Kitchen Kinetics: Women’s Movements in Sigrun Bülow-Hübe’s Research

Annmarie Adams
School of Architecture, McGill University, Canada

Don Toromanoff
School of Architecture, McGill University, Canada

In May 1969, Montréal-based interior designer Sigrun Bülow-Hübe declared that Canada’s five million housewives spent the majority of their working hours in poorly-designed kitchens. She had studied the experiences of the country’s largest labour force, women who maneuvered through arbitrary layouts, endured countertops that were often too high, devised intricate schemes to fit casserole dishes into cramped storage compartments and tolerated inadequate ventilation. In the postwar period, work-saving electrical appliances and the widespread use of pre-cooked, ready mixed, canned and frozen foods induced radical transformations in meal preparation, cooking habits and grocery buying patterns. These rapid changes called attention to how kitchens operated in Canada and whether they were conducive to the work of housewives. In 1967, the Canada Mortgage and Housing Corporation (CMHC) commissioned the Swedish-born designer to re-examine kitchen planning for urban multiple and single family dwellings, and thereby establish norms for work and storage areas based on the concept of the single-worker kitchen. She surveyed thirty-seven kitchens in and near Montréal, and thoroughly studied previous research findings by American and European social scientists and architects.

Keywords: Mid-century design Canada, domestic design, women’s bodies, interior design, architecture, planning, kitchen design, efficiency, modernism.

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In researching kitchens, Bülow-Hübe developed and nurtured a woman-centered approach to domestic design. This paper examines how Bülow-Hübe’s kitchen research and design recommendations were based on a profoundly rigorous, passionate and careful understanding of women’s movements in the kitchen. Indeed, her drawings and public discourse were as much a testament of women’s bodies, daily habits, and social roles in the household, as they were about the technologically-complex environments kitchens exemplified. Her ability to consider kitchens simultaneously as gendered and technical spaces is an excellent example of women’s situated knowledge in the mid twentieth century.

Bülow-Hübe’s extensive CMHC kitchen research was donated in 1994 to the John Bland Canadian Architecture Collection at McGill University, with other papers related to her career. The kitchen research consists of a comprehensive eighty-page written report, organized around the subject of storage areas, work areas, and the interrelationship between storage and work areas. As a means to discuss her work, we follow the same themes, pausing at each to show her insistence on kitchens that functioned in unison with women’s movements. Crucial to the report are six appendixes that further provide an extremely rich array of architectural drawings, photographs, a diary of contacts and, a daybook of expenses. Meticulous research notes, including records of phone calls, provide a unique window into her fastidious work habits. Another useful source is the speech Bülow-Hübe delivered to kitchen manufacturers towards the end of her project during which, she luminously delineated a woman-centered critique of kitchen design.

The immediate circumstances of this comprehensive archive underline the significance of this research. Of the John Bland Canadian Architecture Collection’s sixty-some architectural archives, Sigrun Bülow-Hübe’s archive represents one of only two women’s fonds in the collection, a situation that enhances its historical value. Equally important is that no other interior or furniture designers are commemorated in the collection, the other figures included are well-known male architects. Her archive thus presents several hitherto understudied aspects of mid-century design history in Canada.

**Sigrun Bülow-Hübe as ‘Researcher-Designer’**
A self-described “researcher-designer,” and perhaps best known for her spare wood-and-upholstery Modernist furniture, Bülow-Hübe was the business partner of Reinhold Koller, an Austrian architect trained in Germany. Together they ran the popular Montréal store AKA Furniture Company that closed in 1975. Founded in 1953, the company was originally named AKA Works and, Bülow-Hübe was Chief Designer there until 1967. Working at the store gave her the chance to make valuable connections - she designed dozens of kitchens, interior layouts, and
furniture for upper-middle class clients that came from Montréal’s Westmount and Hampstead neighbourhoods. She did this design work before, during, and following her CMHC-sponsored kitchen research. It is disappointing that, to date, there is very little that has been written and published about Sigrun Bülow-Hübe’s work or life. A Masters thesis written in 1996 and two brief essays in the archival catalogue are the sole scholarly pieces on the prolific Swedish-Canadian designer, despite the fact that her papers have been accessible for nearly twenty years.9

