Open Scientist Handbook • OSH

The Infinite Play of Science

Bruce R. Caron

Published on: Mar 10, 2021

DOI: 10.21428/8bbb7f85.57397ebe

License: [Creative Commons Attribution 4.0 International License \(CC-BY 4.0\)](https://creativecommons.org/licenses/by/4.0/)

“If there are at least two players, a game exists. And there are two kinds of games: finite games and infinite games.

Finite games are played by known players. They have fixed rules. And there is an agreed-upon objective that, when reached, ends the game. Football, for example, is a finite game. The players all wear uniforms and are easily identifiable. There is a set of rules, and referees are there to enforce those rules. All the players have agreed to play by those rules and they accept penalties when they break the rules. Everyone agrees that whichever team has scored more points by the end of the set time period will be declared the winner, the game will end and everyone will go home. In finite games, there is always a beginning, a middle and an end.

“Infinite games, in contrast, are played by known and unknown players. There are no exact or agreed-upon rules. Though there may be conventions or laws that govern how the players conduct themselves, within those broad boundaries, the players can operate however they want. And if they choose to break with convention, they can. The manner in which each player chooses to play is entirely up to them. And they can change how they play the game at any time, for any reason....

Infinite games have infinite time horizons. And because there is no finish line, no

practical end to the game, there is no such thing as ‘winning’ an infinite game” (Sinek 2019).

In *Finite and Infinite Games*, James Carse (1987) makes a number of statements about culture and nature, and about human endeavors that include a wide range (perhaps very wide) of everyday human situations.

Here we attempt to insert science as an endeavor into the scheme Carse outlined, with the purpose of grounding the norms of science—however these are described—within science’s infinite play with nature. Of course any scientist—as a biological organism—plays *in* nature at the same time she plays *with* nature. To play *with* nature as a profession is a privilege scientists all share. The finite games of finance or technology might bring in more (perhaps a lot more) money, but the struggle with universal unknowns has its own rewards. Science play, as we will see, also ties in complexity theories, emergent systems, explanation and narrative.

Today, science is an endeavor housed in organizations where we find game logics that are mainly finite (When is the next RFP coming out? What’s your H-Score?). This circumstance is in direct conflict with research needs that must—this is the main assertion here—include and support playing science.

Norms point to an infinite science play

The notion of the infinite play of science may seem foreign to scientists coached to win finite games to secure their careers. And yet all attempts to capture the normative culture of science hint at an underlying, non-finite home for science. What we find today is an academy trapped in the contradictions between these two mindsets: the poetry of discovery, the awe of nature, the joy of intellection, and the satisfactions of mentoring have been pushed aside, displaced by the rush for reputation in a now-harshly-competitive system of scarce resources and narrow opportunities.

These contradictions have been noted for decades in articles and books that contrast science’s putative norms with the observable organizational practices of science. Sociologists and critics of science *practice* point to the realities of doing science in today’s world. “Science claims X, but *in practice* we find Y.” Ziman (2002) makes this contrast more than seventy times. These observations now share the discourse with a chorus of observations about “bad science:” unreproducible findings, plagiarized and repetitive science articles, ersatz statistics (p-hacking, etc.), systemic biases and conflicts of interest in funding and advancement, public distrust of science findings, and a profiteering publishing industry.

The reality of doing science today seems fundamentally out of step with how good science needs to happen. “Real science” is still distinguished by normative behaviors and values that are regularly called upon to counter deviation into “bad science” (See: [Zimring](#) 2019; Accessed November 8, 2019). But when the incentives are perverse and pervasive, resistance is a challenge that overlays and undermines the challenges of doing infinite-game science. So, what happens when the reality of being a scientist fails to support “real science”?

Doing the right science or doing science right?

“When you rely on incentives, you undermine virtues. Then when you discover that you actually need people who want to do the right thing, those people don’t exist because you’ve crushed anyone’s desire to do the right thing with all these incentives” (Barry Schwartz in Zetter 2009 <<https://www.wired.com/2009/02/ted-barry-schwa/>> Accessed 12/16/19).

