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Resisting Development, Reinventing Modernity: Rural Electrification in the United States before World War II

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ABSTRACT

The essay examines local resistance to the New Deal rural electrification program in the United States before World War II as a crucial aspect of socio-technical change. Large numbers of farm men and women opposed the introduction of the new technology, did not purchase a full complement of electrical appliances, and did not use electric lights and appliances in the manner prescribed by the goverment modernisers (the Rural Electrification Administration) and manufacturers. These acts of 'transformative resistance' helped to shape artefacts and social practices.

KEY WORDS

U.S. Rural Electrification Administration, resistance to new technology

In 1935 the United States government initiated one of its most successful economic development programs by establishing the Rural Electrification Administration (REA). Unlike the technical-aid missions of the Cold War, which transferred U.S. technology to so-called Third World nations, the REA targeted an 'undeveloped' society *within* the United States: six million American farms, of which only thirteen percent had electricity in 1930. In the short span of twenty years, the REA achieved its ambitious goal of universal rural electrification. Ninety three percent of U.S. farms were electrified in 1954, a figure that varied surprisingly little between regions of the country.[1]

Although the REA and other agricultural modernisers did not speak in terms of 'economic development', a discourse that gained momentum during the Cold War,[2] they thought American farmers lived in technologically 'backward' sections of the country. They wanted to modernise the farm by bringing scientific agriculture to the field and consumer technology to the home. Like European colonisers before them, they considered machines to be the measure of

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civilisation.[3] Many of the groups, such as agricultural engineers, agricultural economists, home economists and rural sociologists, applied the techniques they had invented to develop the American farm before World War II to 'undeveloped' countries after the war.[4]

Despite the remarkable success of the REA, the high percentage of electrified farms masks an enormous amount of resistance to the program before the war. American farm men and women initially resisted rural electrification, just as they had opposed the introduction of other 'urban' technologies like the telephone and automobile at the beginning of the century. Electricity did not transform the farm in a wholesale manner. Instead, farmers adapted it to rural culture, thereby creating new forms of life, new forms of rural modernity.[5] In effect, farm men and women achieved one of the goals Sheila Jasanoff has set for analysts of science, technology, and development: the integration of innovations into existing cultures to create new modernities (Jasanoff, introductory essay).

In this essay, I analyse how user resistance to rural electrification helped to create sociotechnical change. 'Resistance', of course, has been a problematic category of analysis. Historians and sociologists have applied the term to a wide variety of actions: from Luddism in the nineteenth century, to organised protests against nuclear power in the 1970s and biotechnology in the 1980s, to consumer resistance to information technologies in the present.[6] There is a large body of literature on the resistance of slaves, factory workers, peasants and other marginal groups to being exploited by technology.[7] Resistance is a constitutive element of the distributive exercise of power in Foucauldian disciplinary networks, a functionalist aspect of Bauer's model of the management of technology, and a feature (expressed as antiprograms and subscripts) of Latour's and Akrich's semiotic vocabulary that describes interactions between designers and users.[8]

Historians have recounted many acts of resistance to new technology in rural America. Midwestern farm labourers broke machines during the economic crisis of the 1870s. Farm men and women resisted attempts to impose scientific-farming and domestic-science practices on them before World War II. The Old Order Amish in Pennsylvania still refuse to own a telephone and automobile. Farmers concerned about the urbanisation of their rural identity delayed the establishment of Daylight Savings Time in Wisconsin until 1957.[9]

Rather than seeing resistance in Foucauldian terms as ineffectual, in functionalist terms as a sign that something has gone wrong in a capitalist market, or as irrational or heroic, I view resistance not only as a social response, but as a common form of negotiation in creating sociotechnical change.[10] I focus on what I call 'transformative resistance', that is, on actions taken by users against the perceived imposition of a technology on a way of life and the transformations that resulted. I think this concept applies equally well to groups other than those we call 'rural', and that it provides yet another antidote to the pervasive belief in technological determinism.[11]

My methodology is a constructivist history of technology involving reciprocal relationships among social groups, artefacts and ideas.[12] Although I use phrases like 'modernisation' and 'way of life', I link them to my interpretation of the views of historical actors on these topics, rather than to theories of modernity and culture. I use the term 'network' to refer to actor-described linkages among social groups and artefacts, not in the full sense of the actant-networks of Latour and Callon, which make no analytical distinction between human and nonhuman actants.[13]

