The Cornell Kitchen: Housing and Design Research in Postwar America

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Correction: There was an error in the spelling of Don Toromanoff's name in the print issue. The online version has been corrected.

The Cornell Kitchen

Housing and Design Research in Postwar America

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ABSTRACT: The Cornell Kitchen (1950–55) was produced at Cornell University by a multidisciplinary team with expertise in home economics, engineering, architecture, and psychology. It promised to deliver rational design, functional principles, aesthetic appeal, and emotional satisfaction in one prefabricated, easy-to-install package. This article sets out the kitchen's history from its design to its field-testing phase to its impact on postwar kitchens. It argues that the kitchen represents an important effort to approach housing in a more scientific way; scientific methods were deployed to understand both the physical and socio-psychological problems of dwelling. The project also sought to introduce a specific model for leveraging housing research into the real world, partnering with industry to mass produce scientific designs. Social scientific methods were hence used to create not only more livable but also more saleable products in an effort to appeal to manufacturers and consumers alike.

The Cornell Kitchen, created between 1950 and 1955 at Cornell University, was a phenomenon, even by the kitchen-obsessed standards of the postwar period.[1] Produced by a team with expertise in home economics, engineering,

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1. Historical studies that discuss the American kitchen's cultural relevance during the cold war include: Greg Castillo, *Cold War on the Home Front*; Beatriz Colomina, *Domesticity at War*; Dianne Harris, *Little White Houses*; Cynthia Lee Henthorn, *From*

architecture, and social psychology, the kitchen aimed to deliver rational design, functional principles, aesthetic appeal, and emotional satisfaction in one prefabricated, easy-to-install package. Even if it did not achieve all it promised, its synthetic vision tantalized audiences enough to garner tremendous interest and publicity in its day, both in America and abroad.

The Cornell Kitchen continues to be cited prominently in contemporary studies of twentieth-century kitchen design produced by historians of architecture, design, home economics, and technology.[2] Surprisingly, however, the kitchen has never been the subject of its own academic study and remains poorly understood. Drawing on the substantial archival records at Cornell University, this article explores the full story of the kitchen's five-year development from its design to its manufacture to its field-testing phase, when it was installed in the homes of local families and observed in use for nine months. It also tracks the kitchen's reception and impact on postwar kitchen design. Its larger aim, however, is to examine the changing historical context from which the kitchen emerged, specifically treating it as an index to shifts in housing and design research in postwar America. As a university-based, government-funded project devoted to the most culturally significant space in the home, the Cornell Kitchen was an important early response to the call for a "more exact and more scientific" approach to housing design.[3]

Submarines to Suburbs; and Cynthia Lee Henthorn, "The Emblematic Kitchen." For accounts of how the American kitchen was received in other countries, see Annmarie Adams and Don Toromanoff, "Kitchen Kinetics"; Ruth Oldenziel and Karin Zachmann, eds., *Cold War Kitchen*, esp. Oldenziel, "Exporting the American Cold War Kitchen"; Susan Reid, "The Khrushchev Kitchen"; and Paolo Scrivano, "Signs of Americanization in Italian Domestic Life." Those that specifically cite the Cornell Kitchen are: Adams and Toromanoff, "Kitchen Kinetics," 28–30; Oldenziel and Zachmann, *Cold War Kitchen*, 15; and Scrivano, "Signs of Americanization in Italian Domestic Life," 331, 333–35.

2. Key sources on kitchen design and domestic technologies consulted for this article include: Annmarie Adams, "The Eichler Home"; Mary Anne Beecher, "Promoting the 'Unit Idea'"; Genvieve Bell and Joseph Kaye, "Designing Technology for Domestic Spaces"; Nicholas Bullock, "First the Kitchen: Then the Façade"; Irene Cieraad, "'Out of My Kitchen!'"; Ruth Schwartz Cowan, *More Work for Mother*; Elizabeth C. Cromley, *The Food Axis*; Kathryn Ferry, *The 1950s Kitchen*; Adrian Forty, *Objects of Desire*, esp. 207–21; Siegfried Giedion, *Mechanization Takes Command*, 512–47, 596–627; Susan Henderson, "A Revolution in the Woman's Sphere"; Orsi Husz and Karin Carlsson, "Marketing a New Society or Engineering Kitchens?"; Sandy Isenstadt, "Visions of Plenty"; Julie Kinchin with Aidan O'Connor, *Counter Space* (the Cornell Kitchen is illustrated on 42–43); Leslie Land, "Counterintuitive"; Ellen Lupton and J. Abbott Miller, *The Bathroom, the Kitchen and the Aesthetics of Waste*, 41–65; Joy Parr, "Modern Kitchen, Good Home, Strong Nation"; and Chad Randl, "'Look Who's Designing Kitchens.'" The most sustained discussions of the Cornell Kitchen to date are Deborah Schneiderman, "The Prefabricated Interior," 199–200; and Deborah Schneiderman, "The Prefabricated Kitchen," 253–55.

3. Milton Blum and Beatrice Candee, *Family Behavior, Attitudes and Possessions*, 9.

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In examining this shift, this article adds to the growing literature around postwar design research in America, which focuses on the turn to scientism in architectural education and practice. Scholars such as Arindam Dutta and Avigail Sachs have tracked how universities at this time attempted to transform architecture from a "soft" discipline defined by its relationship to the arts into a "hard" one held to the same standards of verifiability as the sciences.[4] Proponents believed that it was only by adopting a scientific approach that complex environmental problems could be tackled at scale and, given the severe shortage of postwar homes, housing emerged as the complex environmental problem par excellence. Strikingly, housing was no longer understood as a strictly technical or biomechanical problem; it was now also defined as a social-psychological one. Consequently, architects and engineers initiated collaborations with social scientists, especially psychologists, sociologists, and management specialists, in an effort to make dwellings more "livable" and more responsive to "human factors" as they were termed.[5] The scientific approach was inherently multidisciplinary. It was also experimental: spatial solutions were to be proposed, empirically tested, and refined.

The Cornell Kitchen exactly fits this emerging paradigm. Its project leader, Professor Glenn H. Beyer, was not a designer but an economist with ten years' experience in government bodies such as the National Housing Authority (fig. 1). Under Beyer's direction, the project explicitly attempted to respond to both technological and social-psychological issues associated with kitchen use. Studying such diverse factors—from technical requirements to user values—required the cooperation of a large number of researchers and consultants. These were drawn from four separate colleges at Cornell University, eight state agricultural experiment stations, and the United States Department of Agriculture (USDA). Crucially, the project also called on the technical expertise and resources of corporate sponsors such as Monsanto, General Electric, and Reynolds Metals Company, particularly as it moved into its manufacturing phase.

While these collaborations looked logical on paper, a more detailed study of the Cornell Kitchen reveals how difficult they were to manage in practice. Conflicts quickly emerged over the course of the kitchen's development, demonstrating how multidisciplinary research challenged embedded ideas about authorship and subject-specific expertise. Ideological differences surfaced, too, especially around the question of the project's aims. While the collaborators all agreed that a scientific approach would

4. See Arindam Dutta, ed., *A Second Modernism*; and Avigail Sachs, "Research for Architecture."

5. For an overview of the questions housing reformers believed social scientific research could address, see Catherine Bauer, "Social Research as a Tool for Community Planning." For the turn to the social sciences in architecture, see Avigail Sachs, "Architects, Users, and the Social Sciences in Postwar America"; and Avigail Sachs, "The Postwar Legacy of Architectural Research."

FIG. 1 Professor Glenn H. Beyer examining the Cornell Kitchens installed for demonstration purposes at the Housing Research Center Laboratory, Cornell University, 1954. (Source: NYSC, Box 77, folder 12.)

benefit the user, they fundamentally disagreed over how those benefits should be realized. The college most closely linked to the project, the New York State College of Home Economics at Cornell, had a tradition of diffusing functional design principles directly to rural populations so they could improve home environments themselves. By contrast, Beyer believed that, for maximum impact, researchers had to implant scientific principles into mass-market products. "If kitchen research is to be of ultimate benefit to the consumer," he insisted, "it must be translated into form and substance."[6]

It was this reorientation toward mass production that led Beyer to seek out partnerships with industry. The belief that the market was the best means to disseminate findings also pushed him to enter the realm of consumer research, using social scientific techniques to enhance not only the livability but the saleability of designs in order to guarantee their widest possible distribution. The example of the Cornell Kitchen underscores that the turn to scientism often went hand-in-hand with the promotion of mass consumerism; Beyer himself promised that this alliance would secure new relevance for university research. Over and above any of its particular de-

6. Glenn H. Beyer, ed., *The Cornell Kitchen*, 56.

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sign innovations, the Cornell Kitchen strove to establish a market- and marketing-friendly model for housing studies which, in its turn, would serve as a template for future funded design projects. Due to its fractured reception and partial realization, however, the kitchen was never a success in these terms and the model that it proposed for housing and design research would soon be revealed to have complexities and shortcomings of its own.

Applied Research in Rural Housing

The Cornell Kitchen emerged out of a much larger, federally funded study of farm housing in northeastern states, which began in 1948 and ran for just over a decade. Coordinated by the USDA Bureau of Home Economics, this larger project involved research teams from eight state agricultural experiment stations and aimed to develop design standards for rural houses that would improve "efficiency in household operation, liveability, and economy in construction."[7] The scale and ambition of this study remind us that, although scholarly studies of postwar housing tend to focus on suburban and urban developments, rural housing was also a significant preoccupation at this time as successive governments saw it as key to stabilizing rural-to-urban migration. As a result, its research was comparatively well funded, leading manufactured housing expert Albert G. H. Dietz to note enviously, "The Department of Agriculture spends more money on housing research for 6 million farm families than the Housing and Home Finance Agency spends on housing research for 55 million nonfarm families."[8]

For the farm housing study's first stage, between 1948 and 1949, a survey was conducted of families on owner-operated farms in twelve northeastern states to determine their space requirements and preferences for meal preparation, serving, laundering, clothing storage, and farm business. Led by Glenn Beyer, the Cornell team analyzed and wrote up the results of these 607 interviews (representative of 183,200 families) which were published in *Farm Housing in the Northeast* (1949).[9] Researchers then embarked on the second phase of the project, using laboratory experimenta-

7. This project, "Study of Space, Facility, and Structural Requirements for Farm Houses in the Northeast Region," was funded by the Research and Marketing Act of 1946, and set into motion by the chief of the USDA Bureau of Home Economics, Hazel K. Stiebling. Hazel K. Stiebling to Dr. C. E. F. Guterman [New York State Agricultural Experiment Station at Cornell] (29 August 1947), in NYSC, Box 21, folder 70; "Research and Marketing Project" ("Determination of space and facility needs . . .") (c. 1947), in NYSC, Box 21, folder 70. On the Bureau of Home Economics, see Goldstein, *Creating Consumers*, esp. 62–135, 242–81.

