

THE DIRECTOR'S CORNER

MPEMBA AND ME

Hot water can freeze faster than cold.

I have a vague recollection of hearing that from my mother, or perhaps another of the sages among my ancestors, but I knew, as a bona fide physics major, that it was not possible. Surely the crude household evidence cited was no match for the impeccable logic of real science. I didn't even bother to argue about it—much.

But, in an almost predictable twist of fate the topic reared its head again, returning as the subject of the only question from my PhD qualifying exam that I can remember. The qualifying committee's version of the question went something like this:

Some claim that often a bucket of hot water will freeze faster than an identical bucket of cold water. Assuming this claim to be true, speculate on some possible explanations for this phenomenon, and quantify the conditions under which it might occur.

I was shaken by the question at first, but this was part of the written exam, not the oral, so I had several hours to ponder how to address this quandary. Since my own undergraduate days, I had always considered classical thermodynamics to be the most difficult of the traditional topics of physics in many respects—but perhaps that's just a reflection of my own weaknesses. I know that I still have a lot to learn about the subject, and especially enjoy clear treatments of the subject like the articles in this issue of *Radiations* and the upcoming television

special, "Absolute Zero and the Conquest of Cold." But now that it seemed that my own mother understood freezing better than I did, thermo seemed even more difficult than ever. Not that I hadn't experienced humility in the face of my mother's knowledge before—in pedagogy, in cooking, in child-rearing, in psychology, in work ethic, in ethics-in-general, she was an undisputed master—but, how dare she infringe upon my terrain, small as it was? Anyway, my mother, or whomever I had argued with, would never have to know the details of my exam, right? Eating crow is always easier when no one else knows about it, take it from me. But as I tried to move my mind beyond its usual confines, to allow myself to imagine things I had thought ridiculous before, a subversive idea entered my psyche. Perhaps the committee had been communicating secretly with my mother? OK, that's too preposterous to be believed, and I don't have time to figure out motives and subplots, anyway.

Think! I had to come up with some way that this paradox, this scientific impossibility, could happen. I eventually realized that the hot water would evaporate faster than the cold, and was finally able to jot down a few meager ideas about under what conditions one would expect the hot water to freeze first. This was in about 1985, when several definitive articles on the Mpemba Effect, as it came to be called, had already appeared, but when anyone espousing such an idea

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