MODERNISERS, FARMERS, IDEOLOGY, AND CLASS

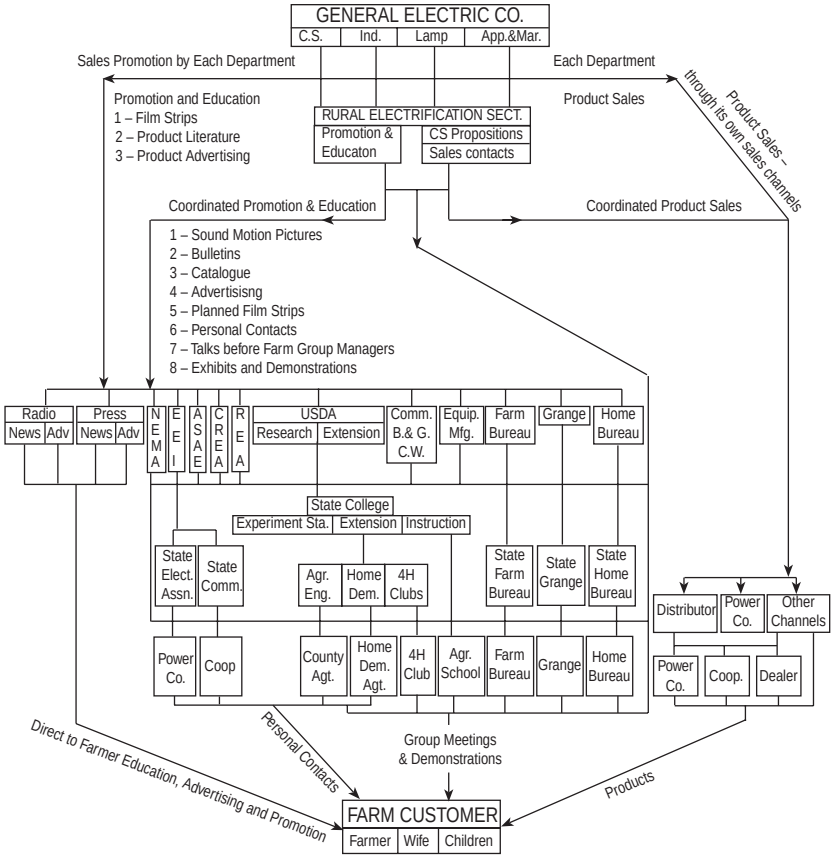

FIGURE 1. Network of groups involved in farm electrification (after GE 1938)

Let me introduce the actors in my story with a diagram from a 'confidential' booklet on rural electrification that General Electric (GE) circulated to utility companies in 1938 (Fig. 1). The diagram depicts a vast network of groups which attempted to electrify the farm.[14] GE, of course, is at the top of the diagram (drawn from its point of view), followed by agencies mediating between GE and the Farm Customer. On the second level are communications media, trade associations, professional societies, an industry-sponsored rural electrification group, the REA, government agencies, equipment manufacturers, and farm organisations. The third level shows those who dealt directly with farm people: state agricultural colleges, their extension services, county agents, home economists, 4-H club leaders for the youth, utility companies, co-operatives, and appliance dealers.

Finally, we get to the box representing farm men, women, and youth (30 million people in 1938, about a third of the U.S. population). The fact that a large number of modernisers were trying to convince them to buy electricity indicates that there might have been some resistance to these efforts!

A major goal of these networked agencies was to turn farm people into a new social group called 'Farm Customers', partly by changing their division of labour to the gendered one of the urban domestic ideal. This attempt is symbolised by the labels, Farmer, Wife, and Children, an implied division of labour into male agricultural work and female housework that would have seemed artificial to most farm people in this period.[15]

The promoters in Fig. 1 constructed a larger network than those built for the telephone, automobile and radio, partly because they could couple the commercial network of manufacturers and sales agents to a large governmental and educational network, which had been developed for modernising agriculture since the beginning of World War I. Stimulating that effort was the Country Life Movement, started in 1908 amid concerns about a rural exodus to the cities, rising food prices, and poor living conditions on farms. As the rural arm of the progressive movement, Country Life leaders, who were mostly urban professionals, helped create rural sociology as a discipline, promoted the fields of agricultural economics and home economics, and helped persuade Congress in 1914 to establish the present co-operative extension system between land-grant colleges and the United States Department of Agriculture (USDA), shown as the middle section of blocks in Fig. 1. Although the REA was a later, New Deal agency, it too was imbued with the ethos of the Country Life Movement.[16]

The beliefs of the promoters of rural electrification include Social Darwinism, scientific management, agrarianism, technological determinism, the progressive ideology of electricity, Ferdinand Tonnie's concept of modernisation, and William Ogburn's theory of cultural lag. Although only the social scientists stated their beliefs formally, the other groups, including farm leaders, shared many of these ideas. Most of them interlocked in a way to support the common

goal of modernising the family farm in order to preserve it as a political, economic and social institution.[17]

Promoters devised many techniques to sell electricity. These included newspaper and magazine advertising, exhortations in farm journals, displays in stores and at county fairs, humorous skits about old-fashioned living, home demonstrations, kitchen parties, door-to-door canvassing, and 4-H youth clubs.[18] More techniques were used to sell electricity than the telephone, automobile, and radio, another indication of resistance to rural electrification.

Although I focus on the actions of users in this essay, resistance was also widespread among the groups depicted in Fig. 1. Electrical modernisation was thus a fractured, difficult-to-achieve effort, not a monolithic force directed by omnipotent government and corporate agencies. The early REA espoused a public-power ideology and criticised private power companies, their trade associations, manufacturers, and the USDA Extension Service (before the REA joined the USDA in 1939) for 'skimming the cream' off the market by targeting wealthy farmers. In turn, the utility industry attacked the REA as a socialistic New Deal organisation. The National Grange, an older grass-roots farm group, accused the younger, business-oriented Farm Bureau of catering to large commercial farmers. Home economists in the USDA criticised REA home economists for doing sales work, rather than education.[19] In the co-operatives, boards of directors and superintendents opposed implementing REA's full-scale sales efforts. Many appliance dealers resisted joining forces with the REA as well because they thought most farmers could not afford electrical appliances.[20]

Farmers, however, varied widely in class. Although urban and town dwellers viewed them as an increasingly marginal group in the twentieth century, there were many gradations of economic class in the countryside. Most of them fall into that catch-all, middle class category called the 'family farm'. Of the 6.3 million farms counted by the agricultural census of 1930, about five percent were over five hundred acres, forty percent were between one hundred and five hundred acres, fifty percent were between ten and one hundred acres, and five percent were less than ten acres. The tenancy rate was at an all-time high of forty-two percent in 1930. African-American sharecroppers made up about fifteen percent of the tenants. About one-fourth of the labour force was hired labour.[21] I will focus on actions taken by upper and middle class farm families the prospective consumers targeted by the promoters of rural electrification.

