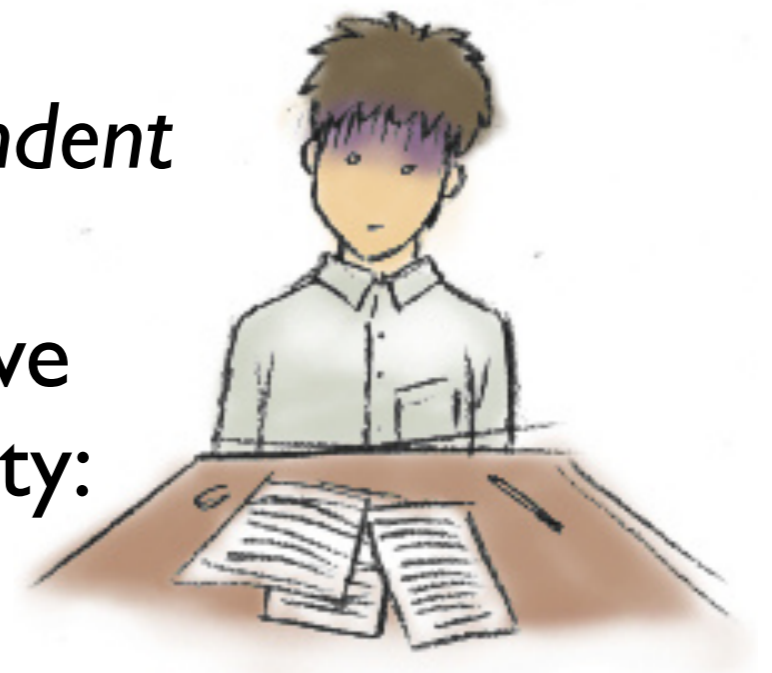


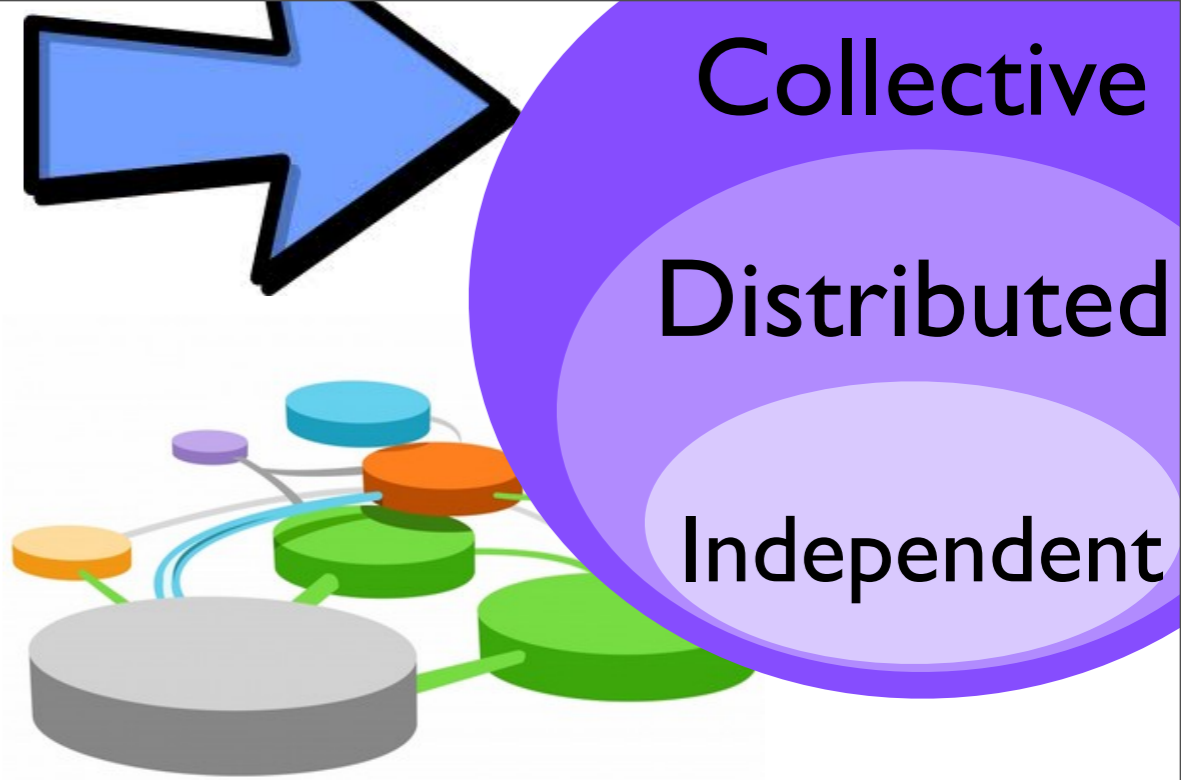
In the mathematics classroom, there would seem to be a nested quality to sense-making. The individual makes sense on their own level. As we move up, we have groups who are making sense of the concepts on together. Finally, the entire class functions as a collective to make sense as whole unity. All three of these levels are present in any given classroom at any given time.