8. Albert G. H. Dietz, "Housing Industry Research," 240.

9. Glenn H. Beyer, with the Northeastern Farm Housing Technical Committee, *Farm Housing in the Northeast*, 3.

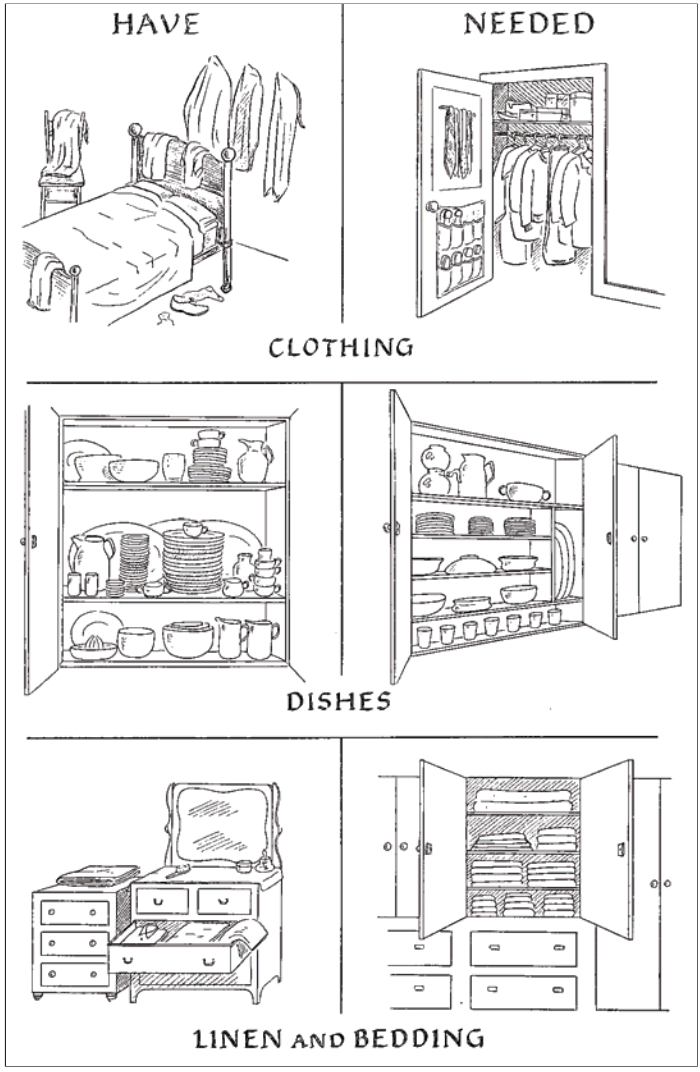

FIG. 2 "Have/Needed." (Source: Glenn H. Beyer, *Farm Housing in the Northeast*, 154.)

tion to establish space dimensions and arrangements that would meet housing needs identified in the survey (fig. 2). Each state was assigned a different space and activity: Penn State Agricultural Experiment Station took charge of "Activities related to care of clothing and household linens"; Rhode Island Agricultural Experiment Station, "Activities relating to care of the house"; and the New York State Agricultural Experiment Station at Cornell, "Activities related to food." What would eventually be known as the Cornell Kitchen came out of this last project.

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"Activities related to food" was the biggest area of research and Beyer was able to take it on primarily thanks to the expertise of two land-grant colleges based at Cornell: the New York State College of Home Economics and the New York State College of Agriculture.[10] Staff members at the former were responsible for studying kitchen space requirements, use, and planning; staff at the latter took on fabrication methods, materials, and technology. Both colleges brought a deep knowledge of farm lives to their research and Home Economics had long made rural housing a particular focus of study. In fact, a concern for rural housing defined most university-based home economics programs in America, which were first set up in agricultural colleges of land-grant institutions (as at Cornell), with a precise mandate to improve the health, finances, and home lives of farm families. This mandate was reinforced by the creation of the Agricultural and Home Economics Extension Service in 1914, which charged these institutions with diffusing advances in farm business and home management directly to rural communities.[11]

In sum, the research of Cornell's home economists was always meant to be applied to rural homes and the space where it was most frequently applied was the kitchen. The College of Home Economics' very first attempt to engage farmers' wives in 1900 had taken the kitchen as its subject: women were invited to count the number of steps they took each day preparing meals, write in with an estimate of their meal travel miles, and the college would "consider whether it has all been unavoidable."[12] The question was rhetorical, as university-based home economics programs were entirely premised on the notion that the fatigue attending domestic tasks *was* avoidable. The belief that kitchen work had to be rationalized and kitchens modernized if farm women were to be "saved" from overwork would sustain the home economists' zeal for efficiency studies, labor-saving devices, and functional planning for decades to come.[13] Although Beyer's ideas about how to go about modernizing homes differed from those of his colleagues, he essentially accepted their view—and that of the USDA Bureau of Home Economics—that improving the lives of rural women required a radical revisioning of their primary workspace.

10. Land-grant institutions were funded through the federal Morrill Land-Grant Act of 1862, which gave land and funding to colleges willing to focus on technical, applied subjects. Cornell has a mix of both land-grant and privately endowed colleges: the Cornell Kitchen research officially involved departments from both the former—the New York State College of Agriculture and the New York State College of Home Economics (now Human Ecology)—and the latter—the Colleges of Architecture and of Engineering.

11. Katherine Jellison notes that by 1905 almost all of the country's land-grant colleges had established home economics departments, and Nancy K. Berlage counts thirty by 1900. Jellison, *Entitled to Power*, 16; Berlage, "The Establishment of an Applied Social Science," 187, 195–98.

12. Quoted in Flora Rose, Esther H. Stocks, and Michael W. Whittier, *A Growing College*, 21.

13. See Ronald R. Kline, *Consumers in the Country*, 87–112.

In 1947, when Beyer arrived at Cornell, the College of Home Economics' Department of Housing and Design was concentrated on the problem of rehabilitating aging rural housing stock, a pressing problem in New York State, where 72 percent of farm homes were over forty-five years old.[14] That same year, by means of visits, demonstrations, courses, lectures, and clinics, the department's extension agents (including a dedicated architect) helped 1,504 farm families remodel their dwellings.[15] But it was evident that such personalized efforts alone were not sufficient to address the scale of the problem; hence, with state funding, staff also began to assess housing needs more systematically through surveys and compilations of census data.[16] It was to develop this scientific data-driven approach that the department hired Beyer as professor of housing and design, which Cornell claimed was the first such full-time appointment in the nation.[17] Three years later, Beyer was named the first director of Cornell's Housing Research Center, established in 1950 in the wake of the Housing Act of 1949, which dedicated federal funding specifically to housing research.

A passionate believer in interdisciplinary research, Beyer explained that a Housing Research Center was the best way of "approaching complex problems from the standpoint of several disciplines in a coordinated manner."[18] The center did not actually mark a substantially new direction for the university, as it largely built on existing research programs in home economics and the applied model of extension. Yet the establishment of a dedicated center served to announce Cornell's scientific ambitions—a message driven home by its logo of a house under a microscope—and, critically, positioned it to compete with other university research centers for funding[19] (fig. 3). One successful rival was the Small Homes Council of the

14. "1947 Annual Report of Extension Activities, Department of Housing and Design, College of Home Economics, Cornell University, New York" (1947), 3, in DDEA, Box 1.

15. In clinics, families would tell extension architect Ruby M. Loper about their housing needs and she would draw up remodeling plans. A household management specialist was also on hand to advise on kitchen designs. Some families then allowed their renovated houses to be used for demonstration. Ibid., 18.

16. Rose, Stocks, and Whittier, *A Growing College*, 166–67. See Grace Morin, *Farm Housing and Some Related Economic and Social Factors*.

17. Prior to his appointment, Beyer spent ten years in the Federal Housing Administration and the National Housing Authority. He came to Cornell with a mandate to take charge of the College of Home Economics' rural housing research program, which he did in 1950, replacing Professor Grace Morin. See "Cornell University Agricultural Experiment Station, Final Report on Housing and Design State Project No. 8, Farm House Storage Facilities for Food Commodities and Related Equipment," 1 (n.d.), in NYSC, Box 22, folder 3; Virginia True to Dean Vincent (29 December 1947), in NYSC, Box 22, folder 10; and Memo re: State Rural Housing Research (20 February 1950), in NYSC, Box 22, folder 13.

18. Glenn H. Beyer, "A Memorandum on 'University Centers'" (1 February 1961), 1, in GHB, Box 8, folder 88.

19. In making these organizational moves to capture funding, Cornell was consistent with other American universities at this time. Arindam Dutta notes that economists

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FIG. 3 Original logo of Housing Research Center, 1950. (Source: GHB, Box 4, folder 11.)

University of Illinois at Urbana-Champaign which, in conjunction with the Illinois Agricultural Experiment Station, was then at work on a kitchen study financed by Hotpoint.[20] Indeed, by 1949, the field of kitchen research was already crowded: as well as other agricultural research stations and home economics departments, government agencies, private foundations, and even public health organizations all had high-profile studies under way.

Embarking on the "activities related to food" component of the northeastern farm housing study, Cornell's Housing Research Center needed to offer something distinctive to make its mark. Surveying the field, Beyer evidently recognized that most existing studies had a similar goal: the creation of minimum space requirements or guidelines that optimized kitchen plans for use by homeowners, architects, and builders. Yet very few designed actual kitchens, and when they did—for instance, the USDA Bureau of Home Economics' "Step-Saving U Kitchen" or the New York Heart Association's "Heart Kitchen," both from 1948—these were model kitchens intended for demonstration, not commercial manufacture.[21]

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emerged as the group with the "most clout in government corridors," putting them at the apex of the new hierarchies of research. Dutta, "Linguistics, not Grammatology," esp. 3, 9, 11.

20. See *Handbook of Kitchen Design*. For more on the Small Homes Council's work and context, see Harris, *Little White Houses*, 185–227, 205–13.

21. Household equipment specialist Lenore Sater Thye designed the "Step-Saving U Kitchen"; The "Heart Kitchen" project was led by efficiency expert Lillian Gilbreth with the assistance of Cornell household management specialists. See the USDA Miscellaneous Publication (no. 646), reprinted by Cornell as "A Step-Saving U Kitchen," *Cornell Rural Housing Leaflet* 15 (December 1948); the 1949 film *Step-Saving Kitchen*; and "The Heart of the Home."

With the Cornell Kitchen, Beyer decided not only to design an optimized kitchen, but to see it fabricated. This commitment to give housing research "form and substance" would represent a significant if controversial effort to shift away from the "passivity" of space standards toward mass-produced design, points to which we will return.

A Rational Start

Ironically, few had done more to advance research into space standards than Beyer's closest collaborators on the Cornell Kitchen project: staff members from the Department of Economics of the Household and Household Management (henceforth, Household Management), who already had an international reputation for kitchen research. While the department had studied kitchen planning and design for many years, it first received external funding in 1943 when the American Central Manufacturing Corporation underwrote a three-year study into kitchen storage needs.[22] This research then formed the basis for a state-funded study of functional kitchen storage led by renowned home manager Mary Koll Heiner, which ran from 1947 to 1952. The findings of these studies were disseminated to the public on an ongoing basis through popular bulletins such as "Kitchen Cupboards that Simplify Storage" (1947) and "Functional Kitchen Storage" (1948), national newspaper coverage, and regular exhibits at Farm and Home Week[23] (fig. 4).