We should also recognise that farmers drew upon a rural tradition of resistance to the growth of industrial capitalism. Farm people protested against monopolistic trusts in the economic and political Granger and Populist movements of the late nineteenth century. Many resented the cultural hegemony evident in the increased urban-rural tensions of the 1920s over the issues of Prohibition, immigration and the continued exodus of country youth to the city.[22]

TRANSFORMATIVE RESISTANCE

How did farm people resist rural electrification within these contexts? I identify three types of transformative resistance: opposing the introduction of a technology into a community; not purchasing a technology or the full complement of a technological ensemble; and not using a technology in the manner prescribed by its promoters. The first sort of actions includes those usually associated with Luddism, the second and third fall along the lines of consumer and everyday resistance. Although a large number of farmers demanded electricity, enough people engaged in these forms of resistance, especially in the consumer and everyday types, for these actions to lead to social changes not predicted by the promoters. I shall discuss these actions in the context of how most farmers encountered rural electrification – through the organisation and operation of an REA co-operative – and shall make a few comparisons with the telephone and automobile.

Although the REA hailed the electric co-operative as a new grass-roots organisation, it was a far cry from being democratically controlled before World War II.[23] The mythology of the REA, fostered by the agency and its political supporters, was that a group of local farmers, usually denied electricity by a private utility company, would organise themselves into a co-operative and borrow government money to build and operate a network of power lines to their farms. The REA archives reveal a different story. The Washington-based agency organised, staffed, and attempted to micromanage every conceivable aspect of the running of about one thousand co-operatives in over forty states, from training linemen and bookkeepers at headquarters to approving the purchase of typewriters. In classic disciplinary fashion, the REA scrutinised every contract, board-of-directors minutes, and managers' report. It sent engineers and attorneys into the field to organise co-ops, superintendents to take over mismanaged co-ops, and agricultural engineers and home economists to build load, that is, to get people hooked up to the system and to buy and use appliances. One of the most successful of the New Deal programs, the REA saw itself as the protector of the federal government's investment in these co-operatives and argued that it had a mandate to push electrification so that the co-op would pay off its loans in time.[24]

Opposing the Introduction of a Technology

The first type of resistance, opposing the introduction of a technology, was usually directed against the building and organisation of an REA co-operative. Most of these actions centred on perceived violations of property rights and had precedents in the countryside. In the early part of the century, farm people cut down telephone poles erected on their land when companies did not obtain legal rights of way. The story of a farmer letting a bull loose on line crews because he

refused to recognise the legality of a utility company's condemnation of property may be apocryphal, but it symbolises rural unrest typical of this period.[25] Many farmers physically attacked reckless automobile drivers and sabotaged roads during the anti-car crusade before World War I.[26]

The right-of-way problem for telephone lines was typically solved by the formation of locally owned and managed telephone co-operatives.[27] But in the 1930s, the government-controlled REA co-operatives demanded rights of way to build extensive power grids. Farmers expected the government to pay them large sums for easements, lines criss-crossed farms in ways that renewed family quarrels, and poles interfered with field work.[28] When matters could not be resolved peacefully, farm people took other measures. An Illinois woman guarded a freshly dug hole with a shotgun to prevent the REA from completing the pole-setting job; Iowans tried forcibly to prevent REA crews from erecting poles along a highway; a Minnesota man said he would chop down poles if they were put on his land. A farm couple carried out the threat in Monroe County, Wisconsin. When the co-op put up poles on their land without obtaining an easement, the husband chopped them down, parked the family car on top of the (unelectrified) fallen wires, then brought food to his armed wife stationed inside the car to keep the REA at bay with a shotgun, while he finished the ploughing.[29]

Not all farm people resorted to violence, of course, and many protests involved simply not giving a right of way. John Carmody, the second Administrator of the REA, complained in 1938 that 'Everybody says he wants electricity, but when it comes to locating the lines and locating the poles, many people either refuse to hand out essentials, thereby denying their neighbours electricity, or make it so difficult and so costly that certain lines cannot be built at all'.[30] One Iowa woman got upset with her husband for granting an easement after holding out for six months, even though the poles would interfere with his ploughing. In a Texas household with a different gendered division of labour, a co-op director did not want poles placed in his fields because it would interfere with his wife's ploughing.[31]

Not Purchasing a New Technology

The most common form of resistance was not violence or refusing to give a right of way, but that of not buying the technologies pushed by the modernisers. This type of consumer resistance appeared in the early days of the telephone and automobile, but it was much more widespread with electrification in the 1930s. Although the aggregate net income of farm operators had recovered from the depths of the Great Depression by the mid 1930s, finances were still a major reason why large numbers of farm people chose not to electrify the farmstead in this period.

