Is a Hot Dog a Sandwich? Using Lateral Thinking to Teach Philosophy of Science

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Philosophy of science concerns the fundamental ideas about reality, truth, and knowledge that underpin science.[1] These fundamental ideas, called *worldviews* or *paradigms*, influence everything about medical education, including pedagogy, research, and more.[2] Medical education includes a diversity of worldviews,[3] and teaching learners about philosophy of science can help them understand the foundational assumptions that undergird our field.[4] Philosophical worldviews are often overlooked and implicit,[4-6] making them a challenging topic to teach and learn. Many learners struggle to step out of their own philosophical worldviews to consider others. In this Perspective, I describe a formative teaching moment in which I learned how lateral thinking can unstick learning conversations about philosophy of science.

Getting Stuck With Vertical Thinking

It was day 3 of a 2-week medical education elective with internal medicine and internal medicine-pediatrics (med-peds) residents. The elective is intended to stretch residents' thinking and spark curiosity, dissonance, and excitement by exploring education topics that often get left out of many residents-as-teachers programs. I had introduced the idea that one's worldview includes implicit assumptions about reality (ontology) and knowledge (epistemology) that shape how one teaches, the questions one asks, and how one understands the world.[2,3] My goal was not to cram an entire course on philosophy of science into a single elective, but rather to crack the door open to new ways of thinking about science. Seated in a semicircle around a small conference room, the residents' furrowed brows and puzzled expressions betrayed their skepticism and confusion.

"I don't understand. You're saying objective reality isn't a thing?" said one of our brightest residents in a quizzical tone.

"Well, sort of," I replied, staring at the skeptical faces of 10 residents. "Depending on your worldview, and what you're talking about, there may be no objective reality."

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Myriad worldviews are used in medical education,[3] but to simplify the discussion, I focused on 2 that are commonly used in education scholarship: post-positivism[7] and constructionism.[8] Post-positivism presumes that there is an objective truth in the world, though one may never be able to fully know truth given limitations of measurement and inquiry. Constructionism, on the other hand, presumes that reality and truth are not objective and "out there in the world," but socially created by and between people. The residents intuitively understood post-positivism, but they struggled with constructionism. To open everyone's thinking to more constructionist worldviews, we discussed published manuscripts focused on concepts that exist in the social rather than physical world, such as empathy and burnout, and began to debate whether objective reality or truth relating to these concepts exists. However, the fact that numerical scales have been used to quantify and measure both empathy[9] and burnout[10] created a veneer of objectivity for the residents. I was still struggling to help the residents consider a worldview other than post-positivism, and none of my examples were helping.

This type of educational impasse can lead to frustration for learners,[11] but it is an expected part of learning philosophy of science. I was asking residents to consider other ways of understanding truth and knowledge, which may require new and different ways of thinking. Much of clinical medicine and the clinical research that informs it is decidedly post-positivist in nature.[5] Objective truth is venerated. Unless a physician has a background in qualitative research or the social sciences, they often struggle to understand how truth or reality can be socially constructed rather than objective. More explanation and logic (ie, vertical thinking) would not get us unstuck; we needed something different to jar us loose.

Getting Unstuck With Lateral Thinking

After a long pause, one of the med-peds residents asked, "So, it's kind of like asking if a hot dog is a sandwich, right?"

"What do you mean? Tell me more." I said.

"Well, a hot dog has some characteristics of a sandwich, but it's not classically considered a sandwich. So, is it technically a sandwich, or not? How

do we find the answer? *Is* there an objective answer?"

And with that, the residents were engaged in heated discussion. What is the essence of *sandwichness*? Is it a holistic judgment or can it be reduced to a checklist of attributes? How different are 2 slices of bread vs a hot dog bun, and are they essentially the same thing if the bun splits down the middle? If a hot dog is a sandwich, then what about tacos, hot pockets, empanadas, or corn dogs? Then comes the most important part: Is there any objective truth about sandwichness or is it socially constructed? And what are the implications of taking one view or the other?

One provocative question unlocked the whole session. Why?