Beyer and his federally funded study appeared on the scene as the state-funded project reached its midway point. Between 1950 and 1952, the two kitchen projects were merged and put under Beyer's control, in theory, a mutually beneficial move. Beyer set an iterative design process into motion, from which the Cornell Kitchen emerged. While there would be many alterations to the kitchen, its basic principles never changed. Above all, it adhered to Heiner's user-centered mantra and inside-out approach:

22. Rose, Stocks, and Whittier, *A Growing College*, 165. Results were published in two parts in *Architectural Forum*, "A New Look at the Kitchen." The experimental cabinets can also be seen in the film *Railroad Exhibits*, which features the "Farm and Home Special" demonstration train that ran through New York State in 1946.

23. The study was titled "Development of a Functional Basis for Kitchen Designing"; it was featured in the *New York Times*, among other newspapers. By 1959, 89,000 copies of "Kitchen Cupboards that Simplify Storage" had been distributed; "Cornell University Agricultural Experiment Station, Economics of the Household and Household Management: State Project no. 2 1958–9" ("Development of a functional basis for kitchen designing"), 11, in NYSC, Box 22, folder 50; "Cornell University Agricultural Experiment Station, Economics of the Household and Household Management: State Project no. 2 1949–1950" ("Development of a functional basis for kitchen designing"), 3–4, in NYSC, Box 22, folder 50; and Jane Nickerson, "Home Carpenters Can Build These Kitchen Cabinets Designed by a University."

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FIG. 4 Covers of nine kitchen bulletins printed by Cornell between 1947 and 1952 (from left to right): "Kitchens," May 1947; "Kitchen Cupboards that Simplify Storage," 1947; "Functional Kitchen Storage," 1948; "A Step-Saving U Kitchen," December 1948; "Easy-to-Build Kitchen Cabinets for the Remodeled Farmhouse," January 1949; "Cornell Kitchen Cupboards that Simplify Storage," June 1949; "Let Your Kitchen Arrangement Work for You," 1951; "Guides for Arrangement of Urban Family Kitchens," 1952; and "How to Make Cupboard Storage Devices," June 1952. (Source: NYSC, Boxes 67, 99, 104.)

Build the cabinets to fit the woman.
Build the shelves to fit the supplies.
Build the kitchen to fit the family.[24]

Beyer and his team worked from precepts established in Cornell's previous functional kitchen studies, which themselves drew on earlier rational kitchen designs. Most notably, they adopted the work station or work center concept, which had been advocated since home economist Christine Frederick in the 1910s and was a staple feature of the college's past efforts at kitchen planning.[25] Divided into five freestanding units—Oven-Refrigerator, Mix, Sink, Range, and Serve—the Cornell Kitchen grouped storage, equipment, and working surfaces around particular activities following a logical pattern of food preparation. Obeying the motion economy principle that tools be stored near the operator, every item required to carry out an activity was to be kept at its related center or built into it. Built-in equipment here included not only smaller gadgets, such as a can opener, cutting board, and paper towel holder, but also all appliances, wiring, lighting, and ventilation (fig. 5).

Given their stated objective of providing everything ("there must be a place for everything and everything must have a place"), the researchers' first challenge was to decide what should be contained in the kitchen as a whole. Their starting point was data from earlier studies, especially the 1948–49 farm housing survey, which had established facts such as 95 percent of farm families stored twelve pounds of potatoes or six bread-and-butter plates. The Cornell Kitchen made room for any item owned by 20 percent of surveyed families; quantities reflected "usual amounts" stored. Each item was then allocated to a particular work center according to the *rule of first use*: flour was at the mix center, frying pans at the range center, and so on.[26] Once "everything" had been allocated, the required storage space at each center was calculated and the optimum placement for its contents mapped out with reference to the "work curve," the user's shoulder and elbow reach (fig. 6). Frequently used, heavy items were kept within the work curve, and less frequently used items above or below it. A five-foot-three to five-foot-five-inch woman was taken as average.

Drawing on these principles and dimensions, the Department of Housing and Design and Agricultural Engineering staff designed and built a set of "trial run" wood prototype cabinets in the Housing Research

24. Gardner Soule, "New Kitchen Built to Fit *Your* Wife," 172.

25. For a summary of the evolution of rational kitchens, see Lupton and Miller, *The Bathroom, the Kitchen and the Aesthetics of Waste*, 43–49. For an example of an earlier application of the work center concept at Cornell, see Ella M. Cushman, "The Development of a Successful Kitchen."

26. Quote ("everything") from Beyer, ed., *The Cornell Kitchen*, 58. For the methods used to calculate storage needs and space requirements, see 24–28. For tables of the typical possessions the kitchen was to hold, see 83–85, 90–94.

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FIG. 5 Samples of the Cornell Kitchen's built-in features (clockwise from top left): can opener at sink center; towel storage at sink center; cutting board at mix center; and breadbox at mix center. All are photos of the kitchen installed at the Housing Research Center Laboratory, 1954. (Source: NYSC, Box 77, folder 12.)

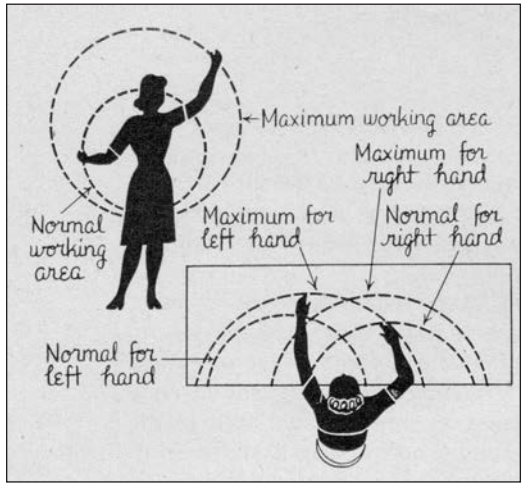

FIG. 6 Measuring the female work curve, 1948. (Source: Mary Koll Heiner and Helen E. McCullough, "Functional Kitchen Storage," 10.)

FIG. 7 Publicity photo of "trial run" cabinets in the Housing Research Center Laboratory, 1950. "Mr. L. C. Lamb [Agricultural Engineering] and Mrs. Evelyn Fisher test the arrangement of major kitchen equipment." Note the height-adjustable sink. (Source: GHB, Box 8.)

Center Laboratory between November 1950 and June 1951 (fig. 7). Their initial findings were then fed back to consulting architect Frank Weise, who incorporated them into a second set of wood-and-steel cabinets between January and March 1952. At this stage, various criteria—strain, relative effort, time spent at areas, number of jobs, space used in front of cabinets, floor-travel distance, and number of trips—were studied through the making, serving, and clearing up of family meals for four people.[27] Cornell's household managers used memomotion filming, that is, filming at slow speed, to analyze the first five criteria, while the latter two were tracked by an observer using trip charts.[28] For example: in order to measure relative effort, researchers cross-referenced the worker's filmed arm

27. Isabelle Flight made the meals, while Mary Miller observed, and Heiner, Rose Steidl, and Jean Warren gave technical assistance. Isabelle Flight and Jean Warren, "Study of Weise Kitchen, Spring 1952" (spring 1952), in CHES, Box 5, folder 20; and Isabelle Flight (in consultation with Mrs. Bratton and Miss Warren), "Farm Housing Research" (22 May 1952), in CHES, Box 11, folder 26a.

28. Cornell researchers adapted the memomotion techniques of Dr. Marvin E. Mundel at the Motion and Time Study Laboratory, Purdue University, which had shortly before carried out its own high-profile kitchen research: "Easier Housekeeping: Scientific Analysis Simplifies a Housewife's Work." For details of how Mundel's methods were modified, see Beyer, ed., *The Cornell Kitchen*, 74, fn19.

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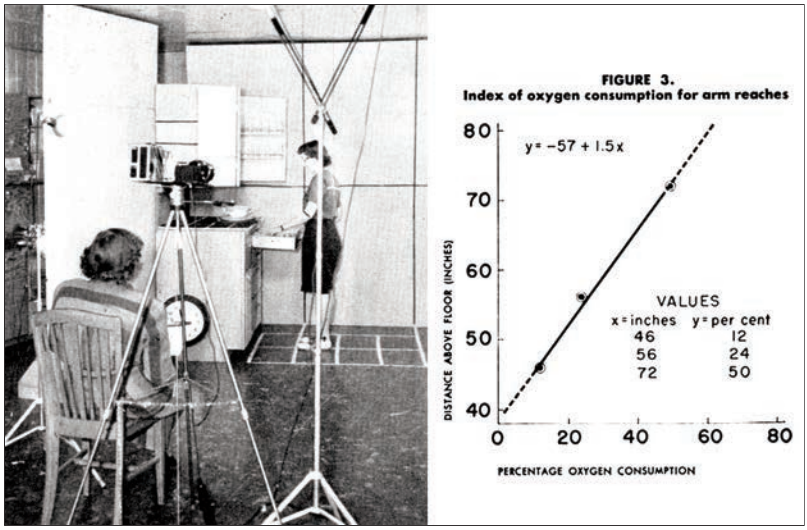

FIG. 8 (left) Memomotion filming at mix center. Note the grid showing tester's position and the clock timing it all. (Source: Gardner Soule, "New Kitchen Built to Fit *Your* Wife," *Popular Science*, September 1953, 172. Used with permission of *Popular Science* ©2017. All rights reserved.); (right) "Index of Oxygen Consumption for Arm Reaches." (Source: Glenn H. Beyer, ed., *The Cornell Kitchen*, 78.)

reaches and body bends with an index of oxygen consumption to confirm that the least fatiguing spaces for most women to use are between twenty-seven and sixty-three inches from the floor (fig. 8).

These findings suggested further refinements to space clearances and heights that informed the kitchen's next iteration. But this third—and last—design did not only take biomechanical factors into account. The subjective appraisals of testers were also recorded and passed along to Frank Weise, as was public feedback. When in 1952 the second kitchen design was put on display at Farm and Home Week, 925 visitors answered a questionnaire about their impressions. Overall, they were positive, with nearly 75 percent agreeing that the cabinets were "better than most" they had seen. Their responses to what features they liked (the oven at eye level, the sliding doors on cabinets, and the cabinet trays) or disliked (the refrigerator and "general appearance") were also folded back into the final design.[29]

In addition to work centers, this last design deployed other familiar elements from the rational kitchen repertoire, such as a space for seated work, toe space, and a waist-high oven (figs. 9 and 10). Yet the Cornell researchers also experimented freely to improve functionality and workflow. Instead of the book-like swing cabinets proposed in Cornell's earlier kitchen

29. "Summary of Results of Questionnaire Survey on Farm Kitchen Cabinets, Farm and Home Week, Cornell University, April 18–21 1952," in CHES, Box 11, folder 26a.