Yet it was not just poor folks who cited economics as a reason not to obtain electricity. Middle class farm people in Illinois, for example, refused to sign up

for electricity when the co-op required that they install two electrical outlets in the kitchen and one in each room. Putting electric lights in the bedroom seemed a luxury when one could light the way to bed with a kerosene lamp. Many people feared losing their farms if the co-op folded and some had been burnt in disreputable co-op schemes in the 1920s. In 1941, some prosperous farmers in western Kansas were waiting until their gasoline-powered electrical generating plants wore out before joining the co-op.[32]

There were concerns other than economics. An REA staff member reported that most farm people 'do not feel that electricity is worthwhile to them even though they can often well afford it'. Many thought that it was more important to obtain other technologies, such as gravelled roads.[33] Others did not trust a New Deal agency, thought the simple scheme of paying a co-op membership fee to get electricity was too easy, or resisted giving up older technologies. Some would not sign a membership application for religious reasons. More than a few were afraid of an invisible force that was still considered mysterious in the pre-electric age. Some thought power lines would attract lightning, others worried that lines would fall across barbed-wire fences and electrocute their cattle. The fears were not groundless. Accidental electrocutions of linemen, farmers, and cattle were common enough for the REA to embark on a major safety program in 1939.[34]

Those who signed-up for the co-op, had their house wired, and hooked up to the highline still resisted the modernisers by not purchasing a full ensemble of electrical appliances. In this way, farm men and women had a good deal to say about what an electrical modernity would look like in the countryside. An indication of what appliances they bought is given by surveys of farms newly electrified on REA lines.[35] Table 1 shows a remarkable consistency in which appliances were first purchased in these years. Because the order is not based simply on purchase price or operating cost and because the order is similar to that of pre-REA surveys, the data gives an idea of which appliances were valued on the farm.

Despite increased farm income in this period and the best efforts of the REA, new co-op members bought mainly radios and irons. Only about one-half bought washing machines and refrigerators. All four items were familiar technologies that prosperous farm people had run on either batteries (for radios) or petroleum products (for irons, washing machines, and refrigerators) before they had electricity. The house was electrified long before most agricultural operations were. Lighting in the barn was universal, but electrical equipment for it went begging – except in irrigation, dairy, and large-scale poultry regions. Other items that had more of an urban aura, like vacuum cleaners and coffee makers, were often seen as 'foolish luxuries'.[36]

Table 2 illustrates the urban-rural contrast for some of these technologies. The percentage of new REA customers buying radios, irons, washing machines, and hot plates in 1940 was comparable to the national figures for these goods (i.e., for all houses, farm and non-farm). Yet farm people purchased fewer

TABLE 1. REA-Serviced Farms Reporting Ownership of Selected Appliance, 1938–1941 (Percentage)

	1938	1939	1940	1941
Radio	86	82	88	90
Iron	81	84	84	85
Washing machine	47	59	55	55
Refrigerator	26	32	33	42
Toaster	24	31	29	32
Water pump	17	19	15	18
Vacuum cleaner	16	21	21	21
Hot plate	12	19	15	15
Motors of less than 1 horsepower	9	18	15	15
Coffee maker	6	6	8	9
Range	5	3	4	4
Cream separator	5	14	8	8
Milking machine	2	4	2	3
Chicken brooder	1	3	4	7
Water closet	– -	6	6	6

Notes: The number of projects in each survey varied from 46 (1938) to 123 (1939), the average length of service from 8.4 months (1938) to 19.3 months (1941), the number of customers responding from 17,100 (1938) to 70,893 (1941), and the percentage responding from 63.5% (1938) to 68.8% (1939).

Sources: *Rural Electrification News*, July 1938, pp. 4-10; Jan. 1940, pp. 6-8; Oct. 1940, pp. 10-11; and J. Stewart Wilson to Robert Craig, et al, Aug. 8, 1941, REAA, Entry 17, Box 4.

refrigerators, toasters, vacuum cleaners and coffee makers. Running water and a modern bathroom were rare on the farm, as was the electric range.

Why did farm people resist buying a full complement of electrical appliances and mix ‘modern’ technologies with ‘old-fashioned’ non-electrical ones? The cases of the refrigerator, electric range and bathroom help explain why and show how farm families created their own versions of modernity.

The lower percentage of refrigerators purchased by farm families with electricity, especially in the North, in 1940 seems to be a result of both economic and cultural reasons. Even in urban areas, the refrigerator was viewed initially

TABLE 2. National vs. REA Ownership of Selected Appliances, 1940

	U.S. Wired Homes 1940 (%)	REA Customers 1940 (%)
Iron	95	84
Radio	81*	88
Washing machine	60	55
Refrigerator	56	33
Toaster	56	29
Vacuum cleaner	48	21
Coffee maker	33	7.9
Hot plate	17	15
Range	10	4.2

* Percentage of total households (wired & non-wired), calculated from U.S. Bureau of Census, *Historical Statistics of the United States, Colonial Times to 1970* (1970; rpt., New York: Basic Books, 1976), Series A 320-349 (p. 42), and Series R 93-105 (p. 796).

Notes: Figures are rounded to two significant places. The number of wired homes in the U.S. was 22.7 million urban and rural non-farm, plus 1.8 million farms. The number of REA new customers was 43,000.

Sources: *Electrical Merchandizing*, Jan. 1940, pp. 10, 14-15; and *REN*, Oct. 1940, pp. 10-11.

as a luxury item.[37] Farmers also realised that buying a refrigerator meant more than purchasing another appliance, it meant changing food preparation and storage patterns common to rural life. Farm people had less access to ice delivery and electricity, but they had more springs, cellars and wells. Most farms also had a daily supply of fresh milk, an economic reason to store large quantities of cream, fresh vegetables in the summer, and plenty of these to can. Thus, the transformation in shopping patterns in the city – from daily buying of groceries and home delivery, to weekly purchases at the supermarket – occurred much later on the farm, well into the 1960s in most areas.[38] Outside of the South, year-round refrigeration was seen as something farm people could do without when it came time to decide which electrical appliances to buy in the 1930s.

