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ESSAY

SCHRÖDINGER'S CROSS: THE QUANTUM MECHANICS OF THE ESTABLISHMENT CLAUSE

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PERHAPS the most famous character in modern physics is Schrödinger's cat, an unfortunate feline trapped in a box alongside a flask containing deadly poison that may or may not have been released. Thanks to the wonders of quantum mechanics, the cat is *both* alive and dead—"mixed or smeared out in equal parts"—until the box is opened, at which point the act of observation causes its state to collapse into either life *or* death.

Far away[1] in the Mojave Desert, the "life" of a six-foot-tall cross is disputed: it is either a religious symbol or it is not.[2] Like the cat, it has spent much of its life (or non-life) in a box that makes direct observation impossible.[3] Is the cross, like the cat, both alive and dead? And does opening the box—either metaphorically or otherwise—cause it to become one or the other? This Essay argues that recent forays into "constitutional physics" may have over-emphasized the role of box-opening

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[1] One hopes. Schrödinger does not indicate where his diabolical cat trap is located.

[2] Salazar v. Buono, 130 S. Ct. 1803 (2010).

[3] Nick Allen, Mojave Cross Memorial to WWI Dead 'Violates First Amendment,' Daily Telegraph, Oct. 6, 2009, available at http://www.telegraph.co.uk/news/worldnews/northamerica/usa/6266291/Mojave-Cross-memorial-to-WWI-dead-violates-first-amendment.html.

judges, and thereby elided the cat's predicament and the relationship between legal and social reality.

I. SCHRÖDINGER'S CAT

One of the many mind-bending implications of quantum mechanics is that of the quantum superposition: the simultaneous combination of all possible states of a subatomic system. In such a superposition, a particle occupies all positions at once—it is both here and not-here, there and not-there. According to the Copenhagen interpretation of quantum mechanics, which was ascendant in the 1920s, the superposition collapses into a definite state only at the point of observation.[4] The observer and the observed are therefore intertwined, and it is the act of observation that *causes* the superposition to take one state or another.

Many physicists found this explanation baffling. Albert Einstein, for one, famously refused to accept it, writing that "one cannot get around the assumption of reality—if only one is honest."[5] In 1935, Austrian physicist Erwin Schrödinger came up with a brilliant thought experiment to illustrate the odd implications of the Copenhagen interpretation's observer-centered reality:

> One can even set up quite ridiculous cases. A cat is penned up in a steel chamber, along with the following diabolical device (which must be secured against direct interference by the cat): in a Geiger counter, there is a tiny bit of radioactive substance, *so* small that *perhaps* in the course of the hour, one of the atoms decays, but also, with equal probability, perhaps none; if it happens, the counter tube discharges, and through a relay releases a hammer which shatters a small flask of hydrocyanic acid. If one has left this entire system to itself for an hour, one would say that the cat still lives *if* meanwhile no atom has decayed. The first atomic decay would have poisoned it. The [psi]-function of the entire system would express this by having in it the liv-

[4] Am. Inst. of Physics, Quantum Mechanics, 1925–27: Triumph of the Copenhagen Interpretation, http://www.aip.org/history/heisenberg/p09.htm (last visited July 7, 2010).

[5] Letter from Albert Einstein to Erwin Schrödinger (Dec. 12, 1950), *in* Letters on Wave Mechanics: Albert Einstein, Erwin Schrödinger, Max Planck, H.A. Lorentz 39 (K. Przibram ed., Martin J. Klein trans., 1967).

> ing and the dead cat (pardon the expression) mixed or smeared out in equal parts.[6]

The purpose of the thought experiment was not to suggest that a cat can be simultaneously alive and dead, but to highlight the bizarre implications of the Copenhagen approach when applied to large-scale (i.e., cat-sized) systems. Schrödinger hoped that his example would prevent people from "so naively accepting as valid a 'blurred model' for representing reality."[7]

II. CONSTITUTIONAL PHYSICS

Constitutional scholars have occasionally turned to physics to inform their craft.[8] Perhaps most importantly, in a *Harvard Law Review* essay notable both for its innovative approach and for the distinguished research assistants who helped assemble it (one in particular has had a constitutionally significant career[9]), Laurence Tribe argued that "the metaphors and intuitions that guide physicists can enrich our comprehension of social and legal issues."[10]

Tribe focused on two major developments in physics. First, the theory of general relativity demonstrated the interconnectedness of physical masses and space-time, showing that there is no such thing as a "foreground" of physical objects and a "background" of space.[11] Space itself is curved by physical objects, and it is that curvature—not a "flat" universe—through which objects move.