FIG. 9 The Cornell Kitchen in the Housing Research Center Laboratory, 1954, demonstrated by Barbara J. Kenrick, instructor in Housing and Design (clockwise from top left): stacking vertical spacers at the sink center; seated work at the sink center; cooking at range center; and reaching into server center. (Source: NYSC, Box 77, folder 12.)

studies, they opted for deep base cabinets with pullout trays and "pocket" doors that could be tucked out of the way. To make higher-up items easier to grasp, they introduced shallow, slanted upper cabinets with sliding panels. To further minimize bending, they installed a separate range with four burners laid in a row and a waist-high horizontal refrigerator with pullout shelves. To enable a better fit between center, user, and activity, they created a system of vertical spacers that could be stacked, one on top of the other, to raise a center's counter heights by up to six inches if needed. (This is why, when the Cornell Kitchen's work centers were side-by-side, their work surfaces were not single-height and continuous as a streamlined kitchen's would be.) And lastly, the kitchen's storage units were a single

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FIG. 10 Oven-refrigerator unit, 1954. Note pullout trays in fridge. (Source: CHES, Box 11, folder 18.)

size, twenty-four inches, making all fittings interchangeable to save on tooling costs, as well as potentially offering greater versatility (cabinet interiors could be reconfigured as required) and novelty (exterior panels could be swapped for differently colored ones).

The design and testing phase went smoothly until September 1952, when Beyer sent around a draft of a bulletin reporting on the project's findings to date.[30] Entitled *The Cornell Kitchen*, this draft consisted of six chapters, each authored by a different member of the research team, and then liberally edited by Beyer—too liberally, in the view of Household Management staff. Tensions between the household managers and Beyer flared, producing a series of evermore acrid memos over issues to do with authorship, attribution, and the public presentation of research. The household managers were especially aggrieved by Beyer's appropriation of the Cornell name for the kitchen, as they claimed this suggested that it had achieved perfection or, less charitably, that it needed propping up by the university imprimatur.

Beyer tried to end the dispute, arguing, "There has been a Cornell egg washer, a Cornell caponizer, and several vegetables and crops carrying the University's name. Of course, there is the Cornell-formula bread."

30. Research would, in fact, continue for another two years. The publication of the bulletin was required at this point, however, to mark the end of the state-funded portion of the project. Beyer, ed., *The Cornell Kitchen*, 74; and "Minutes of Annual Meeting, Northeastern Farm Housing Technical Committee, January 15–16, 1953, Atlantic City, New Jersey," 5, in NYSC, Box 22, folder 5.

Incidentally, Cornell bread and Cornell milk would often appear in publicity photos for the Cornell Kitchen, undoubtedly to capitalize on the university's formidable reputation in the field of nutrition. But Beyer argued that his main reason for using the Cornell name was to highlight the Housing Research Center's cooperative ethos: "What the bulletin describes is a truly Cornell-developed kitchen. It has not been the product of any one person, any one department or even one college."[31] The household managers finally gave way, yet remained unhappy—and with some cause. Up to this point, Beyer had more or less followed their inside-out approach to design and what had been produced was still identifiably a functional kitchen. But the bulletin's full description of the Cornell Kitchen's aims made clear that, even if the project adhered to their design principles, it departed from their core beliefs about how housing research should be used, and also departed from the model of rational consumption that underpinned their work.[32]

Social Psychology, Advanced Technology

A first point of difference emerged in the second chapter of *The Cornell Kitchen* bulletin, which set forth socio-psychological considerations in kitchen planning. Beyer was also studying these considerations in other Housing Research Center projects, notably, an analysis of home buying motivations funded by the Russell Sage Foundation. This parallel research sought to place homebuyers into groups defined by certain "value orientations," which would determine design criteria for more livable mass-market houses.[33] Beyer argued that "value orientations" were more meaningful than "user preferences"—typically the object of surveys and questionnaires—because the former took into account cultural background, education, habits, and experience rather than simply reflecting what people already had or knew.[34]

The Cornell Kitchen tentatively grouped homemakers according to four value orientations—family-centered living, social standing, physical convenience, or aesthetics—with the recommendation that house plans take these into account: for instance, a "family-centered" woman should have a spacious kitchen at the center of the house. More anecdotal than sci-

31. All quotes relating to this dispute are from Glenn H. Beyer to Miss Catherine Personius [coordinator of research in home economics], "Subject: The Cornell Kitchen Bulletin" (10 October 1952), 1–2, in CHES, Box 11, folder 26a.

32. On rational consumption, see Goldstein, *Creating Consumers*, esp. 2, 104.

33. This research was published as Glenn H. Beyer, Thomas W. Mackesey, and James E. Montgomery, *Houses Are for People*. See also Beyer, *Housing and Personal Values*.

34. Glenn H. Beyer, "The Family Related to Its Environment: Perspective from American Research," International Seminar on Problems of Environmental Qualities of Residential Areas, Yugoslavia (October 1968), 8–9, in CHES, Box 2, folder 11.

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entific, the discussion of values did not go much deeper than this, although values would become important later when Beyer and his team selected homemakers to field-test the kitchens. Instead, at this point, the chapter returned to more established psychological literature: "Personal Psychological Reactions" drew on industrial psychology to consider how homemakers could stay motivated when doing routine domestic tasks; "Intra- and Extra-Familial Relations" explored how social relations might impact on homemakers' overall satisfaction with their kitchens; and "Physical Factors Exerting Psychological Influence on Kitchen Design" followed ergonomic theories in advising how environmental elements from acoustics to light could alleviate stress and enhance "well-being."[35]

As this chapter summarized background research, it did not detail how these ideas were manifest in the Cornell Kitchen's design. It seemed largely aspirational, a declaration of allegiance with a social scientific approach and a definition of human needs that included the social, psychological, and emotional. Of course, earlier generations of household managers had also promised their functional designs would create happier homemakers, but this was the by-product of more rational use, that is, a rational workspace made the homemaker happier by reducing fatigue and by providing a greater sense of accomplishment.[36] To imply that a kitchen might also satisfy the needs of a homemaker with "aesthetic" or "social standing" values was pushing into different terrain entirely, that of consumerism.

Beyer was not alone in trying to bring consumer research to bear on housing at this time.[37] To do so from within home economics, however, was to upend its central credo that purchases be based on logical considerations and to acknowledge consumers' non-rational or unconscious desires for fashion, beauty, social status, and gadgets. Despite warning that advertising aroused unrealistic desires for "the latest commodity," the chapter firmly concluded that these were still "definite psychological needs which the kitchen designer must deal with."[38]

In keeping with their own advice, the Cornell Kitchen researchers not only acknowledged these psychological needs, but went to great lengths to provide what they deemed to be "the latest commodities" to their rural constituents. In spite of home economists' expertise in household equip-

35. Beyer, ed., *The Cornell Kitchen*, 22. On ergonomic theory, see John Harwood, "'The Interface': Ergonomics and Aesthetics of Survival."

36. Throughout her career, for instance, Lillian Gilbreth maintained that happiness was the reward for rational housekeeping. This was emphasized in the title of her 1954 home management guide: Gilbreth, Orpha Mae Thomas, and Eleanor Clymer, *Management in the Home: Happier Living Through Saving Time and Energy*.

37. The John B. Pierce Foundation and the Bemis Foundation were two particularly important bodies that funded scientific research into family needs and wants in housing planning and design. See Blum and Candee, *Family Behavior, Attitudes and Possessions*; and Leon Festinger, Stanley Schachter, and Kurt Back, *Social Pressures in Informal Groups*.

38. Beyer, ed., *The Cornell Kitchen*, 20.

ment testing, for instance, the bulletin gave out no advice or guidance to help consumers in making their own appliance purchases.[39] Without fanfare or justification, an electric fridge, range, and oven were simply built into the second version of the kitchen, with room left for a dishwasher, even though high running costs meant that electrical appliances were not an automatic choice for rural kitchens at the time.[40] Integrating three or four appliances into its prewired centers, the Cornell Kitchen was effectively a superstructure that delivered electrical modernity in a single hit, giving rural consumers "technological parity" with their urban and suburban counterparts whether or not they wanted it. It is no wonder electrical appliance companies such as GE, which had long bemoaned the so-called "purchase lag" among thrifty farmers, became the kitchen's enthusiastic sponsors.[41]

A second point of difference with the home economists became apparent in the bulletin's fourth chapter covering technological aspects of kitchen design. Drafted by Agricultural Engineering staff, it was the most extensive chapter, surveying typical production methods and commercially available materials for cabinet construction, from plywood to plastics. The length and detail of this chapter highlights again that the Cornell Kitchen was to be designed professionally and manufactured industrially. By contrast, since its inception, the College of Home Economics had largely sought to empower rural remodelers to improve home environments themselves. The idea that farm people should "adapt [principles] or reject them, according to their own needs and wishes" was a foundational tenet of the Extension Service and was meant to reflect its "democratic" nature.[42] Extension agents provided direct help to rural remodelers by offering one-to-one advice and working drawings, as well as enabling tools such as plans with cutout furnishings which allowed families to assess and design for their own needs. Their do-it-yourself ethos meant that household managers preferred to transmit planning principles and carpentry skills rather than to advise on materials or aesthetics. As one home economist proudly admitted, so long as a storage unit conformed to functional precepts, "it can be a plank on four legs."[43]

The Cornell Kitchen was also designed with the remodeler in mind; its

39. Amy Sue Bix, "Equipped for Life."

40. Kline, *Consumers in the Country*, Table A.16 and Table A.17, on 298.

41. Quote ("technological parity") from Jellison, *Entitled to Power*, 4; and quote ("purchase lag") from Beyer, ed., *The Cornell Kitchen*, 9. On the active role of home economists in campaigns to encourage domestic electrical consumption (including those at Cornell), see Kline, *Consumers in the Country*, 178–211, 241–71. On the aggressive promotion of electric refrigerators by GE, see Cowan, *More Work for Mother*, 128–50.

42. M. L. Wilson, "Thirty Years of Extension Work," 10. See also the firsthand account of Hazel Reed, an extension worker in New York State between 1937 and 1949: "Reminiscences."

43. Mildred S. Howard quoted in "Minutes of Meeting, Northeastern Farm Housing Technical Committee" (1 August 1953), 11, in GHB, Box 4, folder 21.

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freestanding, self-leveling units could be arranged in different configurations to fit existing kitchens as space and budgets allowed. When the various centers were all in place, however, the kitchen had a coherent and unified visual identity, much like its commercial streamlined equivalents. While Cornell's home managers politely dismissed streamlined kitchens because they ignored female work curves and emphasized fashion over storage needs, Beyer openly maintained that aesthetics and "artistry" mattered perhaps even as much as science.[44] At the end of 1950, he brought architect Frank Weise on board to ensure that the kitchen's final design would be striking as well as practical and, significantly, that it appeared so in the bulletin's perspective drawings, which Weise produced in consultation with Beyer. With their open-plan arrangements and floor-to-ceiling windows, Weise's idealized drawings—created before the Cornell Kitchen's design had actually been finalized—owed more to suburban Southern California than to rural upstate New York[45] (fig. 11).

It is not known exactly how Beyer came to hire the Philadelphia-based Weise rather than a colleague from the Department of Housing and Design or the College of Architecture. But the choice of Weise is logical if we consider Beyer's desire to align the Housing Research Center with a more explicitly progressive architectural agenda, which championed flexibility and prefabrication for postwar housing—something Beyer also signaled when he purchased two Lustron houses, then among the country's best-known prefabs, to accomodate the center's laboratory.[46] Weise had sterling modernist credentials with degrees from the University of Pennsylvania and Harvard University under Walter Gropius and Marcel Breuer. Before striking out on his own, he had also worked for leading American modernist practices including Skidmore, Owings & Merrill (which, incidentally, also employed Beyer as a housing consultant at Oak Ridge, Tennessee in the summers of 1949 and 1950.)[47] Although the collaboration would have its rocky moments, Beyer saw Weise's appointment as essential if the Cornell Kitchen was to achieve its goal of transitioning from the laboratory to the real world.

