center for contemplative research

What is contemplative science?

Abstract

As the scope of science expands to encompass all of reality — including both the objective and subjective domains — scientists need new methods to study mental phenomena not just indirectly, via neural correlates and behavioral expressions, but also directly, via first-person subjective inquiry. Toward this goal, professional contemplatives can provide science with *contemplative technology*: rigorous, replicable methods that use refined attention, mindfulness, and introspection to study consciousness directly. However, the field of contemplative science is often framed as only the scientific study of meditation — a framing that treats contemplative methods as objects of investigation as opposed to valid avenues of empirical inquiry that can yield scientific discoveries. To realize the full potential of contemplative science, the Center for Contemplative Research is developing a research program that treats professional contemplatives not as mere participants in neuroscientific protocols but as scientific colleagues who can produce unique forms of empirical evidence, which can be integrated with the traditional third-person methods of science. The following essay thus clarifies the definition of *contemplative science* and describes how contemplative technology can augment scientific efforts to fathom the nature of the mind.

Contemplative technology can become a legitimate tool of science if we recognize that empirical knowledge can come not only from the five physical senses but also from the sixth faculty of *mental perception*, a distinct faculty that provides direct access to the subjective domain. Contemplative science thus requires a paradigm shift because contemplative technology is realized in human beings, from the first-person perspective, and through subjective methods. Because it follows almost trivially that we can't obtain direct objective evidence about subjective phenomena, scientists must accept mental perception as a source of empirical knowledge if the scope of science is to encompass all of reality — including both the object pole and subject pole of experience.

Defining contemplative science

Contemplative science is a discipline of first-person, subjective inquiry into the nature of the mind and its role in Nature, which utilizes methods for developing refined attention, mindfulness, and introspection to directly observe states of consciousness and mental functions in their relationship with the body and the physical world at large.

By contrast, contemplative science is often described as simply the scientific study of meditation. Defining the field in this way is like defining *astronomical science* as the scientific study of telescopes — this view of contemplative science misses the point: We should not only *study* useful instruments of observation — whether it's a telescope or a meditative technique — but also *use* those instruments to derive empirical knowledge.

The scope of science is expanding

We need a broader conception of contemplative science because the scope of science itself is expanding, and contemplative science provides the empirical methods that we need to enable this expansion. The scope of science once included only the *object* pole of experience. Seeking a purely objective account of reality, scientists tried to "step out of the picture and stay hidden behind the camera" (Hut, 2003). The results were the physical sciences, populating our world of experience with physical concepts like atoms, planets, and stars. The physical worldview that resulted had no precise account for consciousness, subjectivity, or first-person experience — subjective phenomena were simply out of the scope of scientific inquiry.

But scientists increasingly understand that a purely objective view of reality is not only incomplete but untenable. Reality consists of both third-person objects and first-person subjects, and we need to understand how the two are related to describe reality fully. As scientists step out from behind the camera and into their own picture of reality, they're trying to understand how their roles as observers shape their descriptions of reality, and even reality itself. Scientists must study both the world of objects — reaching "down into the atom and out into the cosmos" (Price & Barrell, 2012) — *and* the world of subjects.

The scope of science is thus expanding to include both the *object* pole and the *subject* pole of experience (Hut, 2003). Having gained a wonderfully detailed understanding of the external, physical world, science is increasingly turning its attention inward, attempting to understand consciousness, awareness,

thoughts, emotions, and all the other phenomena that involve first-person subjective experience (Figure 1).