The unpopularity of the electric range seems to be due primarily to economics. Although the device cost about one-fifth less, on average, than the more popular refrigerator, it had a much higher operating cost, using about five times as much electricity per month. Purchasing a range often incurred an added installation fee in order to bring a 220-Volt service into the house.[39]

But there were cultural factors, as well. The coal or wood range (whether used in town or on the farm) served a variety of purposes. In addition to cooking and baking, women used it to heat their (usually large) kitchens in the winter, and to heat water for washing dishes, doing the laundry and bathing. Some of these tasks continued on the farm after they were discontinued in town because furnaces, bathrooms and gas hot water heaters were rare in the country. Many farm families needed hot water to clean dairy utensils. For these reasons, most farm women were extremely reluctant to give up their coal or wood stoves. Even when Northern women bought a kerosene or gasoline stove, they did so primarily for canning vegetables in the summer and increased cooking during harvest time. They kept their coal or wood stove for the colder months.[40] Another disadvantage of the electric range was the unreliability of electricity due to frequent outages.

An innovative response by appliance manufacturers was to sell a combination coal or wood stove and electric range. The coal or wood side heated the kitchen in the winter, the electric side cooked and baked in the summer.[41] The combination stove is an excellent example of how user resistance led to the creation of new forms of rural modernity. In this case, the material culture (and economic conditions) on the farm in this period encouraged rural people to heat the kitchen and hot water with the same source used for cooking and baking. One way to bring electricity into this part of rural culture – without upsetting the entire farmstead – was to combine the new with the old technology.

While some farmers created a new form of rural modernity in this manner, the meaning of the outhouse did not change. An inside bathroom with a toilet and running water was universally considered to be 'modern', an outhouse was not. The outdoor privy (and the well-worn path to it from the house) was probably the main symbol of the 'backwardness' of rural society in the twentieth century, the object of countless jokes that kept rural-urban tensions alive in this period. There were many barriers to its adoption: the lack of a sufficient water supply and sewage removal capabilities on the farm; high prices of plumbing fixtures; the necessity, in most cases, to remodel the farm house to add a bathroom; the reluctance of some REA staff to push plumbing because of its poor load-building potential; and the opposition of some co-op boards of directors to giving loans for this urban luxury. The REA made some progress on these matters by negotiating group discounts from manufacturers, making plumbing loans from its own funds, and 'educating' its own staff and the co-ops to this type of modernisation.[42] But it did not meet its goal until well after World War II.

Another factor was the (not inconsiderable) cultural change associated with using a toilet indoors. Farm people took baths in the house, often near the kitchen stove, but discharging bodily wastes seemed to be an activity that 'naturally' belonged in the great outdoors, not in the house. Often, the opposition came from older men, whose wives installed an indoor toilet after they died.[43] An example of generational differences about plumbing comes from a report by an REA

sanitation expert who had set up a demonstration bathroom and water-carrying contest in a North Carolina high school in 1938. The agent proudly told an REA conference that 'Those boys and girls went home at the end of the week, [and] we heard the farmers in town on Saturday saying "Well, we are not going to have any peace at home until we get these things"'.[44]

Not Using a Technology in a Prescribed Manner

My third area of resistance is not using a technology in the manner prescribed by its promoters. In the first half of the twentieth century, automobile manufacturers responded to farm people using the car as a stationary source of power, ploughing the fields and trucking goods to town, by inventing new artefacts: tractors, gasoline washing machines and pick-up trucks.[45] In the case of the telephone, companies like AT&T and the independents gave up trying to use social means to stop farm people from eavesdropping and 'visiting' on the party line. Instead, AT&T designed a farm telephone that would work with so many people on the line.[46]

Farm people also used electrical appliances in 'rural' ways. Refrigerators were often turned off in the winter, in the North and the South, reflecting food storage practices on the farm, rather than those in the city.[47] Farm women learned to read electric meters and borrowed their neighbour's line in order to iron clothes when they were about to go over the monthly minimum bill. Many co-op members went back to the kerosene lamp when they had used the monthly minimum. As late as 1941, the *Rural Electrification News* reported the anecdote of a Kansas farm man who only turned on his electric lights to go into a room to find his kerosene lamp.[48] Although these incidents do not involve the more radical altering of technological artefacts involved with the telephone and automobile, they show that many farmers did not use electrical appliances in the manner prescribed by manufacturers before World War II.

RECONSTRUCTING MODERNITY

Although the three types of resistance I have discussed varied considerably – from violent acts of protest to peaceful actions of selective purchase and modified use – I argue that all were significant aspects of negotiations between promoters and users of rural electrification. Resistance contributed to the mutual construction of artefacts, social groups, and ideology in rural America. Responding to user resistance, promoters (government agencies, manufacturers, home economists, and rural reformers) designed new artefacts (such as the combination wood-electric stove) and new institutions (such as the telephone and REA co-operatives). Ironically, the undeniable success of the REA after the war

masked the contested character of this process before the war, thus reinforcing the ideologies of technological progress and determinism.

But rather than becoming urbanised or suburbanised by consumer technology, farm people wove them into existing patterns of rural culture to create new forms of modernity. Throughout the twentieth century, farm men and women recreated the institution of visiting on the co-operative telephone lines. Farm women travelled further from home with the automobile, but also used it to perform traditional duties within a gendered division of labour, such as marketing eggs.[49] When farmers began to add electricity to the construction of rural identities,[50] they created a mixture of old and new technologies. Before the war, many farm families belonged to the local telephone co-operative, drove an automobile, joined the REA co-op, lit the house with electricity, and listened to the radio. But they also cooked with a wood stove, used a well for refrigeration, and walked the path to the outhouse. Families who had an electrical refrigerator and an electric range used them in seasonal ways common to rural life.