44. Beyer, ed., *The Cornell Kitchen*, 56.

45. Weise and Beyer's correspondence reveals that the latter was very conscious of the impression the drawings would create. Commenting on Weise's first effort to draw a kitchen with a "physical convenience" value orientation, Beyer urged him to "Pep it up as much as possible," and include a "better looking girl." See Beyer, ed., *The Cornell Kitchen*, 19, 52, 72. Letter from Glenn H. Beyer to Frank Weise (25 January 1953), in CHES, Box 11, folder 26.

46. For statements of this progressive position, see Walter Gropius "Prefabrication: A Freedom from Limitations"; and Burnham Kelly, *The Prefabrication of Houses*. The steel-enameled Lustron houses were purchased by the College of Home Economics in 1949 specifically to allow full-scale studies for the farm housing study: "Lustron Contract" (1949), in CHES, Box 2, folder 7. For Lustron's history, see Thomas T. Fetters with Vincent Kohler, *The Lustron Home*.

47. Weise also worked for George Howe and Louis I. Kahn, Reginald R. Isaacs, and Loebl, Schlossman & Bennett. Emily T. Cooperman, "Frank Weise."

FIG. 11 Frank Weise, perspective drawing of the Cornell Kitchen, 1953. (Source: Glenn H. Beyer, ed., *The Cornell Kitchen*, 72).

From Laboratory to Factory

The importance Beyer placed on a design professional's involvement emerged at the Annual Meeting of the Northeastern Farm Housing Technical Committee in January 1953, which involved fifteen members from the agricultural experiment stations of Connecticut, Maine, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and West Virginia, as well as the USDA Bureau of Home Economics. The meeting minutes give a warts-and-all insight into the philosophy underlying the larger northeastern farm housing project and Cornell's increasingly rogue status within it. Early on, Beyer reported to committee members that the initial laboratory phase of his project was complete and that his team was now moving to its next phase: the fabrication of six Cornell Kitchens, five of which would be installed in the homes of local families for observation and demonstration, with a sixth at Cornell's Housing Research Center Laboratory. Beyer emphasized that he aimed to get the kitchen mass-produced, a move that, in his view, made Weise's input necessary:

> The home economists, engineers and psychologists did the basic research, but the architects designed the product. . . . You have to have the transition. The builder will not take home economists' advice, but he will take engineers' advice. The engineers have to take the home economists' advice.

Beyer's offhand remark—that he did not expect builders to listen to home economists unless their ideas were translated through architects or engineers—was astonishingly blunt. Even more astonishing, he said this in

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front of a room full of home economists and nobody contradicted him. Instead, Mildred S. Howard from the USDA's Clothing and Housing Research Division (and no fan of the kitchen), agreed: "The average home economist will admit she knows nothing about design or architecture. The time has come for this work to go over into a different field of specialization." What Howard was conceding was that, if one had manufacturing as an end goal, then an architect or engineer was required. This proved to be a very big "if" for most members of the committee, however, who were obviously unsettled by Beyer's plans to fabricate the kitchen and attacked his intentions, methods, and design throughout the two-day meeting. His fixing of a twenty-four-inch module for his units came under particular fire with one collaborator suggesting it would "eliminate the problem of differences in people."[48]

In reality, the kitchen retained many customizable elements, such as the vertical stackers that allowed work center counter heights to be adjusted from thirty-two to thirty-eight inches at a time when the industry standard was fixed at thirty-six inches. Indeed, with its modular centers, adjustable counters, and interchangeable fittings, the Cornell Kitchen is clearly an example of mass-customized design. Yet the committee remained preoccupied with its standardized features rather than its customizable ones. Considering that European domestic reformers had embraced mass production decades before, most famously with the Frankfurt Kitchen (1926), it is striking to see this level of resistance to it among home economists in postwar America.[49] But committee members believed Beyer was undermining their guiding principle that families build kitchen units to fit precisely their own needs, spaces, and bodies. And, as Beyer himself reported, 50 percent of remodeling rural families *did* build their own cabinets, likely why at this meeting he still promised to produce working drawings for the kitchen. He never followed through, however, opting instead for a model in which "the many" would buy prefabricated units for

48. All quotes in this section are from "Minutes of Annual Meeting, Northeastern Farm Housing Technical Committee, January 15–16, 1953," 19–20, 34–35. NYSC, Box 22, folder 5.

49. Important recent scholarship has tracked how American scientific management principles, often in alliance with national women's movements, were applied to kitchen research and design in Belgium, Britain, Finland, Italy, Netherlands, the Soviet Union, Sweden, and Turkey, among others. Yet Cornell's kitchen researchers rarely acknowledged such projects, even those like the Frankfurt Kitchen, which the Cornell Kitchen genetically resembled. Given that Cornell's kitchen experts regularly corresponded with international researchers, such as those at the Swedish Home Research Institute, it seems likely that they knew at least some of these designs, but may not have felt these mostly urban kitchens, with their sometimes feminist and socialist rationale, were useful or acceptable for American farm life. Bullock, "First the Kitchen: Then the Façade"; Cieraad, "'Out of My Kitchen!'"; Henderson, "A Revolution in the Woman's Sphere"; and Oldenziel and Zachmann, eds., *Cold War Kitchen*.

FIG. 12 Shipping and installing the field kitchens, 1954. (left) The demountable units were shipped flat in crates; (right) assembly of mix center at the Housing Research Center Laboratory. (Source: CHES, Box 11, folder 18.)

home installation—and, due to marked precut panels, he promised installation would be an easy "one-man" job[50] (fig. 12).

In fairness, the USDA representative, Mildred Howard, was not principally concerned with remodeling home carpenters either: she believed the committee's job was to produce data on minimum requirements and turn it over to builders, engineers, or architects to guide their designs. As she brusquely informed Beyer, "I am not worried about [the kitchen] going into mass production. That is not my problem. My problem is minimum dimensions." In this, Howard was upholding the tradition of the Bureau of Home Economics, which had long positioned itself as a mediator between consumers and industry, and tried to influence production broadly through the formulation of standards in cooperation with bodies such as the National Bureau of Standards. As historian Carolyn M. Goldstein emphasizes, due in part to certain constitutive restrictions, the Bureau's home economists were not allowed to recommend particular brands or even technologies, which meant they always had "a secondary, rather than a primary, relationship to the market."[51]

Although diplomatic about their differences while the northeastern farm housing project was under way, once it concluded in 1959, Beyer lost no time in publicly criticizing the Bureau's approach.[52] In a lecture in 1960,

50. Beyer, ed., *The Cornell Kitchen*, 26–27, 69; "Minutes of Annual Meeting, Northeastern Farm Housing Technical Committee, January 15–16, 1953," 17, in NYSC, Box 22, folder 5.

51. Quote ("I am not worried . . .") from "Minutes of Annual Meeting, Northeastern Farm Housing Technical Committee, January 15–16, 1953," 19, in NYSC, Box 22, folder 5; Goldstein, *Creating Consumers*, 10–14, 111–16.

52. Ironically, in spite of Beyer's criticisms of such work, Cornell's Housing Research Center would produce the planning guide that concluded the project. See Beyer, *Farmhouse Planning Guides*.

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he accused home economists of irrelevance, due to their "embarrassingly narrow" focus on space standards, work simplification, and energy and preference studies. Unlike others at Cornell, he did not call the overall value of their research into question; rather, his gripe was that the home economists' passive role as mediators condemned them to be ignored by "most" appliance manufacturers, builders, and architects.[53] His remarks on this occasion were harshly worded and contentious, yet the failure of manufacturers to consult their research findings was a problem that home economists themselves had often remarked on and lamented.[54] For Beyer, setting up a primary relationship to the market was the only way housing researchers could gain what he called "leverage" in the building industry; that is, by implanting actual products with research-derived principles and seeing them through to production, researchers could gain control over how and in what form their principles entered the market.[55]

The assumption that underlay this approach was that manufacturers would recognize and embrace superior, research-derived products. At Massachusetts Institute of Technology, which was openly oriented toward industry at this time, architect Carl Koch expressed the belief that, if the design offered "a deep and lasting satisfaction," it would exert "a pull strong enough to justify [to industrial partners] the tremendous expense for tooling and merchandising, planning and production."[56] Yet this proposition was risky, no doubt why Beyer sought to secure corporate support through as many channels as possible. From the start of Cornell's kitchen research, he assiduously courted company executives, inviting them to visit the Housing Research Center Laboratory. By late 1952, teams of industry representatives from GE, Reynolds, Monsanto, American Standard, and Sears, Roebuck had made the trip to Cornell. These companies subsequently gave technical advice, donated products for the demonstration kitchens (Monsanto supplied the molded plastic breadboxes, flour-sugar units, and utensil trays; GE, twelve compact NB-4 "Space Maker" refrigerators), or made cash grants (Cooperative Grange League Federation Exchange, Inc. and Sears).[57]

53. Glenn H. Beyer, "Future Explorations in Home Economics: Housing," 645–66. *Ladies' Home Journal* asked Beyer to elaborate on his criticisms. Margaret Davidson [homemaking editor] to Glenn H. Beyer (2 November 1960), in CHES, Box 10, folder 12.

54. As late as 1969, architect Sigrun Bülow-Hübe aired this complaint, decrying how little influence kitchen studies, including Cornell's, had on Canadian manufacturers. Thanks to Annmarie Adams for drawing Bülow-Hübe to my attention. Adams and Toromanoff, "Kitchen Kinetics," 28–30.

55. Glenn H. Beyer, Memo to files [on a meeting with Donald O'Connell of Ford Foundation] (11 December 1959), 2, in CHES, Box 2, folder 2.

56. Carl Koch, quoted in Avigail Sachs, "The Pedagogy of Prefabrication," 235.

57. These meetings are listed in Glenn H. Beyer to Dr. Parmenter, "Chronology of Development of the Cornell Kitchen" (3 April 1953), in CHES, Box 11, folder 26a. Other parts were simply purchased from commercial manufacturers, such as Korok (sinks and countertops) and Lectro-Host (burners and ovens): Glenn H. Beyer to the Farm Kitchen

The most generous sponsorship, however, came from Reynolds. This meant the demonstration kitchens were fabricated in aluminum rather than in the more common steel; Pittsburgh Paint Glass Company then enameled the exterior cabinet panels vivid salmon red or yellow—a bold gesture at a time when white cabinets were still the norm.[58] Reynolds agreed to supply aluminum for up to six sets of cabinets, gave technical advice about building them, and helped Beyer find a fabricator. The company also underwrote the cost of *The Cornell Kitchen* bulletin, which allowed it to be printed in color, and rewrote its technical section on aluminum.[59] Reynolds even agreed to pay for a fourteen-minute film featuring the kitchen.[60] In the end, the manufacturing process was bumpy: problems with fabrication emerged, delays occurred, and costs mounted.[61] But six units were finally shipped to Ithaca by early 1954, flat-packed in crates, ready for installation in the Housing Research Center Laboratory and in select local homes (see fig. 12).