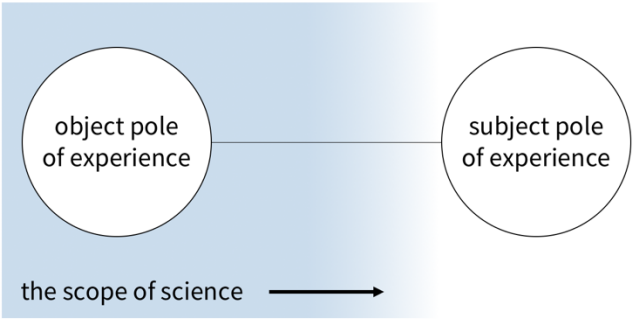

Figure 1: The scope of science is expanding to encompass all of reality, including both the object pole and subject pole of experience. Contemplative science offers empirical methods of refined attention, mindfulness, and introspection that can facilitate this expansion.

Science needs contemplative technology

When scientists start to study new phenomena, they often need new tools, methods, or technologies to enable refined and replicable observations of those phenomena. The science of astronomy, for instance, remained at the level of folk astronomy until Galileo pioneered the use of the telescope for systematically observing celestial phenomena. Currently, scientists lack any sort of methods or technologies for studying the subject pole of experience directly. It's exactly this need that contemplative science aims to address.

Contemplative science offers the rigorous, replicable methods — the *contemplative technology* — that science needs to expand its scope and encompass all of reality, including the subject pole of experience.

The Center for Contemplative Research is therefore clarifying the definition of contemplative science by developing contemplative technology. Highly focused, refined concentration is the primary instrument of contemplative technology for exploring mental phenomena, much as a telescope is the primary instrument for exploring celestial phenomena. It is developed and refined through the rigorous cultivation of attention, mindfulness, and introspection.

Back when science included only the object pole of experience, the *empirical* investigation of the world implied the *objective* investigation of the world. Third-person instruments like the telescope were used to observe the world of objects. But in contemplative science, we can't expect to exclusively use the same, objective modes of observation to study subjective phenomena like consciousness. For centuries, scientists have been bedeviled by the fact that when they plant both feet firmly on the object pole of experience, the subject pole remains curiously out of view. No matter how closely we observe a person's behavior, body, or brain — even down to the firing of their individual neurons — that person's mental processes remain undetectable to the objective instruments of science (Wallace, 2000, pp. 135–6). It's a categorical mistake to equate the observation of mental processes with the observation of those mental processes' neural correlates.

Therefore, the evidence that we can derive regarding subjective phenomena cannot be objective. This is almost a truism; it follows from the definitions of *objective* and *subjective*. Unless you're telepathic, consciousness is an irreducibly first-person, subjective phenomenon (Searle, 1992); we therefore have no means for obtaining objective evidence about other people's subjective experiences.

Although evidence about subjective phenomena can't be objective, it can still be *empirical*, meaning that we can derive knowledge about subjective phenomena from our senses — provided that we use a realistic definition of the word *sense*. Empiricism is usually associated with the five senses of touch, sight, hearing, smell, and taste, but we don't use any of these five to observe mental processes. Instead, we observe mental processes using a sixth mental faculty, *mental perception*: the observation of first-person experiences. For instance, we can use the sense of sight to observe a banana on a table, relying on the photons coming off the banana to transmit visual information to our retinas. But we can also use the sense of mental perception to visualize a banana in our minds, even if we suddenly became blind. This sense of mental perception is clearly not identical to our sense of sight; it's a sense in its own right and thus a legitimate entryway into empirical inquiry.

Contemplative science requires a paradigm shift

Contemplative technology is not made of electric circuits or optical equipment — it's realized in human beings. This point may make some scientists uncomfortable, as scientists have traditionally aimed for a purely objective perspective on reality, avoiding subjectivity to the extent possible. But this unique aspect of contemplative science needn't be taboo; in fact, it's necessary. Led by quantum physicists, scientists are increasingly seeing that a

purely objective perspective is not only an impossible ideal but also a significant barrier in understanding the critical role of the subject in Nature — hence the need for contemplative technology as an instrument of observation.