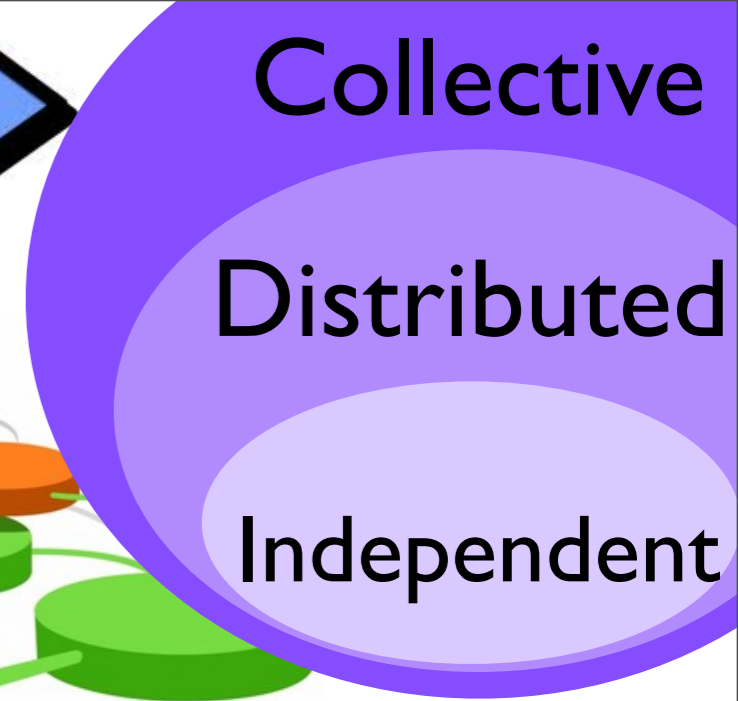
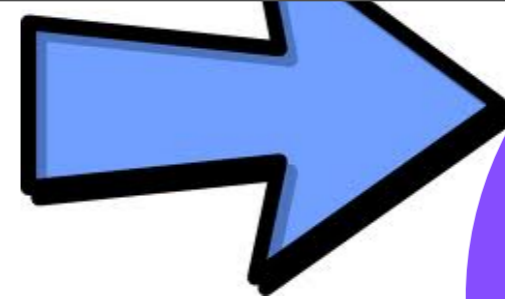
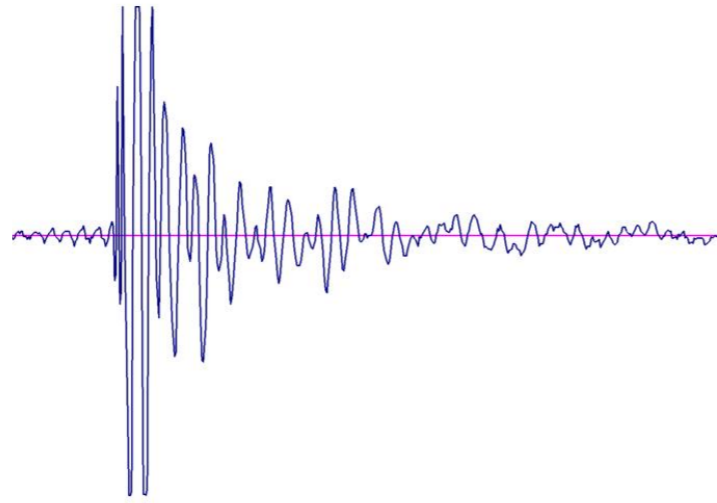
As Teacher-Researchers, we would like to investigate these three levels and the roles they play in the mathematics classroom. Specifically, we would like to be able to identify and distinguish *collectivity* from *distributed* (ie group) and *independent* levels in terms of task engagement and sense making. After investigating the literature, we have chosen to focus on 4 main markers of collectivity:





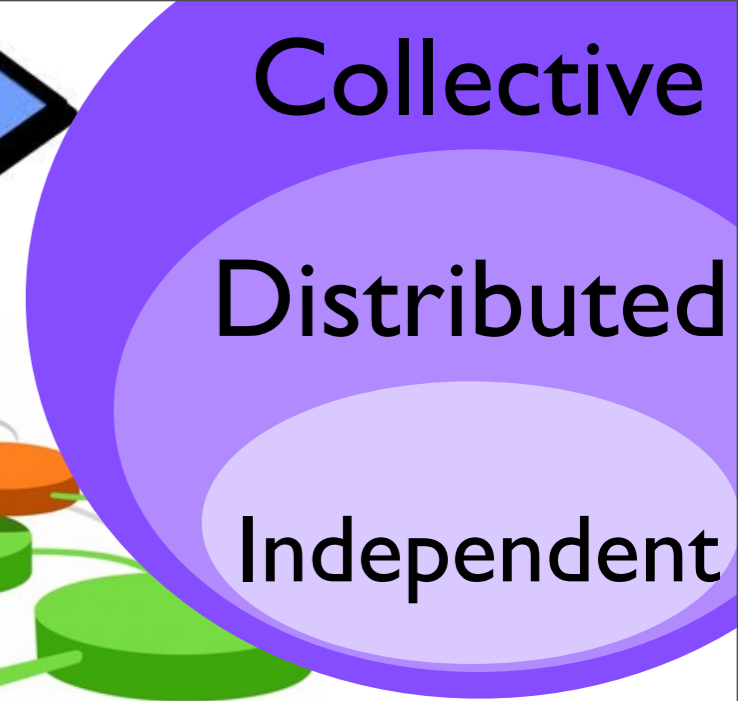
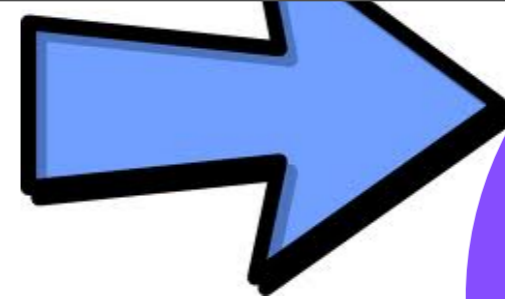
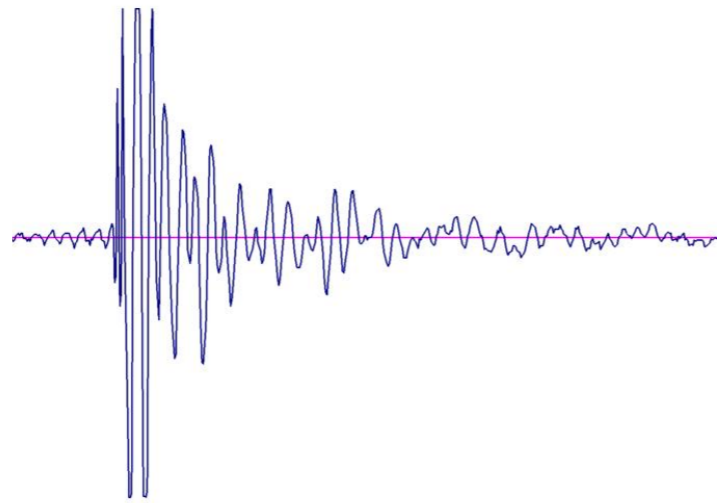
**Collective Dialogues** are conversations in which the group adopts a single voice, or consciousness that makes it difficult to distinguish between the members.