Much of the “How” science is played is discussed within the philosophy of science, and the “What” of science fills books in the sociology of science. The infinite game of science explores the “Why” and the also the “just causes” (Sinek 2019) of science. The “Why” brings us a narrative of science up until this moment, which illuminates its horizon. Science’s *just causes* point us at the thousands of mysteries, the unknowns that scientists confront today; each mystery offers a bit of new knowledge to be discovered, and the benefits of new understanding. Every unknown also carries a moral load, and the need for judgement in pursuit of justice (more about this below), given that there are many consequences to new knowledge.

Mindsets and practices

The book, *Finite and Infinite Games* goes into great detail to expose the two *mindsets*: finite and infinite. These are fundamentally different, and in ways that illuminate many of the issues plaguing the academy today. Here we note only a few key points. First, finite players (players with a finite mindset) play their roles in full seriousness, acquiring their parts as actual and necessary: even when they are always fully free to step out of their parts. They need to forget this freedom in order to play to win. This is really important to keep in mind: finite game players assume their roles as essential parts of who they are, even though they always have the freedom to abandon their role. This mindset lards the role of “scientist” with unnecessary seriousness.

On the other hand, infinite players play with the *rules*, instead of assuming roles. These rules are constantly changing as players move the boundaries of the game.

Infinite play is rule-creating. The players do not need to accept a set of rules to play. Without stable rules, roles make no sense. Best practices do not apply. Every new experiment opens up its own horizon. In terms of complexity theory, infinite play demands that you probe, sense and respond (Laloux 2014, Kurtz and Snowden 2003) each time you play.

When an infinite player (someone with an infinite mindset) plays a finite game within infinite play, they do so fully understanding they are simply acting their role, and that they have the freedom to walk away. Yet they still have the capacity to play any finite game to its limit. They can accept the rules in order to play. However, winning or losing has no meaning for them. This may mean they play with greater freedom and abandon, improving their chance of winning.

To remind scientists that their research is a form of infinite play is to reconnect them to the “one long experiment” (Martin 1998) that is science. Recent organizational management theories (Sinek 2019) have put infinite play and sense-making for complexity (Snowden 2002; Kurtz and Snowden 2003; Ito and Howe 2016) at the center of their recommendations for 21st Century organizational governance. Getting good in the infinite play of science could also build skills that scientists can use to govern their labs, universities, and agencies. Infinite play also hones your ability to communicate through narratives.

“In the science world, introducing narrative early and in a substantial way will produce a whole new breed of scientist, able to communicate far more effectively among themselves, as well as with the public. They will also be less prone to subconsciously reach for false positives or present null results in such a boring way that they help perpetuate publication biases against such results” (Olson 2015).

This handbook will help you create new practices that can recenter your university’s values and vision around infinite play as a strategy for long-term success. Open science is a cultural platform that will connect infinite players across the globe. You and your organization can join this, or you can continue to play the same bullshit “excellence” games (Moore, et al. 2017; also Neylon <<https://www.slideshare.net/CameronNeylon/excellence-is-bullshit>>; Accessed Feb. 7, 2020) you take far too seriously today.

Science is a war with one long battle

The infinite play of science was there with Aristotle and Plato, Bacon and Galileo. With Neuton and Boyle, Einstein and Feynman. And now here, this very moment, with every scientist in and out of the academy. Science play lies beneath the norms that Merton and others have used to delineate science's core ethos. Infinite play stands behind every experimental hypothesis and laboratory method. Every time a scientist battles with some mystery of nature, the infinite game continues.

Science works toward horizons and not within boundaries. Scientists see boundaries around them and laugh as they violate these. They go beyond. Any scientist can change the horizon of science and modify the rules of science (for example, by improving a method of observation). That horizon, once stretched by a new idea or method, never returns to its former dimensions. Each change in the horizon of science changes the horizon of every scientist.