Tribe argued that as it is with space-time, so is it with "the Curvature of Constitutional Space." For example, he suggested that the search for *specific* state action regarding a *particular* individual (the approach taken in cases like *DeShaney v. Winnebago County Department of Social Services*[12]) is misguided. Instead, it is the pervasive influence of the "le-

[6] John D. Trimmer, The Present Situation in Quantum Mechanics: A Translation of Schrödinger's "Cat Paradox Paper," 124 Proc. of the Amer. Phil. Soc'y 323, 328 (1980), available at http://www.tu-harburg.de/rzt/rzt/it/QM/cat.html.

[7] Id.

[8] See, e.g., Brian Stuart Koukoutchos, Constitutional Kinetics: The Independent Counsel Case and the Separation of Powers, 23 Wake Forest L. Rev. 635 (1988).

[9] See http://www.whitehouse.gov/administration/president-obama.

[10] Laurence H. Tribe, The Curvature of Constitutional Space: What Lawyers Can Learn from Modern Physics, 103 Harv. L. Rev. 1, 2 (1989).

[11] Id. at 5–7.

[12] 489 U.S. 189 (1989).

gal structure itself"[13]—not necessarily any particular act—that demonstrates the state's involvement in Poor Joshua's situation. In other words, as with relativity, it is simply impossible to separate foreground (that is, state action, or the movement of a physical object) from background (that is, private ordering, or the space through which a physical object moves).

Tribe turned next to quantum theory, focusing on Heisenberg's Uncertainty Principle, which holds that one cannot simultaneously measure the precise position and momentum of a particle—the more accurately one measures the former, the more impossible it is to know the latter. Tribe extended this principle into constitutional law by extracting from it two related ideas: "[F]irst, that any observation necessarily requires intervention into the system being studied; and second, that we can never be certain that the intervention did not itself change the system in some unknown way."[14] Thus "courts must take into account how the very process of legal 'observation' (i.e., judging) shapes both the judges themselves and the materials being judged."[15]

John M. Bickers explores this second idea in his recent article "Of Non-Horses, Quantum Mechanics, and the Establishment Clause."[16] Bickers argues that courts must "acknowledge their own role in the process, and admit that their actions cannot be neutral between religion and nonreligion."[17] Like Tribe and the physicists of the Copenhagen school, he breaks down the supposed division between observer and observed, and demonstrates quite convincingly that courts inevitably shape the world in which they operate.

III. THE QUANTUM MECHANICS OF THE ESTABLISHMENT CLAUSE

Tribe and Bickers implicitly embrace a Copenhagen interpretation of constitutional physics. They pick up quantum theory at the point of observation—the point at which the superposition collapses into a classical state—and use it to argue for increased focus on the interdependence of object and observation (which they equate with judging) in the constitutional context.

[13] Tribe, supra note 10, at 12.
[14] Id. at 18.
[15] Id. at 20.
[16] John M. Bickers, Of Non-Horses, Quantum Mechanics, and the Establishment Clause, 57 U. Kan. L. Rev. 371 (2009).
[17] Id. at 394.

This is precisely the kind of thinking that drove Schrödinger to (perhaps) kill his cat. The very purpose of his thought experiment was to show the difficulty of accepting a "blurred reality" of the type Tribe and Bickers describe. The jarring thing about Schrödinger's cat, after all, is not simply that it is either alive or dead once the box opens, nor even that opening the box blesses or dooms it, but that before the box is opened it is *both* dead and alive. If, as Tribe suggests, "the metaphors and intuitions that guide physicists can enrich our comprehension of social and legal issues,"[18] what can they tell us about the superposition of legal reality? What reality exists *before* judges render judgment?