Farmers adopted consumer technologies more readily during the prosperity following World War II, when the types of resistance I have discussed were less prominent. Violent resistance disappeared, but not the selective consumerism of a supposedly consumerist era. Electrical appliances filled the kitchen and more families had a bathroom, but the work and leisure patterns of middle-class farmers remained those of rural life.[51]

The persistence and adaptability of rural culture in the face of enormous technological change should not surprise anyone but the most committed technological determinist. In my story, the electrical 'development' of the American farm was a fractured, contested process, not something foreordained. The story questions a moderniser's view of modernisation. Unfortunately, it was just that view – one that was unreflective about the complexities of the past and of technology – that guided many ill-fated international development programs during the Cold War.

ABBREVIATIONS:

ATTA	AT&T Archives, Warren, New Jersey.
GEA	General Electric Archives, Schenectady Museum, New York.
JMC	John M. Carmody Papers, Franklin D. Roosevelt Library, Hyde Park, New York.
REAA	Records of the Rural Electrification Administration, National Archives, Washington, DC, RG 221.
REN	*Rural Electrification News*.

NOTES

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[1] Ninety-seven percent of farms in the Northeast had electricity, ninety-five percent in the Midwest and the Far West, and ninety percent in the poorer South. See Kline 2000, which forms the basis for this essay, p. 287.
[2] On earlier uses of the term 'development' in colonial projects, see de L'Estoile 1997 pp. 349, 365. I thank Suzanne Moon for this reference.
[3] Adas 1989.
[4] For examples, see Fitzgerald 1986 and Moon 1998.
[5] On all of these technologies, plus the radio, see Kline 2000.
[6] Bauer 1995.
[7] See, for example, Dew 1994; Scranton 1988; and Scott 1985.
[8] Foucault 1979; Foucault 1980, especially pp. 162–5; Martin Bauer, 'Towards a Functionalist Analysis of Resistance', in Bauer 1995, pp. 393–417; and Akrich and Latour 1992.
[9] Argersinger and Argersinger 1984; Danbom 1979; Kraybill 1989; and Hamilton 2001.
[10] For similar approaches in studies of rural America, see Neth 1995; Barron 1997; and Hamilton 2001.
[11] For critiques of technological determinism, see Smith and Marx 1994.
[12] This approach extends the Social Construction of Technology method developed in the mid 1980s by Trevor Pinch and Wiebe Bijker to include power relations between social groups and reciprocal relations between social groups and the use of artifacts. See Kline and Pinch 1996.
[13] See Callon 1987 and Latour 1987.
[14] General Electric 1938.
[15] On the work patterns of farm women, see Jellison 1993 and Neth 1995, ch. 1.
[16] Bowers 1974; Danbom 1979.
[17] McDean 1984; Neth 1995, ch. 4; Kline 1997a.
[18] Kline 1997b.
[19] Brown 1980; Campbell 1962; Kline 1997b.
[20] For an example of REA staff complaining about these attitudes, see D. W. Teare to C. A. Winder, n.d. [1941], REAA, Box 76-2.
[21] Watenberg 1976, pp. 465–7.
[22] The vast literature on this topic is summarized in Danbom 1995.
[23] See Dora B. Haines and Udo Rall to Administrator, October 4, 1939, REAA, Box 76-1.
[24] Kline 2000, chs. 5–6.
[25] F. A. Pickernell to Joseph Davis, November 18, 1903, ATTA, Box 1342; *Telephony*, January 1905, p. 100; March 1908, p. 370; September 11, 1909, p. 255. For an example of refusals to give rights of way to Bell companies in Illinois, see *Telephony*, August 1907, p. 130.
[26] Kline and Pinch 1996.
[27] Fischer 1987a, 1987b.

[28] *REA Annual Report*, 1938, p. 75; Severson 1962, pp. 84, 250.
[29] Severson 1962, p. 143; Severson 1972, p. 136; Tweton 1988, p. 143; Richardson 1961, pp. 46–47.
[30] John Carmody to Benton Rural Electric Association, 12 Aug. 1938, JMC, Box 88.
[31] Severson 1964, p. 25 (quotation); Chessher 1964, p. 27.
[32] Severson 1965, p. 220; Severson 1964, p. 24; Margaret Anderson, Field Report, 28 Jan. 1941, KS-32, REAA, 86-8.
[33] William Nivison to John Carmody, 5 Nov. 1937, JMC, Box 84; and Severson 1964, p. 17.
[34] Severson 1965, p. 143; Severson 1972, pp. 106, 114, 130; Severson 1962, p. 31; Tweton 1988, pp. 142–3; Sorenson 1944, p. 268; Chessher 1964, p. 25; Caro 1982, p. 525; Udo Rall to Thumb Electric Cooperative, 7 June 1939, REAA, Box 89-2 (religious reasons); and *REN*, April 1939, *passim*, *REN* Oct. 1939, pp. 20–21. On the mysterious power and fear of electricity, see Nye 1990, ch. 4; Sullivan 1995.
[35] Although the figures undoubtedly underestimate the eventual appliance purchases by these surveyed co-op members before the U. S. entered World War II, this is counterbalanced by the probability that people who owned fewer appliances chose not to participate in the surveys (response rates were about 65 percent), and the fact that the average length of service for members surveyed rose from about 9 months in 1938, to nearly 20 months in 1941.
[36] The quotation is from William Nivison to John Carmody, 5 Nov. 1937, JMC, Box 84. The reluctance to purchase and selective buying of electrical appliances by farmers in this period is also noted by Adams 1993; and Wolfe 2000, which is based on oral histories conducted in North Carolina.
[37] Kuschke and Whittemore 1933; *Appliance Specifications, 1936*, pp. 92–7.
[38] On changing shopping patterns, see Strasser 1982; Cowan 1983.
[39] The electric range was unpopular in the city for similar reasons. See Busch 1983.
[40] Rapp 1930, pp. 8–9; Brackett and Lewis 1934, p. 29.
[41] Rapp 1930, pp. 12–13; Arnold 1984, p. 18. Suzanne Moon, interviews with George Woods, 18 March 1995; Gerald Cornell, 24 May 1995; Thena Whitehead, 11 February 1995; Eva Watson, 21 February 1995; and Dorothy Gracey, 21 January 1995. Tapes and transcripts in possession of the author.
[42] Miller 1937, p. 14. See, for example, John Carmody to Michael F. Garrett, 15 April 1938; Carmody to Harry Hopkins, 19 May 1938, JMC, Box 88; Willard Luft remarks, REA Regional Conference, Dallas, TX, 23–26 May 1939, REAA, 96, Box 6, pp. 145–150; Luft report, attached to George Munger to Harry Slattery, 3 Jan. 1940, REAA, 13, Box 29.
[43] Adams 1994, p. 210.
[44] Willard Luft remarks, REA Conference, Dallas, TX, 23–26 May 1939, REAA, 96, Box 6, pp. 145–150, on p. 150.
[45] Kline and Pinch 1996.
[46] See, for example, P. L. Spalding to Joseph Davis, 5 November 1903, ATTA, location 21, 06, 02, 08.
[47] Lehmann and Kingsley 1929, p. 421; A. R. Tucker to C. A. Winder, 11 Jan. 1939, REAA, 86, Box 21.
[48] George Kable, Remarks, REA Annual Administrative Conference, 9–13 Jan. 1939, p. 628; and A. R. Tucker to C. A. Winder, 11 Nov. 1939, REAA, 86, Box 21; and *REN*, May 1941, 28–29.