“The scientist has a lot of experience with ignorance and doubt and uncertainty, and this experience is of very great importance, I think. When a scientist doesn't know the answer to a problem, he is ignorant. When he has a hunch as to what the result is, he is uncertain. And when he is pretty darn sure of what the result is going to be, he is in some doubt” (Feynman, et al. 2005).

The scientist eats unknowns, and is never full. She sweats doubt. The products of science are not science. These can be destroyed or forgotten and science will continue. Science means challenging the known. Scientists understand how little science knows; that the mysteries they face are mighty. Each scientist picks her own mystery, her own just cause to pursue.

“The earth's history has been only long experiment, poorly constrained in a reductionist's eyes. How impoverished the earth would be if had been otherwise” (Martin 1998).

Science is nature made into poetry

No single scientist speaks for science. No scientist speaks for nature. The speech given by the award winner at the annual convention is not any more scientific than the poster presented by the graduate student. The questions of a student can negate an entire history of discovery.

Unlike the history of society where politics is theatrical and works to close its history (against culture, which keeps this open), the history of science is always dramatic. It is

formed by events that must repeat themselves again and again while remaining open to failure, open to a moving horizon that might, and probably will, change and render them false. After that, they join the past history of science and are merely theatrical. One can repeat a failed experiment only as historical theater. The science present moves on in dramatic fashion.

The goods of science inform the knowledge inventory of the world within which science is played. They push science to remake its horizons. They are not unimportant to science but they are not science in the infinite game. Finite-game science players want to own these products, in order to garland themselves with prizes. Prized science goods require durability for the value of their prizes to endure. Finite-game science players choose to defend their own goods by silencing others and gathering supporters. They seek a past that is closed and known, with their own goods at its front end.

“One must keep in mind that senior faculty probably hold their current positions through their success in the game, which may or may not have been achieved by using the most ethical ways” (Chapman C.A., et al. 2019).

Infinite science players—who know their own research best—interrogate their own findings in search of a larger knowledge horizon. They push the playing forward and their egos to the side. They open up to collaborations and seek out conversations with those who disagree with their findings.

Prizes bind science to a known past. This past is carried by science institutions, such as those learned societies that sponsor prizes. These societies also need to endure so that the prizes of finite-game science players retain their value. Prize winners and “fellows” carry the weight of ensuring the society persists, warranting the currency of their prizes. However, the continuity of science is not based on an attachment to its past or even its current goods—on the closing of its history—but rather, on a continual openness to surprise, to experiment (Schulz 2011). Science is based on the nearly universal ephemerality of its findings. Science has always been the child of an open history that will never close.

“[W]hat resounds most deeply in the life of Copernicus is the journey that made knowledge possible and not the knowledge that made the journey successful” (Carse).

Science doesn't just have a culture. Science also *is* culture (in Carse's sense). Like any culture, science is "itself a *poiesis*, all of its participants are *poietai*—inventors, makers, artists, storytellers, mythologists. They are not, however, makers of actualities, but makers of possibilities. The creativity of [science] has no outcome, no conclusion" (Carse 1987; paraphrase).

Scientists are ImagiNatives. Poets of the natural world. Makers of possibilities. "It's been said that science fiction and fantasy are two different things: science fiction, the improbable made possible; fantasy, the impossible made probable" (Rod Serling, "[The Fugitive](#)". [The Twilight Zone](#). Season 3. Episode 25. March 9, 1962. [CBS](#).) Science is nature made into poetry.

"The physicist who sees speaks physics with us, inviting us to see that the things we thought were there are not things at all. By learning new limitations from such a person, we learn not only what to look for with them but also how to see the way we use limitations. A physics so taught becomes *poiesis*" (Carse).