Bülöw-Hübe’s Scandinavian background informed all her work. Born in Linköping, Sweden, on 1 January 1913, she studied under architect Kaare Klint (1888-1954) at the Royal Danish Academy of Fine Arts in Copenhagen, graduating about 1936.10 Klint was a pioneer in the design of modern Danish furniture. Unlike his colleagues at the Bauhaus, he embraced historical precedents.11 Modern Scandinavian furniture looked to both history and the immediate natural environment for inspiration, favouring warm woods and highly textured upholstery over the hard- edged metal and leather combinations made famous by Bauhaus designers such as Marcel Breuer.12 Bülow-Hübe also obtained training at a furniture factory, which would have been highly unusual for a young woman at this time.13 According to art historian Margaret Hodges’ Masters thesis, she worked as a researcher for the State Committee for Building Research in Sweden, developing residential standards with a special emphasis on kitchens.14 In the late 1940s she won a number of design awards, including a fellowship for a year of travel to the United States in 1948-49 to study prefabricated housing construction. She visited influential models of prefabrication and was exposed to the mass furniture market in the United States.15 In 1950 she wrote an advice book in Swedish on housing for consumers, Vi Tänker Bygga (We Think to Build).16 The same year the Canadian department store T. Eaton Co. Ltd., invited her to work as design consultant in Montréal. After an embroiled discussion with fellow Swedish designers at the popular Restaurang Cattelin in Stockholm concerning the public responsibility of professional designers, she decided to accept Eaton’s offer.17 It was a fateful decision that would shape her career as a designer.

Three years later, she and three partners opened the AKA Works, with a factory on Charron Street which in 1956 it moved to Hurteau Street. The showroom on Drummond Street was relocated in 1954 to 2020 Union Street and, in 1958, was moved to 550 Sherbrooke Street.18 Bülow-Hübe’s career in Canada nurtured her earlier interests from the Swedish period, it also brought new clients and new opportunities for sponsored research. Her entry into the world of design in Canada, however, did bring some unexpected hurdles. In 1968, she told the Swedish magazine Möbelvärlden (never published in the Canadian media) about her disappointing experiences in the position at Eaton’s home furnishings department:
And it sounded very appealing - think of spreading ideas of lightweight, practical, new furniture in this country [...] But soon it became apparent that the whole thing would not turn out as one had hoped. I wasn’t welcome to come in with my own ideas, or draw new furniture, propose anything that didn’t belong to the department store’s own traditions. In Canada, in all these years, a ‘well furnished’ home was understood as consisting of heavy, large, often costly furniture. The home was something of a status symbol, and the practical, the cozy, the simple, the new, the original - it just didn’t exist. I didn’t get a chance to work as I wanted, and after two or three years at Eaton, I decided to break free and work on my own.19

As this candid confession attests, Bülow-Hübe encountered a cultural barrier in her quest to participate in the local design scene. Perhaps, and more importantly, in postwar Canada the design field was a male-dominated milieu that proved to be a challenge for creative women like Bülow-Hübe as women were often relegated to the more typical roles of decorators instead of the more male-dominated roles of professional designers.20

Indeed, Québec, Bülow-Hübe’s adopted province, was among the last places in North America and Europe to welcome women as architects. While England and the United States had seen women register as architects prior to 1900, the first woman to graduate from an architectural program in Canada was a full generation later, in 1920. In Québec it was even later; Pauline Roy Rouillard graduated from L’École des Beaux Arts in Montréal in 1941 and registered with the provincial association in October 1942. The 1940s witnessed the admission of women architecture students to Montréal’s McGill University but the number of women in the profession remained low until 1970.21 The relative rarity of Québec women architects would certainly have seemed shocking to Bülow-Hübe whose native Sweden accepted its first woman architecture student in 1921.22

When juxtaposed, Swedish and Canadian news articles depict Bülow-Hübe in a troublingly distinctive manner. While Swedish journalists often introduced her as “Architect” Sigrun Bülow-Hübe, and were quick to point out her many design accomplishments both in Sweden and abroad, Canadian journalists tiptoed around her professional background and reduced her design role to “domestic taste-maker.”23 The relegation of the work of women architects to interiors or even to simply realizing design ideas conceptualized by male clients has a long history in North America, especially among the first women to become registered in the profession. It is part of a larger history, we believe, which limited women’s professional work to sub-fields closely linked to family life and domesticity. For example, many women painters focused on flowers and
children; women photographers specialized in portraits and still lives; women doctors became pediatricians and obstetricians. So too did many women architects forge their careers on interiors. Art historian Judith Neiswander charts the rise of the woman decorator in the late nineteenth century in self-help books published between 1870 and 1900. “By the end of the century the control of women over interior decoration was so complete that the master of the house could be chided for interference,” insists Neiswander.