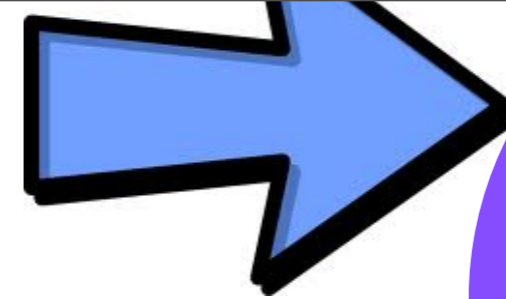
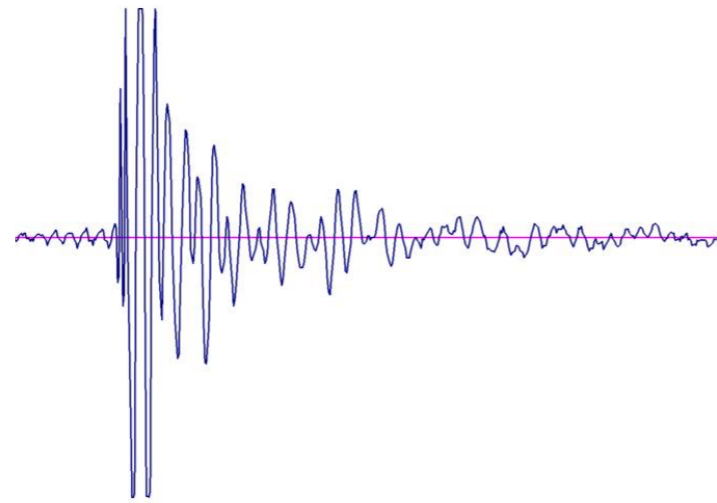
All complex systems follow semi-regular cycles of activities. The **Pulse** of the class may be a noticeable phenomenon when a recording of the actions are accelerated or decelerated and viewed with an observant eye.



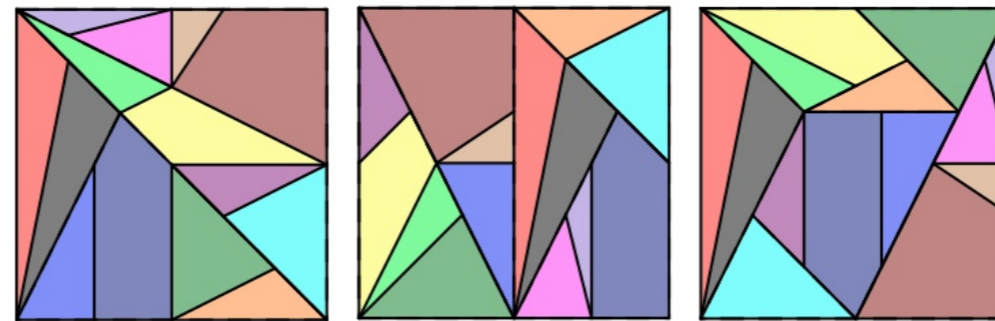


Data gathered in a complex system follow **power law distributions**. There is a higher likelihood of minor events and lower likelihood of major events. In a classroom, the length of student articulations and pauses, difficulty and complexity of questions posed, and the depth of realizations; all should follow a power law distribution, many minor (short) ones and a few major (long) ones.