Conscious human beings simply offer the most direct access to the phenomena that contemplative science tries to observe and understand: the mind and its relation to everything else. And currently, consciousness is not just the *best* technology that we have for studying first-person experience directly — it's *the only one*. Third-person instruments like MRI and EEG give us only indirect access to the mind via its correlates in the brain, body, and behavior.

In addition to being empirical, contemplative science can also engage in rigorous peer review through *inter-subjective verification* — something that scientists rely on regularly, despite their objective modes of observation. Physicists, for instance, know that a mathematical proof never occurs on the blackboard or on a piece of paper. We may be able to write down the equation $E = mc^2$, but without an understanding of what the variables mean in relation to an underlying theory, we've proven nothing at all.

Instead, proofs always happen *in the minds of the scientists*.

By engaging in dialogue using a domain-specific vocabulary, experts who share the same mental models can interrogate each other's understanding and verify whether a new theorem is sound. Like scientists who discuss a new theorem, contemplative scientists can discuss their experiences and insights, interrogating each other's understanding to assess the validity of a particular claim.

Contemplative science also represents multiculturalism: Its methods are based on the world's contemplative traditions, many of which flourished in Asia, far from the birthplace of modern science in Europe.

For hundreds of years, science developed almost entirely out of a single worldview: that of white, European men who were trying to understand the "mind of God" as they conceived of this through Christian Revelation. Although science has since dropped its explicitly religious affiliations, it still suffers from ethnocentrism (Roth, 2008) — a belief that if modern science has failed to explain some aspect of Nature, then *no* culture in the history of the world could have made a genuine discovery about it.

Of course, this view is terribly short-sighted, ignoring, for instance, the enormous contributions of the university system in India that preceded all comparable institutions of higher learning in Europe. Unlike the European

universities, which excelled at studying the object pole of experience, these Indian universities prioritized the rational and experiential investigation of the mind. *It's precisely this prioritization of first-person experience that makes contemplative techniques suitable to the empirical investigation of the subject pole of experience.*

Contemplative technology can revolutionize science

Contemplative technology can thus be a legitimate tool of science, provided that scientists are willing to relax a *specific constraint* that is currently imposed on science: the requirement for empirical knowledge to come only from the five senses of touch, sight, hearing, smell, and taste. Relaxing this constraint will allow scientists to consider empirical knowledge derived from the *additional sense of mental perception.*

This pairing of (1) a new tool or method and (2) a relaxed constraint on scientific inquiry was essential to the largest scientific revolutions:

REVOLUTION	TOOL / METHOD	RELAXED CONSTRAINT
Modern science begins *(Galileo)*	Telescopic observation of celestial phenomena	The idea that knowledge must conform to the tenets of scholastic theology and philosophy.
Physics *(Newton)*	Calculus	The realities to which scientific theories refer must be imaginable and intelligible to common sense.
Biology *(Darwin & Wallace)*	Longitudinal observation	Biological taxonomies must be static.
Physics *(Plank et al.)*	Black-body radiation techniques	Science must achieve the one true, objective view, describing reality as it exists apart from our measurements.

Galileo was the first to use a telescope to systematically observe celestial phenomena, but his observations could not truly launch science until he and

others decided that what they observed through the telescope did not need to agree with the tenets of scholastic theology and philosophy.

Newton developed calculus and revolutionized physics with his laws of motion, but he also caused science to relax the constraint of intelligibility. Before Newton, scientists assumed that scientific theories must be intelligible to the human mind. They assumed that God, like a supremely skilled watchmaker, had created a complicated, machine-like universe that humans could eventually understand as consisting of special forms of gears, like the mechanisms found in a watch. But Newton showed that the world is not a machine. We simply can't explain the universe completely in terms of things like gears and other mechanisms that we can intuitively grasp (Chomsky & Polychroniou, 2017). Indeed, we have since discovered that the universe is capable of what Einstein called "spooky action at a distance" (Popkin, 2018) and other forces that we can predict and describe but not intuitively grasp. Yet, as brilliant as it was, Newton's approach to physics would have been discarded if scientists had clung to the constraint of intelligibility.

