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BOOK REVIEW

Cyrus C.M. Mody, *The Squares: US Physical and Engineering Scientists in the Long 1970s*

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The physical scientists and engineers at the centre of Cyrus Mody's new book are simultaneously familiar and elusive figures. Anyone who has studied the transformative effects of Cold War funding on American academic and industrial laboratories will recognize them. They were overwhelmingly white, middle-class men who tended to dress conservatively and downplayed their political stances, even during increasingly tumultuous debates over their contributions to the conflict in Vietnam. Yet despite comprising the bulk of the nation's scientific workforce in the 1960s and 1970s, these researchers have largely avoided collective analysis. Instead, historians investigating this period have devoted more attention to activists protesting the military–industrial complex and individual scientists engaging with countercultural ideas.

Framing his study in deliberate contrast to previous explorations of 'groovy' science, Mody seeks to understand how 'squares' working in the scientific mainstream reacted to political, economic and environmental crises between the late 1960s and the early 1980s. He acknowledges the shortcomings of 'squareness' as an analytical category, since it encompasses researchers with a wide range of professional and ideological backgrounds, unified partially by demography but primarily by their public reticence. It is precisely this ambivalence, however, that makes the squares an intriguing lens through which to view changes in American science during the 'long 1970s'. As military budgets for basic research shrunk, universities grew increasingly entrepreneurial, and the government pivoted from directly sponsoring research and development to fostering partnerships between industry and academia, the squares embraced a variety of tactics to secure financial support and reaffirm their professional standing.

Through a series of case studies set at universities, government agencies and corporations, Mody demonstrates how the pursuit of these objectives led some squares to advocate for the kind of socially relevant projects that one might normally associate with their groovier counterparts. At the University of California, Santa Barbara (UCSB), the physics department responded to new limits on federal funding and dwindling enrolment numbers by creating a Master of Scientific Instrumentation programme that emphasized the development of new civilian technologies. A similar dynamic played out at Stanford University, where administrators promoted interdisciplinary research to defuse tensions over the school's association with the national security state. At both universities, students helped design new types of biomedical equipment, environmental sensors and aids for people with disabilities.

The change in research priorities at UCSB and Stanford occurred elsewhere, though the motivations behind each realignment varied. At NASA, the decision stemmed from what Mody terms a crisis of 'existential success' following the Apollo 11 moon landing. Neil Armstrong's 'one small step' provided compelling evidence of America's technical superiority over the Soviets but raised questions about the space programme's long-term future. The Nixon administration and Congress could not justify the expense of future lunar missions and urged NASA's leaders to turn their attention from the heavens to the earth. In response, squares at the Johnson Space Center (JSC) and Jet Propulsion Laboratory (JPL) started brainstorming ways to address issues like crime and poverty. Some of their projects, like fingerprint recognition software for the Federal Bureau of Investigation, reaffirmed Nixon's 'law and order' agenda, whereas others, including telemedicine systems for rural and indigenous communities, were more progressive.

One research topic that bridged the political divide was solar energy, which took on greater importance after the 1973 oil embargo. As gasoline prices spiked, the government launched several new renewable-energy initiatives. Researchers at JSC and JPL played an important role in these efforts, and soon they were joined by colleagues in academic and corporate labs. Even relatively strait-laced scientists like Jack Kilby, the co-inventor of the integrated circuit whom Mody characterizes as the 'squarest of squares', took an active interest in solar power, despite its association with the environmentalist movement.

Kilby's experiences illustrate the factors that prompted some squares to pursue socially relevant research, as well as the limits of their involvement. The energy crisis inspired him to design a new form of photovoltaic panel that theoretically offered increased efficiency and lower manufacturing costs. He persuaded Texas Instruments (TI) to invest in the technology but found it difficult to make headway in the burgeoning solar industry. Instead of partnering with experts at the Department of Energy, who struck them as overly idealistic reformers, Kilby and TI sought patrons in the military who shared a more pragmatic vision of solar power. Despite promising back-channel conversations, the Pentagon ultimately deferred, arguing that expanded fossil-fuel production was the best way to ensure America's energy security.

The collapse of TI's solar-energy system mirrored the fates of similar projects that the squares initiated during the long 1970s. Regardless of their desire to solve civilian problems, many found it difficult to disconnect from Cold War military partnerships or acknowledge the expertise of stakeholders with different political views or professional backgrounds. In addition, most of the squares' public-facing initiatives relied on external incentives. Once that pressure was removed, those programs were shelved. The Reagan administration's cuts to alternative-energy funding in the early 1980s curtailed future solar projects, while the completion of the space shuttle led NASA to abandon its various terrestrial endeavours.

Still, the persistence of academic rhetoric surrounding interdisciplinarity and responsible innovation reminds us of a period when it was possible to imagine that the squares' technical expertise would be mobilized for the public good. If we wish to cultivate a similar sense of civic duty among contemporary researchers, there is much to learn from their 1970s predecessors, many of whose stories remain untold. Mody suggests a number of potential follow-up studies, most notably an examination of racial politics and technoscience in the post-civil rights South. His book also leaves room for a gendered discussion of squareness that examines the relationship between masculinity and scientists' professional identities. Whether considered on its own or as a starting point for future investigations, *The Squares* deserves attention from historians and policy makers for demonstrating the importance of scholarly engagement with the scientific 'silent majority.'

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