Multi-cellular biological systems demonstrate resilience and dexterity when navigating the unknown, including the "unknown unknowns" – situations unforeseeable through prior experience. The biological research archives are rich with examples of cells, especially nervous system cells, constantly seeking connection, and demonstrating effective coordination amongst a massive collective[3]. These coordinations can span distances many times larger than a cell, and they can last many lifetimes longer than the lifespan of any individual cell. Thus, **every organism is a living testament to our abilities to use *coordination as an information technology***[1], providing a potent example of "manipulating salience through redefining what is local" [9] in both space and time, and suggesting a strong evolutionary orientation towards *collaboration across scales*.

Stories, especially speculative fiction stories, can achieve similar levels of massive, long-lasting coordination amongst humans[6, 7, 8]. If we imagine humans as cells within our planetary organism, what insights might come from modeling the chemicals passed between our body's cells as *cellular stories*? Given the different conditions under which our bodies and social institutions excel and struggle, what mutual insights could we develop? Such insights are urgently needed at a time when we are drowning in harmful stories, including those deemed misinformation. We are hyperconnected when it comes to exchanging information[2] and moving materials[3], but not nearly as well-coordinated when it comes to formulating insights and taking intentional collective actions based on collective resources[4]. The struggle to discern knowledge and wisdom from propaganda, rumor, and fear-mongering undermines trust, making it hard to build healthy relationships that could support robust coordination.

But we are not powerless, and we have opportunities to evolve beyond this era of dysfunction. One such opportunity is to study and practice better storytelling[5], especially when it comes to the stories we tell about ourselves[6]. To make progress towards this goal – of **better collective storytelling for resilient and dextrous coordination in the face of the unknown** – I propose a combination of theoretical, experimental, and observational research.

The theoretical work seeks to re-examine existing neuroscience data with a new lens – that **our nervous systems are *storytelling engines* that our cells build, develop, and evolve to coordinate behavior throughout our body collective**. I seek evidence of biological mechanisms that evolved to facilitate coordination, and to validate the framing of biological behaviors as purposeful, deeply contextual, and highly variable [2, 5]. This is a perspective that has influenced modern neuroscience since the field formalized in the 1960s and 1970s – however, in the decades

[1] Here I borrow J. W. Zimmerman's definition of technology as "the manipulation of space and time"[9]
[2] i.e. the internet
[3] i.e. our global systems for growing and distributing food
[4] See our global behavior in the face of the COVID-19 pandemic and the multitude of ongoing genocides as sobering examples.
[5] For this framing, I define storytelling as "a method for sharing complex information about an inner world with other agents sharing an outer world".
[6] Here I include both speculative fiction stories and science communication in topics such as neuroscience, psychology, sociology, ecology, etc.

since, the cybernetic framework has been placed on the backburner because it was less convenient to test under reductive, high-throughput laboratory conditions [4, 5]. The change in framing that I propose to apply to the neuroscience research archives is most succinctly demonstrated by rephrasing the key goal of neuroscience, as articulated by the editors of the first Annual Review of Neuroscience in 1978 – instead of "understanding how the nervous system *controls* behavior" [1, emphasis my own], **I seek to understand how the nervous system *coordinates* behavior**.

A key output of this theoretical work would be an engaging, accessible, and multi-lingual neuroscience primer[7] that can develop shared vocabularies between expert collaborators coming together from significantly diverse[8] backgrounds. **The nervous system is implicated in every complex behavior we exhibit as human beings, and so *the ability to communicate clearly about nervous systems with diverse audiences is a crucial theoretical tool*** if we are to "reject compartmentalized thought common in academia." I have already made a start with such a neuroscience primer[9], developed over more than 15 years of teaching young people[10] and applying neuroscience to help nurture multi-generational free choice learning communities[11]. The theoretical work outlined here will bring the additional depth and detail necessary to make this primer a more effective, engaging, and accessible tool for a wider range of audiences, including academic researchers, artists and craftspersons, indigenous elders, community organizers, and clinical practitioners.

More broadly, I want to address the lack of movement on updating neuroscientific experimental methods to match what we already say in the introduction of every neuroscience talk [5] – that **behaviors are *purposeful coordinations***[12][2]. Under this framing, I want to probe the possibility that **storytelling not only coordinates across agents sharing the same level of scaling** (cell to cell or human to human), **but also *across levels of scaling*** (cell to tissue to organ to organism to social group to ecosphere). For instance, when we fall ill and feel sensations of pain in specific areas of our bodies, we've developed stories that give meaning and context to those sensations. These stories can guide our decision to ingest a specific substance that can quiet our perception of this pain and tip the scales on a cellular battlefield. When we feel sweet relief from a fever or allergies after taking the appropriate medication, *are our cells experiencing a miraculous answer to their collective prayers*? This metaphor offers a fascinating light on the omnipresence of mythologies and rituals in human history – can stories that teach us how to "please the gods" become tools for affecting the autopoietic[13] recursions[14] within which we live?

[7] As in, a succinct "big picture" introduction to the topic.
[8] Not just diverse in academic discipline, but also in cultural heritage, language, geographical location, socio-economic situations, learning and communication styles, lived experiences of marginalization, etc.
[9] The primer prototypes currently exist in a variety of formats, including within a self-published graphic novel titled The First VIRS, and as video recordings of neuroanatomy "live drawing lectures".
[10] Primarily while teaching at AICL in multi-age classrooms for students ranging from 8 to 18 years old.
[11] e.g. Terrascope, Pulse & Pickle, F*Choir, Chapunk, and Dear Neuroscience.
[12] As opposed to the final result of a linear process often referred to as a stimulus-response arc or "sensorimotor transformation" [1]
[13] From autopoiesis, coming from Greek αὐτο (auto) 'self' and ποίησις (poiesis) 'creation, production'.
[14] A la the viable system model (VSM).

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