In forming their theories of natural selection, Charles Darwin and Alfred Russel Wallace both demonstrated the power of thorough fieldwork involving longitudinal biological observations. But their ideas required scientists to abandon the notion of static biological taxonomies, paving the way for the theory of evolution.

And lastly, experimental techniques involving black-body radiation allowed Max Planck to develop the notion of the quantum, leading to the enormously successful theory of quantum mechanics. Although this second revolution in physics is still underway, with remaining challenges like the measurement problem left to explain, quantum mechanics has caused scientists to rethink objectivity itself, revolutionizing how we view fundamental concepts like observation and information (Zeilinger, 2005).

Likewise, contemplative science has the potential to revolutionize the mind sciences not just by demonstrating the utility of contemplative technologies. Contemplative science can show that another revolution is possible if we relax yet another constraint in science. This constraint is the requirement for empirical knowledge to come from only the five physical senses of touch, sight, hearing, smell, and taste.

A goal of the Center for Contemplative Research is to demonstrate that our sixth mode of experience — mental perception, or mental consciousness — is a valid avenue of empirical inquiry and thus a legitimate part of science.

Indeed, scientists must accept this sixth mode of experience as a source of empirical knowledge if the scope of science is to encompass all of reality — including both the object pole and subject pole of experience.

REVOLUTION	TOOL / METHOD	RELAXED CONSTRAINT
Mind sciences	Contemplative technology	Empirical knowledge comes only from the five senses of touch, sight, hearing, smell, and taste (*not* mental perception).

Contemplative technology: An overview

Prior to Galileo's refinement of the telescope and other instruments for measuring and experimenting with terrestrial phenomena, natural philosophers relied primarily on naked-eye observations of celestial and terrestrial phenomena. But with Galileo's development and application of appropriate technologies for rigorously observing and experimenting with physical phenomena, natural science with respect to the objective, physical world was born.

For a comparable natural science of subjective phenomena to arise, highly refined concentration, or *samadhi*, is equally indispensable. This technology was developed and refined in India millennia ago, and has been applied since then with great success in multiple contemplative traditions throughout Asia. Hindu, Buddhist, and Taoist contemplatives have made fundamental, replicable discoveries about the nature and potentials of consciousness and the role of the mind in Nature that remain beyond the scope of Western science. The integration of the technologies of contemplatives and scientists may herald the first true revolution in the mind sciences and, at the same time, a renaissance for contemplative inquiry within the world's religions.

Contemplative methods are to the contemplative scientist what the telescope is for the astronomer, or the microscope for the biologist: a refined mode of observation. Many of the greatest scientific discoveries have been derived from sustained, rigorous observation, enabled by technology that augments everyday human perception. At the Center for Contemplative Research, our contemplative training regimen can be likened to first building a telescope of the mind and then using this first-person technology to gain insight into the nature of the mind:

- Building the telescope: Attention training
- Using the telescope: Insight meditation

Contemplative methods can develop one's attention skills to a staggering degree, far beyond even what would be considered exceptional among those who have not undergone contemplative training. Comparing the upper limits of attentional development to average attention skills is not unlike comparing average running speeds in the general population to that of Olympic track runners. Another apt comparison is that of folk astronomy performed with naked-eye observations of the sky and professional astronomy performed with modern telescopes. With the naked eye, one can see thousands of stars in the night sky. But advanced optical technologies like the Hubble Telescope have enabled astronomers to detect billions of galaxies. In much the same way, the attentional stability and vividness afforded by contemplative training allows one to detect mental phenomena and states of consciousness that would simply be undetectable without such training.

Contemplative insight methods apply these refined states of attention to fathom the nature and potentials of the mind. Such methods can be used to inform a variety of pressing scientific challenges, such as the measurement problem in quantum mechanics and the mind–body problem in neuroscience and philosophy.

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