Field Testing, True Responses

The Cornell Kitchen's move into real homes was the most novel phase of its development. More than any other element of the research, it speaks to Beyer's pursuit of scientific verifiability, inside the lab and out. The first step was to find suitable families willing to have demonstration kitchens installed. Grange League Federation had already nominated one family, the McConnells, in exchange for its cash grant. The selection criteria for the others were strict: they had to be within fifty-five miles of Ithaca and have farmhouses in good condition; they had to be cooperative, middle-class, and "family centered" in the judgment of the assessment team; and they had to be able to pay $500 toward the kitchen and cover all installation costs themselves.[62] This involved extensive construction work, from re-

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Research Advisory Committee (30 March 1953), 1, in NYSC, Box 22, folder 6; Glenn H. Beyer to the Farm Kitchen Research Advisory Committee, "Summary of Farm Kitchen Research Advisory Committee Meeting—June 9, 1953," in FWC; and Marshall Bartlett, Jr. [GE, Major Appliance Division, Product Planning, Household Refrigerator Dept.] to Glenn H. Beyer (8 August 1952), in FWC.

58. On modular steel kitchens, see Randl, "'Live Better Where You Are,'" 163. On the persistence of white, see Regina Lee Blaszczyk, *The Color Revolution*, 256–62; and Randl, "'Look Who's Designing Kitchens,'" 74.

59. This resulted in a predictably glowing review of aluminum's potential: Clarence F. Manning [Vice President, Reynolds Metals Company] to Glenn H. Beyer (7 November 1952), in GHB, Box 7, folder 2; and Beyer, ed., *The Cornell Kitchen*, 43–44. Also see Glenn H. Beyer to Clarence F. Manning (30 January 1954), in GHB, Box 7, folder 2.

60. Vitali V. Uzoff, dir., *The Cornell Kitchen* (1955 film).

61. Problems with the fabrication process drove up costs from an initial estimate of $14,800 to $43,300. See "Minutes of Annual Meeting, Northeastern Farm Housing Technical Committee, January 26–27, 1954," 6, NYSC, Box 22, folder 5.

62. The Hawley kitchen renovation cost $2,433 (including the $500 payment to

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moving existing cabinets to redoing floors, ceilings, and windows as advised by team architect Werner Seligmann, who planned the kitchens with the families.[63]

Once the kitchen was in place, families had to consent to keep records of their activities; agree to be studied and photographed by a Cornell observation team; and allow industry representatives and others to visit their kitchens. In light of the heavy demands placed on the participants, and the kitchen's undeniably modern aesthetic (it was often likened to an Erector set), it is not surprising that potential participants were first identified through discussions with Cornell home economists and were known to be conversant with household management, home demonstration, and contemporary design principles. For instance, Margaret Potter was mentioned as a possible participant as she had formerly been a cooperative extension leader. Upon visiting her home and meeting her family with the Cornell assessment team, Beyer approvingly wrote:

> The family has a real interest in its children and in family life in general, as evidenced by the building of a new playroom. The wife appeared to have a good foundation in home management principles, having her kitchen well arranged. . . . The kitchen contained two Casco chairs which shows that the family emphasizes convenience, comfort and modern living.[64]

There is not enough space here to do justice to the full story of the Cornell Kitchen's nine-month field-testing phase. What is important to note is that this phase was considered essential to establish the kitchen's viability; and that it was done rigorously, with a trained team of observers from Household Management working to a schedule and systematically recording information. Participants had many opportunities to provide feedback of their experiences through questionnaires and unstructured interviews, but Beyer did not believe that direct feedback alone could capture people's "true" emotional responses to the kitchen's design. Hence, it was the job of the observation team to get past user bias and gauge "how

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Cornell), comparable to what an average modular steel kitchen cost at this time. Thanks to Chad Randl for confirming this detail. Clough & Elliott, "Estimate Evaluation: Third Visit to Families, Hawley, Harold, Weedsport, New York" (21 July 1953), in CHES, Box 11, folder 25.

63. Seligmann himself would go on to become a noted architectural educator and designer. See Alexander Caragonne, *The Texas Rangers: Notes from an Architectural Underground*. Thanks to Susan Henderson for highlighting Seligmann's importance.

64. For a comparison to an Erector Set, see Soule, "New Kitchen Built to Fit *Your* Wife," 176. Quote ("The family has") from Glenn H. Beyer, "Mr. and Mrs. Bernard Potter: Tuesday, May 12" (16 May 1953), in CHES, Box 11, folder 25. The initial list comprised 400 families. Glenn H. Beyer to Mrs. Heiner, Miss Warren, Mr. French, Mr. Boyd, Mr. Elliott, Mr. Weise, "Summary of Farm Kitchen Research Advisory Committee Meeting—April 22, 1953," in NYSC, Box 22, folder 6.

much of the homemakers' criticism is based on custom or tradition, as against the actual lack of utility of the . . . units."[65]

The transformations of test families' homes were dramatic. Their rambling farm kitchens, filled with separate furnishings, appliances, and busy wallpapers, gave way to more unified spaces with integrated fittings and generous picture windows located above sink centers to give good natural light and clear views onto yards (fig. 13). The work centers were organized in different configurations depending on each existing space and each family's wishes, with some incorporating additional elements such as a planning desk. As all of the kitchens were compactly arranged to minimize steps, however, plenty of room remained for dining tables and social spaces. This was no accident. For the field testing, Beyer and his team only selected homemakers they deemed family-centered—they did not consider any of the other value orientations identified in the bulletin—and their demonstration kitchens were set up to enable proximity and sociability. In contrast to the bulletin's static and idealized perspective views, the 1955 film and a 1956 series of publicity photos showed the field kitchens in use, filled with activity and people (especially children)—integral hubs of family life.

These tableaux of family-centered activity seemed intended to reassure rural audiences that farm wives could enjoy the advantages of a rational workspace while staying connected to family and friends. But they also highlighted that the kitchen offered socio-psychological advantages that extended beyond the homemaker to the family as a whole. In the series of photos of the Hawley family, for instance, the kitchen was presented as a sort of biopolitical command post from which the neatly dressed Mrs. Hawley supervised the operation of her household and the care of her children[66] (fig. 14). In depicting not just an efficient but also an emotionally satisfying environment, these images appeared to offer proof that the kitchen would provide families with "sustenance for life itself" and deliver on the bulletin's most grandiose claim: that the kitchen would act as a buffer against "outside agencies" which might otherwise "destroy" traditional farm life.[67] Even as it delivered technological parity with, and visually resembled, contemporary suburban "living" kitchens, then, Cornell's kitchen was deliberately positioned as a tool for strengthening rural social

65. Quote ("true" responses) from Glenn H. Beyer and James W. Partner, *Marketing Handbook for the Pre-Fabricated Housing Industry*, 8–9; and quote ("how much") from Glenn H. Beyer, "Field Observation Technique in Housing Research," Tentative Draft of Paper Prepared for Housing Research Methodology Conference (30, 31 July and 1 August 1953), 7, in NYSC, Box 22, folder 4.

66. These images support Dianne Harris's argument that housewives during this period were typically portrayed as white-collar managers with desks and "electrical servants" at their fingertips. The Hawley images remind us, however, that not only were wives meant to manage the domestic realm professionally but also the many affective relationships within it. Harris, *Little White Houses*, 195–209.

67. Beyer, ed., *The Cornell Kitchen*, 10.

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FIG. 13 Before and after photographs showing changes to three of the five field kitchens. (All "before" photos on the left taken in 1953; all "after" taken from the same perspective, 1954). (top) Benson kitchen, showing sink center and new picture window; (middle) Hawley kitchen, showing island (to left) and oven-refrigerator center far wall; (bottom) Potter kitchen, showing Cornell Kitchen with island arrangement and added planning desk with telephone. (Source: CHES, Box 11, folder 18.)

patterns and patriarchal families in keeping with the conservative aims of its agricultural funders.[68]

But did these scientifically designed kitchens deliver on such promises? How well did they function? At the end of the nine-month live-testing phase, the participants completed one last questionnaire. The features of the kitchen they rated most highly were the built-in lighting, the counters at different heights, the pullout trays, the vertical adjustability of trays and shelves, and the burners built into the countertop. But participants also

68. On living kitchens, see Adams, "The Eichler Home," esp. 168–70; and Giedion, *Mechanization Takes Command*, 620–25.

FIG. 14 Publicity images of Hawley kitchen after eighteen months of use, January 1956, Cornell Visual Aids Office. (Source: CHES, Box 11, folder 18.)

offered criticisms; almost all agreed the flour and sugar bins were too small and messy, and they wondered why the dishwasher was not at waist height as were the oven and fridge. Mrs. Kellogg, star of the *Cornell Kitchen* film and a 1956 feature in *Look*, made the sharpest critique:

> I cannot get my every-day dishes for our family of 8 packed away on [the serve center's] shelves—cups etc. are forever tumbling down. Top has chipped in several spots because of this. Back part of bread box for cake and pies are unused here—cannot get any of our standard sized tins in—not big enough for layer cakes, etc.[69]

Several of the women commented on their experience of cleaning the

69. "Questionnaire—The Cornell Kitchen Families, Nine Month Evaluation Report" (1955), 3–4, in CHES, Box 5, folder 22.

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kitchen—not something that the Cornell researchers had tested for—describing the sliding trays and towel drying compartment in particular as "dirt-catchers." They also discussed how they found the kitchen to work in, often with children underfoot. Mrs. McConnell observed: "I'm there alone, some of the time—or two of us—or a real influx of children, grandchildren, and friends. It seems to stand the test of conditions, provided I can organize helpers and keep them out of the working area." And, when asked, "In what ways are you using the kitchen differently from the way you think we planned it? (For example, putting baby washing equipment at the sink)," Mrs. Hawley retorted, "It is the baby (not the equip) I wash in the sink!" Another noted using the kitchen for milk pasteurization. And Mrs. Kellogg reported that she had appropriated the towel-drying compartment for some much-needed extra storage: "Here the larger supplies (bags of flour, sugar, etc.) go very well."[70]

Generally, the women seemed happy with their kitchens. But Mrs. Kellogg's comments about not having enough room for her large family's cups and layer cakes exposed the restrictions of designing a kitchen for an "average" family's needs and to a standard set of specifications. Even if, as Mrs. Kellogg intimated, the Cornell team had simply made some incorrect measurements, there would always be limits to how far features like interchangeable drawers could compensate for evolving storage needs. The team's aim to provide a space for "everything" was even more optimistic given that a flood of new packaged foods and appliances were just then entering the market, dramatically increasing kitchen storage requirements overall.[71] More fundamentally, the aim that the kitchen predictively contain "everything" stood in tension with its desire to accommodate changes in family life cycles flexibly. As realized, the kitchen's design ended up sitting somewhat awkwardly between what architects Tatjana Schneider and Jeremy Till term "hard" (determined) and "soft" (indeterminate) design.[72]

The emphasis on field testing suggests that the researchers were aware that the kitchen would not necessarily be used in the prescribed manner and that they hoped to incorporate a more realistic understanding of use into their design.[73] But no more design iterations were forthcoming; the

70. All quotes in these two paragraphs come from Glenn H. Beyer, "Evaluation of the Cornell Kitchen after Nine Months Use" (19 March 1955), in CHES, Box 5, folder 22; and "Questionnaire—The Cornell Kitchen Families, Nine Month Evaluation Report" (1955), 3–4, in CHES, Box 5, folder 22.

