



## The Change of Change

The duality of time offers a key to better understanding the complexity of change and transformation.



[Steffen Huck](#)

**Change is not a one-dimensional process. To grasp its true nature, we must consider two levels of time: the rhythm of individual moments and the totality of elapsed time. Steffen Huck explores this perspective through examples such as technological progress and the rise of the populist right, demonstrating its crucial role in understanding processes of change.**

In a world of constant transformation, the concept of change may appear self-evident. Yet how change actually unfolds—and how it changes over time—often remains unexamined. To truly understand change, it is not enough to see it as a single process. Rather, it operates on two fundamental time scales: one that ticks in the rhythm of individual moments and another that unfolds through the cumulative passage of time. This duality is more than a theoretical construct; it has profound implications for both scientific analysis and our understanding of social dynamics.

At the core of this argument lies a distinction between two ways in which time shapes change. First, some processes advance tick by tick—step by step, moment by moment, in a sequential chain of causal events. Second, other processes manifest themselves through the accumulation of elapsed time, where change cannot be understood merely as the sum

of individual steps. These two dynamics—discrete and continuous—interact, overlap, and shape each other.

Take technological progress as an example. The spread of the internet cannot be explained solely by the number of devices sold or the pace of innovations. It must also be understood in terms of its long-term transformative effect—an effect that unfolds over decades and is not linearly tangible in discrete moments.

Overlooking either of these time scales leads to serious analytical errors. A narrow focus on tick-by-tick developments risks missing broader patterns and long-term dynamics. Conversely, viewing change only in terms of large-scale trends obscures the mechanisms and triggers that drive it forward.

In [our research](#) (with Teresa Backhaus, Johannes Leutgeb, and Ryan Oprea), we have explored these dual dynamics in the evolution of social cooperation. Our findings reveal a strikingly counterintuitive insight: social cooperation often benefits when individuals have less detailed information about their immediate opportunities for gain. Too fine-grained perception can undermine long-term cooperative behavior, as it shifts focus to short-term self-interest rather than enduring social stability. This example illustrates the deep interdependence between tick-by-tick dynamics and overarching time scales—and why their interaction is central to understanding change.

### **Social Change and the Rise of the Populist Right**

A contemporary example of these dual dynamics is the rise of the populist right worldwide. At the tick-by-tick level, individual events—such as elections, political decisions, or crises—can be pinpointed as moments that propelled these movements forward. Yet at the same time, a broader dynamic has been unfolding, shaped by long-term structural changes such as the erosion of traditional institutions and the growing polarization of public discourse.

The populist right draws strength from both levels of change. On one hand, it thrives on short-term mobilization through slogans, social media, and emotionally charged campaigns. On the other, it taps into deeper resentments and insecurities that have accumulated over decades—forces that cannot be explained by isolated events alone.

The rise of Alternative für Deutschland (AfD) is a case in point. On a tick-by-tick level, the AfD was founded in 2013 in response to the eurozone bailout policies. Then, in 2015, the so-called refugee crisis provided a powerful mobilization tool. The German government's decision to accept hundreds of thousands of refugees gave the AfD an immediate opportunity to stoke resentment against migration and established political actors.

Yet beyond these short-term triggers, a deeper transformation was taking place. The refugee crisis acted as a catalyst for larger social and political shifts. Notably, German public broadcasters, for reasons that remain debated, provided the AfD with disproportionate media exposure—offering the party a platform that extended far beyond

its actual political weight at the time. This presence, in turn, amplified the tick-by-tick momentum of the AfD's rise.

Brexit offers another striking example. For decades, skepticism toward the EU had been growing in the UK, shaped by economic, cultural, and political factors. These long-term dynamics laid the groundwork, but it was the referendum campaign—targeted, emotional, and immediate—that provided the tipping point for departure.

These processes echo Malcolm Gladwell's concept of [tipping points](#)—moments when a cumulative process reaches a critical mass, triggering sudden and often irreversible change. Such tipping points arise from the interaction between the two time scales: long-term dynamics set the stage, while a single tick—a seemingly minor event—can tip the system into a new state.

Change itself evolves over time. The mechanisms that drive transformation are not static; they shift along with society. In a digitalized world, for instance, tick-by-tick dynamics have accelerated due to technological networks, while large-scale dynamics are increasingly shaped by global challenges such as climate change and economic inequality.

The populist right exemplifies this interplay. It exploits the acceleration of tick-by-tick dynamics through social media while drawing upon decades of economic and social frustration. These combined forces create new tipping points, leading to radical political shifts.

### **Beyond Society: The Duality of Time in Science and Culture**

The idea of tick-by-tick and cumulative dynamics is not confined to social and political processes—it is fundamental in the natural sciences as well. Many physical systems operate simultaneously on both time scales, where the overall transformation cannot be reduced to the sum of individual steps.

A striking example is phase transition in thermodynamics—such as the melting of ice. At the tick-by-tick level, individual molecules break their bonds and move more freely as energy is added. Yet the shift from solid to liquid does not occur as a simple accumulation of these movements. Instead, a qualitatively new state emerges when the system reaches a critical threshold, marking a fundamental reordering of molecular interactions. This behavior can only be understood by considering both time scales at once.

Similar principles appear in evolutionary biology. On a tick-by-tick level, we observe mutations in individual organisms and localized adaptations to environmental shifts. But evolution as a whole unfolds across vastly longer time spans, characterized by emergent phenomena—such as the formation of new species and ecosystems—that cannot be explained by simply summing individual mutations.

Even in art and culture, these dual dynamics shape influence and legacy. The sudden success of a novel, painting, or musical movement may be triggered by specific ticks—a glowing review, an exhibition, a viral moment. Yet lasting cultural impact only develops

over time, as works resonate with audiences and become embedded in larger historical narratives. Take Richard Wagner: his operas initially provoked mixed reactions and controversy on a tick-by-tick level. However, over the decades, his innovations—most notably the concept of the “Gesamtkunstwerk”—reshaped opera and profoundly influenced musical thought well into the 20th and 21st centuries.

Understanding the change of change requires moving beyond simplistic, linear models of time. If we focus on just one time scale, we risk misinterpreting developments and overlooking critical mechanisms of transformation. The interplay between tick-by-tick dynamics and cumulative time offers a vital key to deciphering complexity—whether in politics, science, or society.

Our research suggests that recognizing these two levels is not just a theoretical exercise—it has practical consequences. In a world shaped by tipping points and political upheavals, we need a deeper understanding of how change unfolds. Only then can we not just analyze transformation—but actively shape it.

Geopolitical crises and climate change make this understanding more urgent than ever.

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