In 1967, Dr Edward de Bono introduced the concept of lateral thinking,[12,13] which involves moving away from logical and linear thinking to more imaginative and creative approaches.[14] With lateral thinking, "…established cognitive patterns are deliberately disrupted and information is processed differently, increasing the chances of arriving at novel perspectives."[15] Lateral thinking is a deliberate way of handling information or approaching questions with the goal of spurring creativity, generating new insights, and creating aha moments.[15] For philosophy of science, lateral thinking can help disrupt a learner's default way of seeing the world and invite openness to different paradigms.

Rather than a singular approach or checklist, lateral thinking provides a series of tools that can be used to find new perspectives.[12,14] The question posed by the resident in this story leveraged several such tools. First, the question served as a provocation,[15] calling the learners to engage in a creative thinking activity. Second, it used random input,[15] a stimulating question that is unrelated to the topic at hand. Hot dogs and paradigms rarely enter the same discursive space. Third, the question allowed for exploration of a useful analogy. Learners can find movement in their thinking around an analogy before relating it back to the philosophy of science or other challenging topics. Multiple strategies to promote lateral thinking are available (see the TABLE for a sample),[12,15] all seeking to nudge one into new ideas and lines of thought.

Lateral thinking is not a panacea in teaching philosophy of science, nor does it replace or supersede vertical thinking. However, it is a useful and fun way to help learners step out of their implicit paradigms to learn other ways of seeing the world. It can also be used in multiple other aspects of medical education, such as using the trolley problem to catalyze discussions around medical ethics[16] or using

TABLE
Sample Strategies to Promote Lateral Thinking With Examples of Potential Applications in Medical Education

Lateral Thinking Tool[12,15]	Example for Medical Education
Challenging assumptions: Examine a situation or problem through the lens of "making it strange" and questioning implicit assumptions.	When trying to improve family-centered rounds, create a list of assumptions that exist with rounding practices and examine them critically (eg, rounds begin at 8AM, trainees must preround, presentations follow a SOAP format) by asking "why?" for each.
Random input: Introduce a stimulus (eg, picture, word, object) that is unconnected to the topic at hand to generate creativity	Prior to a team meeting on improving the residency selection process, have everyone on the team watch the movie *Moneyball*.
Suspended judgment: Delay making any judgments while initially exploring an idea or solution to allow for creative advancement.	When considering a time-variable training approach, consider which clinical service lines can easily flex to have or not have residents present. This could be considered a nonstarter, but before making a judgment, allow the full exploration of possibilities.
Quota of alternatives: Set a predetermined number of alternative ways of looking at a situation or solving a problem.	When trying to improve a resident call system, set a goal to create at least 3 different approaches before choosing one.
Analogies: Use an analogy that relates to the situation at hand to provide room for creative exploration before bringing the discussion back to the problem at hand.	Debate a social construct such as "sandwichness" when learning about epistemology and ontology.
Six thinking hats: Examine a problem through multiple lenses by putting on different metaphorical hats. Each hat has a color with an associated lens (eg, white hat=facts/information, red hat=intuition/emotion, black hat=judgment/caution, etc)	When deciding whether to change to a X+Y curriculum structure, have a discussion where each person on the team wears a different "hat" and uses that lens to bring a unique perspective.

Abbreviation: SOAP, subjective, objective, assessment, and plan.

immersive games to help explore bias and inequity in medical education.[17] By opening space for creativity and exploration, lateral thinking can help learners challenge assumptions and broaden perspectives.

Postscript

Readers may be wondering if a hot dog is, indeed, a sandwich. There is no widely accepted answer to this question. The National Hot Dog and Sausage Council says hot dogs are not sandwiches, stating, "Limiting the hot dog's significance by saying it's 'just a sandwich' is like calling the Dalai Lama 'just a guy.'"[18] Some governmental bodies have weighed in, such as the state of New York, which classifies hot dogs as sandwiches for taxation purposes.[19] The late chef Anthony Bourdain stated he did not think hot dogs were sandwiches, though in fairness he did not believe hamburgers were either.[20] For what it's worth, the residents in Cincinnati tend to agree with Mr Bourdain. The more important question, dear reader, is do you believe this debate gets us closer to the objective truth about hot dogs (post-positivism), or do you believe the reality of their sandwichness is socially constructed (constructionism)? The great hot dog debate rages on.

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