[49] On the new forms of modernity surrounding the telephone and automobile, see Kline 2000, chs. 2–3.
[50] On technology and rural identity, see Hamilton 2001.
[51] Jellison 1993, ch. 6; Kline 2000, ch. 9.

REFERENCES

Adams, Jane 1993. 'Resistance to "Modernity": Southern Illinois Farm Women and the Cult of Domesticity', *American Ethnologist*, 20: 89–113.

Adams, Jane 1994. *The Transformation of Rural Life: Southern Illinois, 1890–1990*. Chapel Hill: University of North Carolina Press.

Adas, Michael 1989. *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance*. Ithaca: Cornell University Press.

Akrich, Madeline and Bruno Latour 1992. 'A Summary of a Convenient Vocabulary for the Semiotics of Human and Nonhuman Assemblies', in *Shaping Technology, Building Society: Studies of Sociotechnical Change*, ed. Wiebe E. Bijker and John Law, pp. 259–64. Cambridge, MA: MIT Press.

Argersinger, Peter H. and Jo Ann E. Argersinger, 'The Machine Breakers: Farmworkers and Social Change in the Rural Midwest of the 1870s', *Agricultural History*, **58**: 393–410.

Arnold, Eleanor (ed.) 1984. *Party Lines, Pumps, and Privies: Memories of Hoosier Homemakers*. Indianapolis: Indiana Extension Homemakers Assoc.

Barron, Hal S. 1997. *Mixed Harvest: The Second Great Transformation in the Rural North, 1870–1930*. Chapel Hill: University of North Carolina Press.

Bauer, Martin (ed.) 1995. *Resistance to New Technology: Nuclear Power, Information Technology, and Biotechnology*. Cambridge: Cambridge University Press.

Bowers, William L. 1974. *The Country Life Movement in America, 1900–1920*. Port Washington, N.Y.: Kennikat.

Brackett, E.E. and E. B. Lewis 1934. *Use of Electricity on Nebraska Farms, 1920–1934* (University of Nebraska Agricultural Experiment Station Bulletin No. 289, June 1934).

Brown, Deward Clayton 1980. *Electricity for Rural America: The Fight for the REA*. Westport, Conn.: Greenwood Press.

Busch, Jane 1983. 'Cooking Competition: Technology on the Domestic Market in the 1930s', *Technology and Culture*, 24: 222–45.

Callon, Michel 1987. 'Society in the Making: The Study of Technology as a Tool for Social Analysis', in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, ed. W. E. Bijker, Thomas P. Hughes and Trevor Pinch, pp. 83–106. Cambridge, Mass.: MIT Press.

Campbell, Christiana M. 1962. *The Farm Bureau: A Study of the Making of National Farm Policy, 1933–1940*. Urbana: University of Illinois Press.

Caro, Robert A. 1982. *The Years of Lyndon Johnson*, vol. 1 *The Path to Power*. New York: Random House.

Chessher, Allen H. 1964. *Let There Be Light: A History of Guadalupe Valley Electric Cooperative*. San Antonio, Texas: Naylor Co.

Cowan, Ruth Schwartz 1983. *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave*. New York: Basic Books.

Danbom, David B. 1979. *The Resisted Revolution: Urban America and the Industrialization of Agriculture, 1900–1930*. Ames: Iowa State University Press.

Danbom, David 1995. *Born in the Country: A History of Rural America*. Baltimore: Johns Hopkins University Press.

de L'Estoile, Benôit 1997. 'The "Natural Preserve of Anthropologists": Social Anthropology, Scientific Planning and Development', *Social Science Formation*, 36: 343–76.

Dew, Charles B. 1994. *Bond of Iron: Master and Slave at Buffalo Forge*. New York: W. W. Norton.