These questions implicitly arise in Establishment Clause cases regarding government involvement with religious iconography. As in Schrödinger's thought experiment, such cases implicate a fundamental and binary choice: a government-maintained symbol is, in a sense, either "alive" (predominantly religious, and therefore unconstitutional) or "dead" (secular, and therefore acceptable).[19] Moreover, as Tribe and Bickers argue, the very act of observation—however one chooses to define it—has an impact on whether the symbol is alive or dead, in both a legal and social sense. But what is the status of the iconography before judges make their observation? And why should it be the judges' observation that counts?

A. Legal and Social Superpositions

Because Tribe and Bickers pick up their analysis at the point of observation, they inevitably focus on the role and importance of that observer—that is, of the judge. But what is in the box before the judges open it? Did the framed copy of the Ten Commandments in the McCreary county courthouse only "become" religious after the Supreme Court decided *McCreary County v. ACLU*?[20]

In a purely legal sense, the answer may be a straightforward "yes": nothing is unconstitutional until a court rules it so. But if that's all there is to the physics analogy, it would not be very interesting. It would

[18] Tribe, supra note 10, at 2.

[19] In order to limit variables, I have focused on cases in which the only question is whether or not a particular icon is religious—I assume, therefore, that the other Establishment Clause variables are satisfied. For explanation of these variables, see *Lemon v. Kurtzman*, 403 U.S. 602, 612–13 (1971) (laying out a three-prong test to determine constitutionality under the Establishment Clause).

[20] 545 U.S. 844 (2005).

prove only the obvious point that courts' judgments have legal effect in particular cases.

Of course, there is more to the analogy than that. The real insight of the Tribe/Bickers analysis is that courts as legal actors cannot be separated from courts as social actors, any more than law can be separated from the supposed "background" of social meaning. Thus a cross may be a popular religious icon even if a court rules that it is not. In *Van Orden v. Perry*,[21] for example, Justice Breyer's controlling concurrence concluded that a Ten Commandments monument displayed at the Texas state capitol had "a predominately secular message."[22] But that does not mean that the people of Austin really see it that way.

In other words, a cross is not *nothing* until a court "observes" it, nor is the court's ruling the only thing that determines its meaning. The legal and social "lives" of a religious icon are intertwined but distinct. For example, some threads of Establishment Clause doctrine indicate that courts should base their legal determinations on social understandings—this is the essence of the endorsement test, which defines legal reality as a "reasonable observer" would see it.[23]

And just as social reality may intrude on legal meaning, so too can the reverse be true. For example, when Alabama Chief Justice Roy Moore refused to remove a Ten Commandments monument from his courthouse, the monument *became* an important religious icon for many Christian evangelicals[24]—not because the federal courts found it to be an impermissible government endorsement of religion, but because they ordered it to be removed. In other words, it was not the court's "observation" of the icon that gave it life or death, but rather the legal consequences of that observation. If Schrödinger's observer killed every live cat he found in a box, for example, we would not say that his observation alone "caused" the cats to die.

One might object to the cat/cross analogy on the grounds that it is easy to tell the difference between living and dead cats, but not necessarily between religious and nonreligious crosses. Or perhaps the latter is a "matter of opinion," whereas the cat's vital signs are not. But this differ-

[21] 545 U.S. 677 (2005).

[22] Id. at 702.

[23] County of Allegheny v. ACLU, 492 U.S. 573, 620 (1989).

[24] Jeffrey Gettleman, Supporters of Ten Commandments Rally On, N.Y. Times, Aug. 24, 2003, at 20, available at http://www.nytimes.com/2003/08/24/us/supporters-of-ten-commandments-rally-on.html.

ence is not as great as it seems, at least not in a legal sense, because courts must give determinate answers to legal questions—their "opinions" *are* legal reality. As Bickers points out, "At the end of the case, the court must decide. It may grant the injunction, or it may deny it. It can allow the state to prohibit the teaching of evolution or it can forbid the state from doing so."[25]

A court's ruling therefore resolves the superposition with regard to specific legal questions: it creates one reality or another. But the binary and definite nature of a cross's legal state does not mean that its social meaning must follow suit—a cross can have socially recognized religious significance no matter what a court rules. And this parallel reality complicates matters, for Tribe and Bickers have convincingly shown that the legal and social lives of religious icons cannot be totally separated. Perhaps we would do well to focus on who is opening the box, rather than what is inside it.