71. Harris, *Little White Houses*, 206–8.

72. Tatjana Schneider and Jeremy Till, *Flexible Housing*, 4–8. The bulletin rather implausibly tried to maintain that family size had little impact on space requirements: Beyer, ed., *The Cornell Kitchen*, 24.

73. There is a long history of rural users resisting the guidance of home economists. Kathleen R. Babbitt, "The Productive Farm Woman and the Extension Home Economist in New York State, 1920–1940"; Jellison, *Entitled to Power*; and Kline, *Consumers in the Country*.

questionnaire marked the end of the kitchen project. Rather than informing future designs, the user feedback served as market research to convince potential licensees of the kitchen's feasibility. It was also used to demonstrate the value of social scientific research methods to the housing industry more broadly. As architectural historian Avigail Sachs notes, saleability had recently emerged as a crucial issue for manufacturers of industrial houses who realized "the only [prefab] houses that would actually be fabricated would be those that would sell."[74] To help them along, in 1955 Beyer published a handbook detailing how social scientific research could improve housing. Not coincidentally, it showcased all the methods employed in the Cornell Kitchen, from surveys to installing products in real homes for observation.[75] Prefab manufacturers were assured that by deploying all of these methods they could respond more accurately to consumer demand, and create more successful housing products.

Into the "Real World"

Despite its complexity and contradictions, the Cornell Kitchen's principal aim stayed constant: it sought to leverage scientifically designed products into the real world to improve human dwellings at scale. Evaluating its success requires consideration of how and in what forms it entered the "real world." The kitchen unquestionably had an impact. In the wake of the bulletin's publication, it was the subject of an exceptional amount of national and international media coverage.[76] It was exhibited frequently, a highlight of Farm and Home Week at Cornell in 1951, 1952, and 1954 (when another 2,800 people filled in a questionnaire about it); and of the Modern Living Exposition in New York City in 1954.[77] The Reynolds-sponsored film was screened at schools and extension events and on television stations from Schenectady, New York, to Evansville, Indiana. And Beyer was constantly invited to speak at academic, industry, and government events such as the 1955 Museum of Modern Art symposium "What's

74. Sachs, "The Pedagogy of Prefabrication," 246. On the marketing challenges facing prefabricated housing manufacturers, see Kelly, *The Prefabrication of Houses*, 357–94.

75. Beyer and Partner, *Marketing Handbook for the Pre-Fabricated Housing Industry*, 8–9.

76. Feature articles on the kitchen appeared in: *American Builder* (June 1953), *Daily Boston Globe* (19 April 1953), *Chicago Daily Tribune* (22 and 23 March 1953), *Detroit Free Press* (3 May 1953), *Farm Journal* (June 1952), *House & Home* (June 1953), *Look* (21 September 1954), *New York Times* (13 July 1952; 26 March and 26 April 1953), *Popular Science* (September 1953), and *Washington Post* (4 October 1953). For its reception in Italy and the United Kingdom, see Scrivano, "Signs of Americanization in Italian Domestic Life," 331, 333–35; Ferry, *The 1950s Kitchen*, 19–20; and Joan E. Walley, "The Kitchen of To-day and To-morrow."

77. "Results of Questionnaire—The Cornell Kitchen" (22 September 1954), in NYSC, Box 21, folder 70.

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Cooking in Kitchens?" These invitations, however, were rarely extended to his female collaborators.[78]

For proof of the Cornell Kitchen's wide dissemination and for evidence of its reception, we may turn to the hundreds of letters preserved at Cornell from people across the United States, Canada, England, and even Israel. Many of the letter writers explained how they knew of the kitchen, citing the bulletin, extension courses, print media, television, and professional organizations such as the American Institute of Architects and the National Association of Home Builders. The writers' aims varied. Many were professors of agricultural engineering, home economics, or rural sociology who wished to use the kitchen as a teaching case study; others ran extension courses or home demonstration programs or worked at government housing agencies. Some represented corporations, such as General Motors, Whirlpool, and Mitsubishi, that wanted the bulletin for product development purposes. Others were architects, industrial designers, builders, or inventors. Physical disabilities and rehabilitation therapists also made contact, including the director of Occupational Therapy at Cornell Medical Center, seeking advice about designing a demonstration kitchen for handicapped patients, showing that its findings translated to other settings, too.

Lastly, many letters were from members of the public requesting information about, or working drawings for, the kitchen. Although a few mentioned the kitchen's family-centeredness, more seemed attracted by its potential to save time and energy—also the feature most consistently emphasized in media coverage. By this date, a touch of dream-home fatigue had set in and the Cornell Kitchen was not immune from skepticism. After seeing photos of the kitchen in the *Chicago Tribune* in 1953, one reader asked archly: "One of [the models], who is said to be baking, is wearing a suit with sleeves to her wrists. Is this the modern way?"[79] Nonetheless, labor-saving promises remained appealing at a time when rural women still did forty-seven to fifty-two hours of housework weekly, sometimes on top of a job outside of the home.[80] While Cornell's comfortable vision of rural family life did not admit the idea of wives as wage earners, one corre-

78. This was highlighted at a conference dedicated to "The American Consumer" in 1954, when Wells Bennett, dean of the University of Michigan's College of Architecture, asked Beyer if one of his female collaborators might speak, after being pressed to do so by a female professor in the Art Department. He mentioned Helen Canon (though noted, "None of us know her . . .") and seemed embarrassed, stressing, "I hope you both will understand that this is only a suggestion to proceed with as you see fit." Unfortunately, Canon had died the previous year and her logical substitute, Mary Koll Heiner, was in poor health, so the idea was shelved. Letter from Wells Bennett to Glenn H. Beyer (10 November 1954), in CHES, Box 10, folder 4b; and Letter from Glenn H. Beyer to Burnham Kelly (16 November 1954), in CHES, Box 10, folder 4b.

79. Old Fashioned, "The Well Groomed Cook." On dream house backlash, see Henthorn, *From Submarines to Suburbs*, 179–93; Timothy Mennel, "'Miracle House Hoop-La'"; and Andrew M. Shanken, *194X*, 166–81.

80. Beyer, *Farmhouse Planning Guides*, 10.

spondent explained that for her—as for a growing number of "average" wives—paid work was a necessity:

> I just saw the sample of the new kitchen installed in a farm house. . . . It was mentioned in the T.V. program that it saved a lot of walking which I could use. We are an average family . . . built our own house, and it yet is far from being completed. . . . My husband is a defense worker and I drive a 30 passenger school bus but we aren't even breaking even. . . . I would be the happiest person in the world if . . . I could have a university like yours reconstruct our kitchen and show the people around our city [Oneonta, NY] what a modern kitchen looks like.[81]

In reality, as we have seen, the Cornell Kitchen attempted to move beyond the efficiency paradigm and to synthesize several kitchen narratives: it was equal parts labor-saving kitchen, gadget-filled technokitchen, prefab packaged kitchen, and family-centered living kitchen. Yet members of the public and journalists struggled to grasp its many facets and, tellingly, the last major article to feature the kitchen seemed unsure about just what it added up to. *Look* was the kitchen's biggest media booster and the only major magazine to follow up on the demonstration kitchens, which it did in 1956. Its coverage, however, was ambivalent, unenthusiastically contrasting the Kelloggs' kitchen (described as "a giant package") to a "living room" kitchen that spread appliances throughout the house.[82]

While the demonstration kitchens featured in the Cornell Kitchen film, it is curious that the prolific Beyer himself never undertook to write a report on them or to publish a final account of his research. By the time the *Look* article appeared, funding for the kitchen research had run out (though the northeastern farm housing study continued another four years). Considering the importance he placed on manufacturing, Beyer may have felt that the real measure of the project's success was industry take-up. Here the Cornell Kitchen did make inroads: it helped to shape national architectural standards, not least when Beyer and architect Alexander Kira enshrined many of its dimensions and principles in the influential handbook *Time-Saver Standards*.[83]

Even more gratifying in light of the project's aim of translating research into "form and substance," by the mid-1950s, various products matching

81. Mrs. Richard Wiedman to Glenn H. Beyer (17 April 1957), in CHES, Box 6, folder 19a. On the participation of married women in the workforce, see Stephanie Coontz, *The Way We Never Were*, 160–63.

82. John Peter, "The American Kitchen Takes off in Two Directions."

83. For instance, Beyer's 24-inch module for built-in kitchens was adopted at an industry-led Standardization Round Table in 1955: "Standardization Round Table recommends 24" module to sell more built-in kitchens," *House & Home* (September 1955), reprint in CHES, Box 10, folder 7; James Hancock Callender, ed., *Time Saver Standards*, 960–1020.

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the kitchen's criteria appeared on the market: Beyer cited sinks with built-in features (GE, Youngstown), sinks for seated work (Elkay, St. Charles), and sloping upper wall cabinets and pullout trays (Sears). While the Cornell Kitchen did not invent all these features, it inspired some of its sponsors to manufacture them, and in this way influenced the postwar kitchen's appearance. Most memorably, in 1955 GE launched its own horizontal wall refrigerator-freezer designed by George Nelson.[84] However, GE emphasized its design's aesthetic benefits over its ergonomic ones. Available in five standard colors, which could be "mixed-or-matched" across a full array of appliances, it was treated like a cabinet that could be integrated with other storage cabinets to produce a "flat wall"[85] (fig. 15). Modular colored wall fridges like these would temporarily proliferate in the latter part of the decade, supplanting white boxy models to deliver a seamless, smooth-planed kitchen at last.[86]

The original aim of the Cornell Kitchen was mass production as a system and, even as Beyer moved on to private consulting work, he did not abandon this goal.[87] He continued to pursue patent applications for the kitchen, which Cornell's Research Foundation then shopped around to potential licensees.[88] One serious licensee materialized: Westinghouse. Although the exact terms of their final agreement are unknown, subsequent Westinghouse designs, such as the 1956 "Confection Color Kitchen," took elements from the Cornell Kitchen—work centers, integrated lighting, separate ranges, waist-high oven, wall refrigerator-freezer—but not others, such as seated work or height-adjustable counters[89] (fig. 16). Overall, the Confection Kitchen was more rigid, consisting of built-in units rather than

84. According to Stanley Abercrombie, GE hired Nelson as a consultant in 1953 to "catch up" on a prefabricated kitchen he had designed for *Fortune* ten years before (see illustration in Giedion, *Mechanization Takes Command*, 615). Given the timing, however, it seems more likely that the Cornell Kitchen prompted GE's sudden interest in prefab, modular designs, and wall-hung appliances. Stanley Abercrombie, *George Nelson*, 72–74.

85. Franklin Friday and Ronald F. White, *A Walk through the Park*, 40–41; and "Beauty in a Busy Place."

86. Regina Lee Blaszczyk observes that the color appliance trend began in earnest in 1954, but peaked by the end of the decade due to difficulties with supply and distribution: *The Color Revolution*, 256–62. On GE's horizontal fridge, see Lupton and Miller, *The Bathroom, the Kitchen and the Aesthetics of Waste*, 61.

