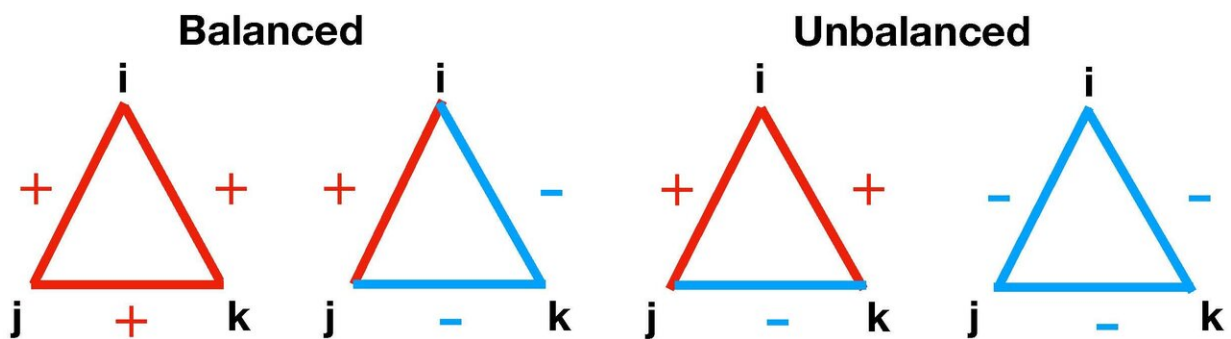# Like fire and ice: Why societies are increasingly fragmenting

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People like to create social triangles with others. Red lines represent friendly and cooperative relations between individuals, blue lines are negative or hostile links. We usually cope better with balanced relationships, i.e. when all three in the triangle get along with each other well (triangle 1), or when one person (i) that is on good terms with one (j) and on bad terms with another (k) observes that j and k dislike each other too (triangle 2). What we dislike is when two friends don't get along (triangle 3). Unbalanced social relationships are much rarer in societies than balanced ones. Credit: CSH Vienna

Scientists at the Complexity Science Hub Vienna (CSH) have shown that the accelerating fragmentation of society—often referred to as filter bubbles—is a direct consequence of the growing number of social contacts. According to their model, societies can only be either cohesive or fragmented. And just as water becomes ice or gas at a certain temperature, a society abruptly changes from one state to the other at

certain tipping points.

"Equal to equal"

For their theory of social fragmentation, just published in the *Journal of the Royal Society Interface*, the researchers use two classical sociological concepts that have been empirically tested in hundreds of studies in recent decades. The first hypothesis is that of homophily. "People are happier when they do not disagree or argue with others," explains Tuan Pham (CSH & Medical University of Vienna), the first author of the study. "One can also say: Like will to like. In order to avoid stress, there is a tendency for opinions within a group to become more and more similar and aligned with each other," he adds.

The second concept is the social balance theory (SBT) of the Austrian psychologist Fritz Heider (1946). Put simply, it describes the fact that people are keen to ensure that their friends get along well with each other. "We like to construct social triangles," Stefan Thurner (CSH & Medical University of Vienna) points out. "What we like best is when all three in the triangle love each other. What we don't like is when two people with whom we are on good terms do not like or argue with each other. As a matter of fact, such states of imbalance occur much less frequently in societies."

Phase transition: from cohesive to fragmented

In their simple social model, the complexity researchers combine homophily and SBT with the physical principle of energy minimization. "We apply this to societies and say: People in societies seek the state of least social stress," says Thurner. "And here, we clearly see two social phase states: Either it is cohesive, meaning that there is cohesion and exchange and cooperation can take place, or the society disintegrates

into small bubbles of like-minded people. Although they then get along well with each other, constructive communication across the bubbles is no longer possible. Society fragments."

Too many social contacts lead to the tipping point

The transition, the researchers say, is abrupt. But what causes the tipping? In the phase transition of water, it is temperature; in societies, according to their theory, the tipping point is the number of contacts people have. Thanks to the internet, smartphones and social media, this number has exploded in recent years. "A few decades ago, we had to share our phone line with other households. Then every household had a line; later, every person had his or her own phone. Today, smartphones connect us with people all over the world at all times—and simultaneously through many channels," explains Thurner.

This is becoming a problem for the well-being of individuals. "Disagreements in small groups, for example, disputes with two out of 10 people in an extended family, are something we can handle quite well," says Tuan Pham. "But if 20 out of 100 people are suddenly against me, I can't stand it. As a consequence, I will avoid these 20 in the future. Instead, I will stay within my own social bubbles. This is particularly easy in the online world." If many people do this at the same time, the automatic fragmentation observed in the new social model occurs. "This is as certain as a law of nature," says Thurner.

Democracies at risk

If the basic sociological assumptions are correct, CSH president Thurner sees a huge problem that could endanger our democracies as well as the management of massive challenges such as the climate crisis or future pandemics. "If people stay within their bubbles and are no longer willing

to leave these comfort zones, how are we, as a [society](#), supposed to negotiate important issues and reach compromises that are the basis of all democracy?" The last two U.S. elections or the increasingly rapid spread of conspiracy theories show how real and potentially explosive this development is.

But what to do to save democracy? "The most effective means would be to dramatically reduce contacts again—this is completely unrealistic," says Thurner. "We really have to think about this urgently." To begin with, the researchers want to test their model with large data sets.

  More information: Tuan Minh Pham et al, The effect of social balance on social fragmentation, *Journal of The Royal Society Interface* (2020). [DOI: 10.1098/rsif.2020.0752](#)

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