Fischer, Claude 1987a. 'The Revolution in Rural Telephony, 1900–1920', *Journal of Social History*, 21: 5–26

Fischer, Claude 1987b. 'Technology's Retreat: The Decline of Rural Telephony in the United States', *Social Science History*, 11: 295–327.

Fitzgerald, Deborah 1986. 'Exporting American Agriculture: The Rockefeller Foundation in Mexico, 1943–1953', *Social Studies of Science*, **16**: 457–83.

Foucault, Michel 1979. *Discipline and Punish: The Birth of the Prison*, tr. Alan Sheridan. New York: Vintage Books.

Foucault, Michel 1980. *Power/Knowledge: Selected Interviews & Other Writings, 1972–1977*, ed. Colin Gordon, tr., Gordon, Leo Marshall, John Mepham, and Kate Soper. New York: Pantheon Books.

General Electric Rural Electrification Section 1938. 'Cash in on the Great Farm Market'. GEA.

Hamilton, Shane 2001.'"The Sun Still Rises Just the Same": Daylight Savings Time and the Politics of Rural Identity, 1945–1966', paper presented at the annual meeting of the Society for the History of Technology, October 2001.

Jellison, Katherine 1993. *Entitled to Power: Farm Women and Technology, 1913–1963*. Chapel Hill: University of North Carolina Press.

Kline, Ronald 1997a. 'Ideology and Social Surveys: Reinterpreting the Effects of "Labor-Saving" Technology on American Farm Women', *Technology and Culture*, 38: 355–85.

Kline, Ronald 1997b. 'Agents of Modernity: Home Economists and Technology Transfer, Rural Electrification in the United States, 1925–1950', in *Rethinking Women and Home Economics*, ed. Virginia Vincenti and Sara Stage (Ithaca: Cornell University Press), pp. 237–52.

Kline, Ronald R. 2000. *Consumers in the Country: Technology and Social Change in Rural America*. Baltimore: Johns Hopkins University Press.

Kline, Ronald and Trevor Pinch 1996. 'Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States', *Technology and Culture*, **37**: 763–95.

Kraybill, Donald B. 1989. *The Riddle of Amish Culture*. Baltimore: Johns Hopkins University Press.

Kuschke, Blanche M. and Margaret Whittemore 1933. *Home Refrigeration in Rural Rhode Island* (Rhode Island State College Agricultural Experiment Station Bulletin No. 239, September 1933).

Latour, Bruno 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.
Lehmann, E.W. and F.C. Kingsley 1929. *Electric Power for the Farm* (University of Illinois Agricultural Experiment Station Bulletin No. 332, June 1929).
McDean, Harry C. 1984. 'Professionalism in the Rural Social Sciences, 1896–1919', *Agricultural History*, 58: 373–92
Miller, K.E. 1937. 'Health Protection through Improvements in Farm Life', *REN*, Aug. 1937: 13–15
Moon, Suzanne M. 1998. 'Takeoff or Self-Sufficiency? Ideologies of Development in Indonesia, 1957–1961', *Technology and Culture*, **39**: 187–212.
Neth, Mary 1995. *Preserving the Family Farm: Women, Community, and the Foundations of Agribusiness in the Midwest, 1900–1940*. Baltimore: Johns Hopkins University Press.
Nye, David E. 1990. *Electrifying America: Social Meanings of a New Technology, 1880–1940*. Cambridge, Mass.: MIT Press.
Rapp, Miriam 1930. *Fuels Used for Cooking Purposes in Indiana Rural Homes* (Purdue University Agricultural Experiment Station, Bulletin No. 339, May 1930).
Richardson, Lemont K. 1961. *Wisconsin REA: The Struggle to Extend Electricity to Rural Wisconsin, 1935–1955*. Madison: University of Wisconsin Experiment Station.
Scott, James C. 1985. *Weapons of the Weak: Everyday Forms of Peasant Resistance*. New Haven: Yale University Press.
Scranton, Philip 1988. 'None Too Porous Boundaries: Labor History and the History of Technology', *Technology and Culture*, **29**: 722–43.
Severson, Harold 1962. *The Night They Turned on the Power: The Story of the Electric Power Revolution in the North Star State*. Midwest Historical Features.
Severson, Harold 1964. *Determination Turned on the Power: A History of the Eastern Iowa Light and Power Company*.
Severson, Harold 1965. *Architects of Rural Progress*. Association of Illinois Electric Cooperatives.
Severson, Harold 1972. *Corn Belt: A Pioneer in Cooperative Power Production.* Humboldt, Iowa: Corn Belt Power Cooperative.
Smith, Merritt Roe and Leo Marx (eds) 1994. *Does Technology Drive History? The Dilemma of Technological Determinism*. Cambridge, Mass.: MIT Press.
Sorenson, C.A. 1944. 'Rural Electrification: A Story of Social Pioneering', *Nebraska History*, 25: 257–70.
Strasser, Susan 1982. *Never Done: A History of American Housework*. New York: Pantheon Books.
Sullivan, Joseph P. 1995. 'The Electric Wire Panic in New York City', *IEEE Technology and Society Magazine*, 14(3): 8–16.
Tweton, D. Jerome 1988. *The New Deal at the Grass Roots: Programs for the People in Otter Tail County, Minnesota*. St. Paul: Minnesota Historical County Press.
Watenberg, Ben J. (ed.) 1976. *The Statistical History of the United States: From Colonial Times to the Present*. New York: Basic Books.
Wolfe, Audra J. 2000. '"How Not to Electrocute the Farmer": Assessing Attitudes Towards Electrification on American Farms, 1920–1940', *Agricultural History*, 74: 515–29.