87. In 1955, Beyer was hired as a consultant in Advanced Kitchen Design to Youngstown Kitchens and was given his own independent staffed laboratory in Ithaca to continue product development. GHB, Box 7, folders 32–35.

88. Beyer obtained three design patents as well as two mechanical patents for the kitchen (US D173923 S, US D173920 S, US D173921, US 2807835A, and US 2785938A). CHES, Box 5, folder 19.

89. The archive does not contain correspondence between Westinghouse and Cornell beyond May 1955, but by this date Westinghouse had agreed to pay Cornell a lump sum of $15,000, and discussed future royalties that assumed a very significant volume of business. Glenn H. Beyer to Dr. T. P. Wright (21 May 1955), in CHES, Box 5, folder 22.

FIG. 15 George Nelson for GE. Wall refrigerator-freezer. (Source: "Beauty in a Busy Place," *Life Magazine*, 13 December 1954, 114–15.)

freestanding centers. And, quite simply, it looked different. Weise's Erector Set aesthetic was given a total makeover by Westinghouse's in-house design team and celebrity interior designer Melanie Kahane, who deployed color and cabinetry resembling "fine furniture" to render the kitchen suitable for "an open-plan living room." This makeover was presumably necessary to appeal to the suburban consumers who would ensure the kitchen's financial viability. Inevitably, the kitchen's promise to meet the specific needs of farm families yielded to its mass-market aspirations.

Leveraging Research through Design

With its failure to be translated into the real world as a system, the Cornell Kitchen was not a total success according to its own criteria. Nonetheless, this did not invalidate the project overall, given its role in advancing other Housing Research Center goals. The kitchen was the opening salvo of Beyer's campaign to reform Cornell's housing research program in line with shifting national priorities. In light of the continuing housing shortage and the proportional fall in farm dwellers—only 15 percent of the

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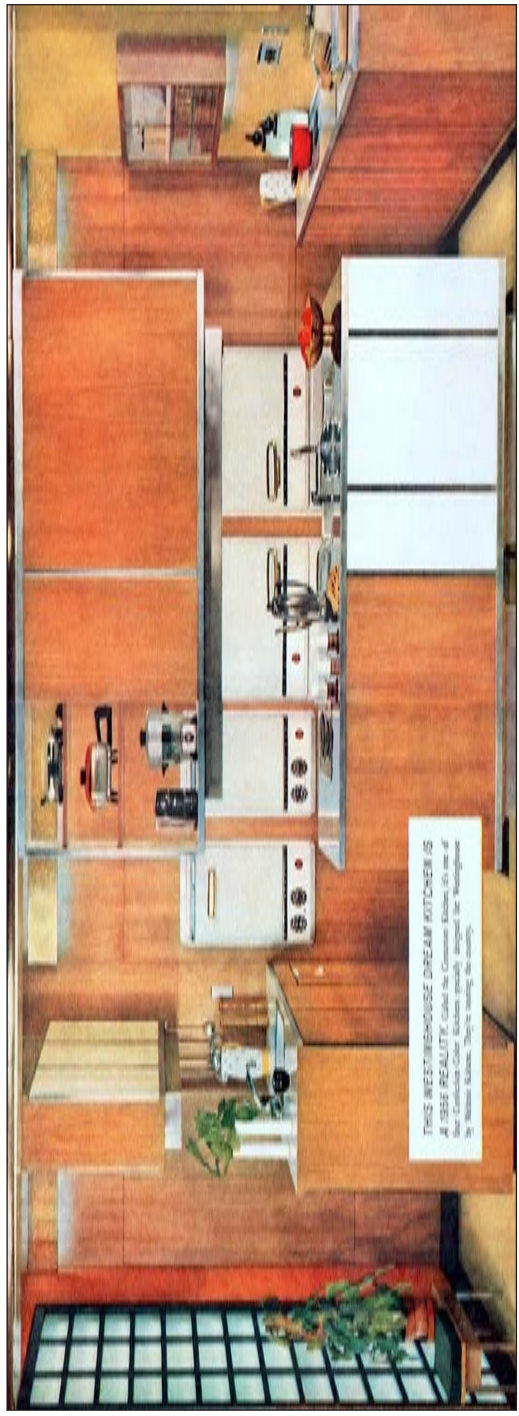

FIG. 16 Westinghouse "Confection Color Kitchen," 1956. (Source: Used with permission of Westinghouse.)

American population still lived on farms in 1950, down from 50 percent in 1900—the need to research suburban and urban housing issues came to seem far more pressing.[90] Over the five years of the Cornell Kitchen research and beyond, Beyer steadily moved away from the aim of improving rural housing through remodeling to that of delivering housing of all kinds through industrial production and prefabrication. As part of this reorientation, he began to ally the Center with experts from construction, engineering, and social scientific backgrounds rather than with those from agricultural or home economics ones.[91] These same (now almost exclusively male) experts would also come to dominate the bodies set up in the 1950s to coordinate housing research nationally.[92]

An embrace of industrial production was not the only reform the shift away from the DIY model required. If manufacturers were to become the path by which research-infused goods entered the market, then university-led researchers also needed to reform the idea of the user that underlay their work—to deploy concepts like "values" to develop a more psychologically nuanced understanding of human motivations and reliably create saleable products. Acknowledging that non-rational factors were important in home selection, the Cornell researchers tried to satisfy consumers' conflicting desires for functionality, flexibility, and fashion. A concomitant of the move away from the rational model of consumption, however, was that people were no longer trusted to know or to articulate their own design needs and responses (and it is surely ironic that proponents of consumer-oriented design became wary of directly asking consumers what they wanted). Beyer complained that previous methods for identifying needs, such as preference studies, "found out what people wanted just before they changed their minds." Hence, he advocated methods like "market response," with trained observers recording how designs were used in real homes and judging "true" reactions. The supposedly enhanced scientific accuracy of these techniques gave consumer research more credibility in the housing industry and boosted another set of "experts" then on the rise: housing market consultants.[93]

90. Kline, *Consumers in the Country*, 2.

91. Beyer was instrumental in appointing a new head for the Department of Housing and Design, Joseph Carreiro, who went on to lead well-known studies of prefabrication and urban housing. See Carreiro, *The New Building Block*. Beyer also supported rebranding the College of Home Economics as the College of Human Ecology, which took place in 1969. See Margaret W. Rossiter, "The Men Move In."

92. While acknowledging home economists in its 1951 survey of the housing research field, for instance, the Building Research Advisory Board (BRAB) went on to appoint an all-male housing advisory committee, heavy on engineering and social scientific expertise. Beyer himself served on the BRAB's Board of Governors between 1958 and 1966, as well as on the Board of Directors of the National Building Research Institute, 1961–64. On the rise of these experts, see Goldstein, *Creating Consumers*, 269–81.

93. On preference studies, see Beyer, "Future Explorations in Home Economics: Housing." For a contemporary view of housing market consultants, see Vance Packard, *The Status Seekers*, 61–75.

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Beyer did not see any ethical difficulty with cooperating closely with manufacturers or making products more saleable through social scientific research because, like many others in America at this time, he believed that the market was the most efficient mechanism for distributing goods. Greater sales meant greater distribution for superior scientific designs which ultimately would serve the consumers' interests—a benevolent model that reflected the prevalent postwar faith in corporate capitalism as the best path to national prosperity.[94] Even if this distribution model may not have operated perfectly in the case of the Cornell Kitchen, corporate sponsors responded positively enough to persuade Beyer and Cornell of the basic soundness of this method, and became the template for subsequent Housing Research Center projects. The most visible—certainly the most notorious—of these was the follow-on study to the Cornell Kitchen, "Study of Design Criteria for Bathrooms," carried out between 1958 and 1965 and published as the best-selling paperback *The Bathroom* in 1967. In this project, Beyer and Alexander Kira again designed experimental prototypes for bathroom equipment, which the study's sponsor, American Standard, agreed to put into production.

It is easy to see why corporations responded well to this model: cooperation with universities was a low-cost, low-risk means to develop products and gain prestige. And of course they were under no obligation to reproduce recommended designs. American Standard, for instance, never followed through with the bathroom study. Even when manufacturers did take up a design, they put it through their own engineering, styling, costing, and market research processes, freely modifying it so as to appeal to the broadest possible market. Significantly, the features that manufacturers were most likely to modify or drop were the more user-centered, flexible ones. As various feminist scholars have pointed out, for instance, despite the adoption of height adjustability in office spaces and its proven popularity in kitchens—not least in many Cornell Kitchen questionnaires—postwar manufacturers never seriously pursued it.[95] Yet, apart from improving user comfort, it was features like these that would allow kitchens to be adapted for users of different abilities, ages, and stages of the life cycle, an increasingly explicit priority for researchers in the late 1950s as they began seriously grappling with problems such as housing for the aged and disabled people.

For all the reforms he proposed to the home economists' mode of operation, Beyer always respected and promoted their adaptable design philosophy.[96] And for all its determinism and paternalism, the Cornell Kitchen

94. Lizabeth Cohen, *A Consumers' Republic*, 200–55.

95. Rachel Z. Arndt, "The Specifications of American Kitchens Are Actually Sexist"; Land, "Counterintuitive"; and Schneiderman, "The Prefabricated Kitchen," esp. 248–50, 253, 256–60. See also David Goldbeck, *The Smart Kitchen*, 5–7.

96. In the 1960s, the Center—now renamed the Center for Housing and Environ-

was an undeniably ambitious effort to provide for more flexible domestic space. But even though manufacturers proved willing to adopt flexibility in the kitchen when it enhanced consumer choice (e.g., mix-and-match colored appliances), they never embraced its adaptive potential, likely because their business model relied on a contrary strategy: planned obsolescence with its cycles of ripping out and replacement.[97] The Cornell Kitchen team's failure to get manufacturers to buy into the most critical element of their design program exposed the weakness of their market-oriented approach: it left them no less likely than earlier researchers to have key recommendations ignored. By the 1970s, under pressure from the civil and consumer rights movements and their demands for more equitable and safer designs (enforced by government legislation when necessary), such unquestioning reliance on corporate sponsors would seem naive at best.[98] Even as it established a new consumer-oriented model for postwar university design and housing research, then, the Cornell Kitchen also demonstrated its limitations. The goal of finding a sure way to leverage scientific research into American homes remained as elusive as ever.

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The Cornell Kitchen. 1955. 13:36 min. Directed by Vitali V. Uzoff. Pro-

mental Studies—would become nationally known for championing flexible housing to permit aging in place and independent living. See Glenn H. Beyer, *Economic Aspects of Housing for the Aged*; and Beyer and Margaret E. Woods, *Living & Activity Patterns of the Aged*.

97. Vance Packard called this strategy the "replacement revolution." See Vance Packard, *The Waste-Makers*, 116; and Randl, "'Look Who's Designing Kitchens,'" esp. 73–76.

98. Avigail Sachs, "Research for Architecture," 203–10. For an account of Alexander Kira's growing doubts about the corporate commitment to user-centered design, see Barbara Penner, "Designed-in Safety."

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