Bülow-Hübe’s active participation in the Swedish Women’s Club in Montréal foreshadowed her dedication to design spaces women could actually enjoy and not simply work in. The presence of fellow Swedes was also undoubtedly an opportunity to discuss design cultures in both countries and their living experience in Canada. In an undated two-page text specifically prepared for a presentation to the Club, Bülow-Hübe carefully outlines the main points she wanted to express. It serves as a clear synopsis of her perception of the status of design in Montréal, after a decade of calling Canada’s then-largest city home. She begins, “Why did the homes look that way?” and points to, amongst other things, the absence of a unified national tradition, the lack of political figures with any training in design, and describes Canada as “an impoverished [fattigt in Swedish] country.” Her next subheading, “When did Canadians wake up to issues of taste?” highlights the improving Canadian economy after the war and the increase in imports of Modern furniture but also warns against bad pieces still popular then introduced nationwide as a result of many buyers’ lack of design expertise. Bülow-Hübe often resisted popular consumer trends in Canada which, in her opinion, were too conservative. Later in her notes, she tells the crowd of fellow Club members that Canadians have acknowledged “lighter wall colors but not white, yet,” alluding to the heavy, dark interiors of many traditional Canadian homes at the time. In contrast, Modern Swedish interiors, and especially kitchens, were always painted in a sterile white colour. Bülow-Hübe was visibly astounded that Canadians had not adopted a cleaner kitchen aesthetic and, more importantly, that they were reluctant to implement design changes at a federal level. Her involvement with nationwide organizations like the CMHC would become a way to improve housing and kitchen design throughout the country. Triumphant, she declares that in 1955, as Danish teak furniture broke into the Canadian furniture market, “with it, came the white walls.”

Her multi-dimensional career focused on the design of residential and commercial interiors, working at times in collaboration with well-known Modernist architects. For instance, in 1958 she furnished the main council chamber of Rother, Bland & Trudeau’s Ottawa City Hall (Figure 1).
Figure 1: Ottawa City Hall drawings (Courtesy: John Bland Canadian Architecture Collection, McGill University Library)

This fine example of Canadian modernism won the Montréal firm a national competition. The Ottawa City Hall garnered its architects a Massey Award in 1959 and it is considered one of the most important examples of International Style architecture in Canada. Likewise, in Montréal, Air Canada and McGill University commissioned her to design their board rooms and executive offices and she also collaborated in the design of Place des Arts, one of the city’s much beloved public spaces. Bülow-Hübe’s best known interior, however, remains her design of a model suite at Moshe Safdie’s Habitat 67, dubbed Unit 1030. Along with eleven other Canadian designers, and as one of only two women, she was invited to be the sole designer of an apartment during Montréal’s Expo 67. Rather than furnishing Unit 1030 with pieces and textiles that might complement the rather tough, modernist, concrete architecture, Bülow-Hübe filled the unit with Scandinavian-inspired furniture and accessories, emphasizing soft woods and printed textiles. A particularly delightful image of the designer is a photograph of Unit 1030, where she occupies a swivelling leather chair she chose for the living room. Her fashionable print dress, like the drapes and sofa she designed, enliven Safdie’s grey concrete forms. In the picture, she looks quite pleased with her design and immediate surroundings. The photograph also underlines Bülow-Hübe’s insistence that the real test of good chair design was the resulting comfort it provides for the sitter rather than the way it appears or looks when it is not in use.
Expo 67 drew an estimated fifty million visitors to the city and it proved an excellent venue for Bülow-Hübe’s work to get greater visibility and be widely published.

