

## Thoughts on Complex System--

Below are three answers from GPS 1010 (Gray Matters) cohort 2018 students in the UCCS Honors Program. Posted Nov 5, 2018.

### Kinsey's thoughts on Complex System-

"In my mind, a complex system is a system made up of simple components performing relatively straightforward tasks that, through various interactions and building upon each other, lead to more complex patterns of behavior. These patterns are also dynamic and unpredictable, with changes in variables of the situation leading to different behaviors; the system and its components adapt to changing circumstances. Rather than simply being a network of smaller components, the actions of these components must lead to the larger, unpredictable patterns of complex behavior.

This definition appeals to me because you can think of a nearly infinite variety of examples that fit it, and therefore you can think of many examples of complex systems in the real world: ecosystems, cities, living cells, airports, schools, and more. It's fascinating that so many of the networks we're made up of or that we are part of are complex systems, because it means that many things in our life are unpredictable. As much as many of us would like to know exactly how the world around us will act and how our lives will unfold, the study of complex systems and the many complex systems we see in our lives proves that we can't really know what will happen in the future. This may seem like an intimidating prospect, but it also means that almost anything can happen, just like when life miraculously arose out of matter billions of years ago."

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### Mark's thoughts on Complex Systems: Where the Predictable and the Unpredictable Coexist-

"Complex systems are one of four kinds of systems: simple, complicated, complex, and chaotic. Simple and complicated systems differ only in the amount of information required to understand them. Both are highly predictable. Chaotic systems are the complete opposite. Almost nothing about them can be understood or predicted. Complex systems are neither wholly predictable nor wholly unpredictable. This is such an essential component of complex systems that is a good definition of them: A complex system is a system made up of sub-systems that through individual behavior cause unpredictable results, although with proper research general tendencies of the results can be predicted."

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“Another accepted complex system is the immune system in a human body (Mitchell 4). The sub-systems in an immune system are the organs and cells of which it is comprised. Like with economies it is possible to learn and then predict certain things about the immune system. For instance, the immune system will eventually beat a common cold, but it may need some help beating pneumonia. As with economies, the details caused by the interaction of the sub-systems are unpredictable. For instance, no one can predict what cell will have the best fitting mutation for repressing the pathogen. These two examples show that the definition of a complex system given in this paper is in fact a reasonable definition.”

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### Holly's thoughts on Complex Systems-

“To me, a complex system would be defined as a set of things that constantly work together for a common goal but are very hard to fully understand. I believe to classify something as a complex system, it must be nearly impossible to predict the complex system's future events and completely replicate it. The reason that this definition appeals to me is because it captures every aspect of a complex system in my mind. I think this definition captures my understanding of how complex and complicated a complex system is to me. My definition says that a complex system cannot be completely replicated or understood. This appeals to me because it was very hard for to fully understand the complex systems that were addressed in the Mitchell's novel Complexity. It was tough for me to read some of the sections, because when the material got too deep into describing the complex systems I no longer could fully understand or describe how they worked. Also, my definition captures my understanding of a system by the many different things working together for a common goal. For this part, I related it to a complex system that I face every day playing sports, because I am constantly working together with a group of girls to meet our common goal of winning games. I believe that there are infinite complex systems in the world and new ones are forming all the time, which is why I made my definition very open and general.”

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