You cannot do science alone in isolation; do science only in your own mind. This does not mean that you cannot be solitary in your imagination, but only that science happens when you share this with at least one other person. A poet who does not speak has no poetry to speak of. Science happens between and among infinite players.

The infinite play of science allows no personal power or authority. In a finite game, power always requires opposition and an audience. Neither is available within science. In finite games, winning silences the loser. The personal power that a title conveys; this authority means nothing to science, and usually far too much for scientists. Competition feeds arbitrary power in the academy and defeats science itself, silencing the many to praise the few.

Finite games of prestige in the academy are failings of the academy. Finite games of personal influence and authority contradict the inherent authority of science methods. Scientists are known by their names, not their titles. If your method is transparent and well-founded, your science goods need no amplification beyond their public sharing. The audience that power seeks is not found in science. An infinite game allows no audience. There is no vote that can elevate one science good above another.

Science does not belong to any one society. Science flows across the globe. Change for science has no location, it is always everywhere. Change is always surprising, and so never a surprise. "To be prepared against surprise is to be trained. To be prepared for

surprise is to be educated” (Carse). To invite and welcome surprise is to do science. Science creates its activities through fluid consensus, not from any established doctrine, but in response to surprises that happen whenever science moves its horizon.

“[As it is in nature, so] also in [science]. Infinite players understand that the vigor of [science] has to do with the variety of its sources, the differences within itself. The unique and the surprising are not suppressed in some persons for the strength of others. The genius in you stimulates the genius in me” (paraphrase) (Carse 1987).

Every science effort begins and ends in surprise. Because the next instant of knowing is always open, the moment of discovery is always surprising. This is a source of joy for the scientist. If the object of research were already known or fully predictable, the research is unnecessary. Reproducibility means that the same effort must result in the same surprise. The first effort exposes the scientist to this surprise. The second time gifts this surprise to science.

In its infinite play, science invests more authority on the rigor of its methods than it does in the sagacity of its practitioners. The results of well-constructed experiments are all discoveries, even when the results are null. Each experiment extends the horizon of the game.

Who wants yesterday's findings?

“If everything we write today already bears within it a future anterior in which it will have been demonstrated to be wrong-headed, we have the potential for a genuine exploration of a new path, one along which we develop not just a form of critical audacity but also a kind of critical humility” (Fitzpatrick 2019).

The final page of science will never be written. A new finding is lightly penciled in after the previous paragraph on the current page. Every infinite player brings their own eraser to this book. Chapters long settled and well considered can be erased in a single day. That is a joy for science. New pages open up then. New horizons emerge. The play accelerates. More players find ways to add new paragraphs to this ledger. Ever since Bacon, yesterday's findings hold less knowledge than tomorrow's.

Scientific surprise is mainly retold as serendipity. Serendipity, the unexpected confluence of curiosity and sagacity, is just another way of announcing that scientists are playing with/in the infinite mode.

“The paradox in our relation to nature is that the more deeply [science] respects the indifference of nature, the more creatively it will call upon its own spontaneity in response. The more clearly we remind ourselves that we can have no unnatural influence on nature, the more our [science] will embody a freedom to embrace surprise and unpredictability” (paraphrase) (Carse 1987).

What is real science again?

“The notion that academic scientists have to be humble and disinterested... seems to contradict all our impressions of the research world. Scientists are usually passionate advocates of their own ideas, and often extremely vain” (Ziman 2002).

We have all read studies and stories of “actual” science that highlight how scientists live and work in the “real world.” Today, scientists labor within the pragmatic circumstances of the increasingly neo-liberal academy—surrounded by an increasingly neo-liberal global economy: a world of intense competition for fame and funding, a space of cumulative advantages for a few, and increasing precarity for the rest. Yet the moments of science, the methodical but often serendipitous event of discovery, yank the scientist back into a different “real”—the real task of uncovering new knowledge about the actual “real world”—the natural universe. To do science is to play with nature.

Bibliography: Open Scientist Handbook References