B. Thinking Outside the Box

The dramatic moment in Schrödinger's thought experiment (especially for the cat) is the point of observation—the point at which the box is opened and the superposition collapses into a definite state of life or death. Clearly the cat is the star of the show. But what of the mysterious observer? Who is he or she, and who is her legal analogue? Tribe and Bickers implicitly equate "observation" with the act of judging. But why should that be the case?

Some strains of Establishment Clause doctrine suggest that in fact judges are *not* the relevant observers. The endorsement test, for example, asks whether a reasonable and fully informed observer would consider a particular symbol to be a government endorsement of religion.[26] On the one hand, this seems refreshingly analogous to Schrödinger's experiment: it does, after all, involve an observer. But it also raises problems for the analogy. Who is the one doing the observing? The judge? Or the "reasonable observer" from whose hypothetical perspective the judge is evaluating the symbol? Is it even possible to separate the two?

Certainly if we are to consider the social meaning of religious icons, and not just their legal status, then we must also take into account the many people who "observe" them. Different people are bound to see dif-

[25] Bickers, supra note 16, at 383.
[26] Salazar v. Buono, 130 S. Ct. 1803, 1819–20 (2010).

ferent things; indeed, different *Justices* see different things. Are they all simply opening their own boxes? What if a judge or Justice, hoping to "save" a cross he knows full well to be religious, pens an opinion saying that it is not? (Does Schrödinger's cat live if the first observer relays a false report?) And how are we to make sense of the fact that the life of religious iconography—like all of the socio-legal objects Tribe and Bickers discuss—is constantly changing in response to more than just law?

These difficulties help vindicate Schrödinger. His goal, after all, was to show the absurd implications of the Copenhagen interpretation's belief that observation creates reality—the same belief reiterated by Tribe and Bickers. So, too, must constitutional theorists be able to construct models that recognize a reality outside of that created by judges' "observation." One answer may be to say that legal superpositions *must* resolve to a definite state ("observation" by judges makes this so); but that social meaning superpositions *cannot* do so, for the simple reason that there is no observer capable of prying the box open. But this explanation puts a lot of weight on the supposed division between legal and social meaning, which Tribe and Bickers have convincingly demonstrated does not exist. How can we escape the box? If it is unclear whose observation counts, and the act of observation does not fully resolve every relevant meaning, then the cat will continue to be both alive and dead, even after the box has been opened.

CONCLUSION

In August 2010, just a few months after the Supreme Court's decision in the Mojave Cross case, the Tenth Circuit decided a similar case involving an Establishment Clause challenge to a Utah Highway Patrol Association practice of erecting twelve-foot-high crosses on roadsides and other public land in order to memorialize fallen officers.[27] Applying the endorsement test—asking, in other words, whether a reasonable observer would perceive the crosses to be a government endorsement of religion—the court concluded that the cross displays were unconstitutional.[28] Its decision has already been flagged by some scholars as a

[27] Am. Atheists, Inc. v. Duncan, No. 08-4061 (10th Cir. Aug. 18, 2010), http://www.ca10.uscourts.gov/opinions/08/08-4061.pdf.

[28] Id. slip op. at 4–5.

possible vehicle for Supreme Court review, and likely retirement, of the endorsement test.[29]

There may be good reasons to do away with the endorsement test, but there is at least one reason not to—namely, that it helps avoid the seemingly absurd implications of theories that give judges final say over "reality." Rather than focusing on judges as the box-openers whose observations determine whether a piece of iconography is religious ("alive") or secular ("dead"), the endorsement test attempts to move them one step further away. As in the Tenth Circuit case, their role is to report reality, not create it. In that sense, they watch the people who open the boxes, rather than doing so themselves.

Tribe, Bickers, and the Copenhagen school of physics are all undoubtedly correct that observation—whether of constitutional or atomic phenomena—impacts reality. But their insight implies the existence of a pre-observation "blurred reality," which is as difficult to comprehend as Schrödinger's alive/dead cat. By adopting social reality *as* legal reality in Establishment Clause cases, the endorsement tests provides a way to make sense of this "mixed and smeared out" existence.

[29] Eugene Volokh, A Possible Endorsement Test Case for the U.S. Supreme Court?, Volokh Conspiracy (Aug. 18, 2010, 11:59 pm), http://volokh.com/2010/08/18/a-possible-endorsement-test-case-for-the-u-s-supreme-court/.