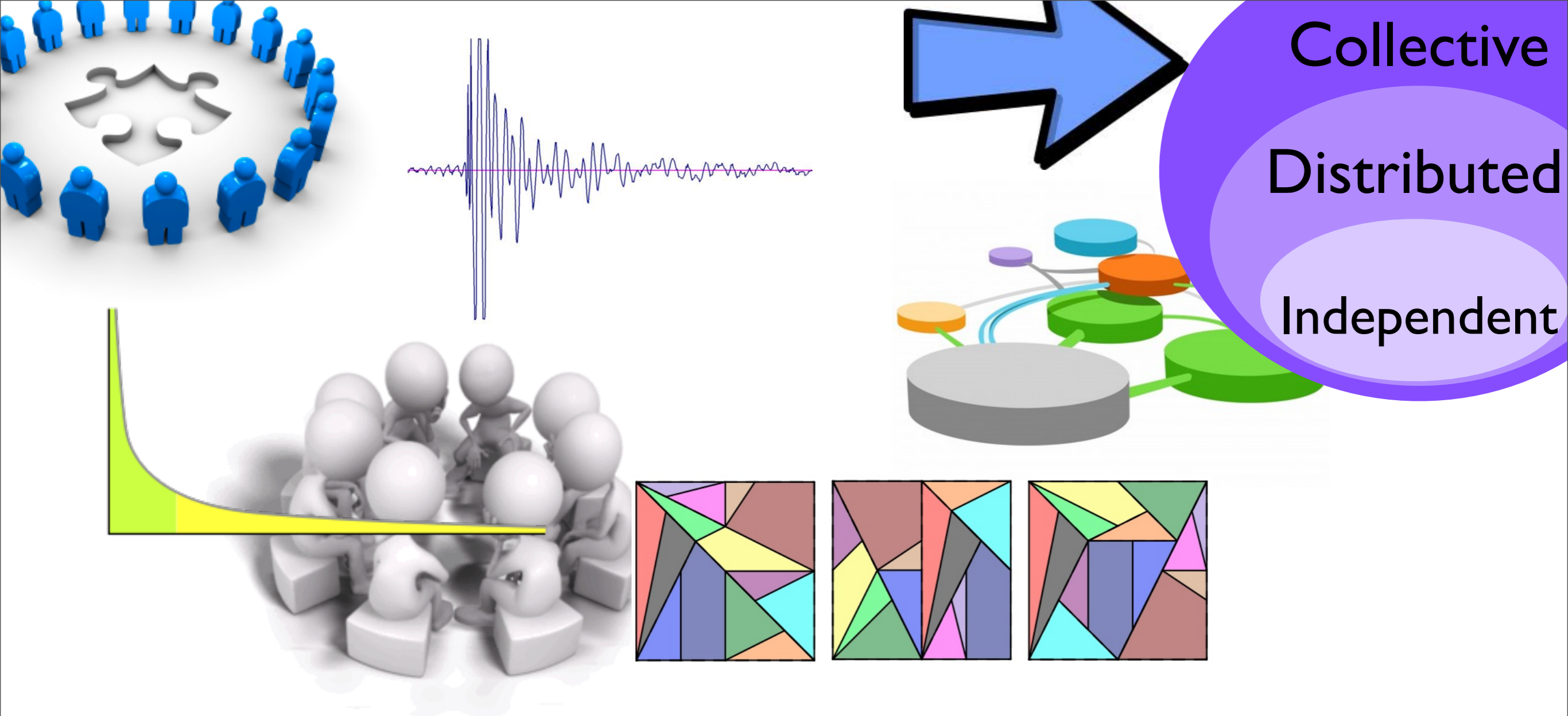
Collective  
Distributed  
Independent



**Knowledge building communities** are classrooms in which the primary goal is knowledge creation, rather than the constructions of specific products or the completion of tasks. These communities suggest that collective knowledge building transcends the immediate contexts and the sum of the knowledge of the collective. There are many recognized principles which may act as markers for collectivity; Real ideas and authentic problems, Ideas being treated as improvable, Rich diversity of ideas, Democratization of knowledge, Symmetric exchange of knowledge expertise, etc.







By identifying specific markers of collective thinking we hope to create a starting base in the area of classroom collectivity. We feel this would give extra evidence that learning environments are complex systems. Teachers will likely benefit from consciously knowing markers associated with collectivity and to be aware of when collective engagement and sense-making is happening in our classrooms. This would allow teachers to set up conditions promoting collective thinking and to offer suggestions for occasioning collectivity within the classroom.



Thank you