What rendered Sigrun Bülow-Hübe’s expertise so attractive to others was her knowledge and experience at all stages of the design process. To handle every aspect of the architect’s profession was not common practice in Canada at the time and remained out of reach for women designers. During her AKA years, Bülow-Hübe was responsible for space planning, concept sketches, technical drawings (including structural details and assembly methods), prototypes and furniture fabrication. In addition, the numerous furniture pieces she designed for houses in Montréal won her, between 1955 and 1959, twelve of Canada’s National Industrial Design Council awards. In 1973, Bülow-Hübe was elected to the Royal Canadian Academy of Arts.

In conjunction with her design work, research was paramount to Bülow-Hübe’s career development. Like many other twentieth-century home designers and architectural educators, she was convinced that the more she knew about how particular rooms functioned, the better placed she would be to design for everyday use. Beyond aesthetics, Bülow-Hübe’s work was informed by a genuine belief that good design promoted social well-being and users’ health and, as such, should be available to all. Even at the height of her design career at AKA, she allotted time to see clients with smaller budgets and taught them to remodel their existing furniture
instead of buying new pieces. Her particular interest in domestic environments and kitchens grew from the fact that it was something that affected society as a whole, not just wealthy clients. As a result, her kitchen research gave particular attention to the average housewife and critiqued the notion of designing for a typical user. As she would later state in the introduction to the final research document, she wished to focus on what she referred to as “semi-able” workers. This group consisted of women of all ages, though mostly middle-aged or elderly, who had experienced diminished health and a gradual or sudden decline and restriction of their physical abilities. She remarks that this group was the most neglected in research even though it represented the majority of housewives.

Bülow-Hübe retired from AKA in 1968 to work full-time on the kitchen research program funded by the CMHC. In devoting her career to research, she set out to educate the Canadian public about the importance of design and attempt to bring about change at the national scale. It is also possible for Bülow-Hübe to have been drawn to research opportunities as a means to supplement her salary as designer. An understudied aspect of the rise of the architect as social science researcher is how funded research supplemented the diminishing incomes of designers in the late 1960s. This perhaps also appealed to the designer when the CMHC offered to sponsor her at approximately sixty-five dollars per day. She would work on the project fifteen to twenty-eight days per month from November 1967 to March 1970.

It is noteworthy that government-funded work, characterized by higher-than-average salaries and a tangible social agenda, has been a niche for innovative work by women designers. In her article, “Past the Parapets of Patriarchy? Women, the Star System, and the Built Environment,” architectural historian Cynthia Hammond reminds us of American planner Catherine Bauer Wurster’s contribution to public housing legislation and standards in pre- and post-war United States. Bauer Wurster wrote Modern Housing (1934), an influential comparative study of modern architecture in Europe and the United States, that was central in the drafting of the US Housing Act of 1937. And, she also taught urban planning at the College of Environmental Design at UC Berkeley and at the Harvard Graduate School of Design. Hammond suggests that Bauer Wurster’s ability to symbiotically engage with politicians, housing committees, and powerful unions gave her a tremendous authority as a housing expert. Both Bülow-Hübe and Bauer Wurster share this history of effective communication with public and private stakeholders in their various roles as authors, housing activists, and designers. In this regard they echo the success of previous generations of women like Octavia Hill, Catharine Beecher, Charlotte Perkins Gilman, and others who worked in philanthropic and utopian circles, effecting change in the built environment without having formal architectural qualifications.
Kitchen Research, Swedish Influence and the CMHC Report

Sigrun Bülow-Hübe’s twenty-seven years of experience designing kitchens in Montréal gave her tremendous insight into the needs of housewives and their domestic environments. Her increasing interest in the human body as an important element to be considered in design and her growing attention to women’s bodies and kinetics seemed to have been influenced by a variety of factors. Of these, her familiarity and connection to Sweden and research that was done on kitchens before she immigrated to Canada may have played a role. Like Germany in the interwar period, Sweden experienced a heavy housing shortage throughout the 1930s culminating in a government-led intervention to create one million new dwellings while also improving existing ones. The need for functional, standardized, and healthy kitchens led to the state’s establishment of the House Research Institute or Hemmens forskningsinstitut (HFI) in 1944.
Commissioned to investigate the habits of housewives living in urban areas, the researchers at the HFI were shocked to discover that, on average, Swedish housewives’ daily movements in their own homes were equivalent to a seven-kilometer journey. If counted over the course of a full year, researchers claimed it was the equivalent walking distance from Stockholm to the Congo. Perhaps unsurprisingly, the greater part of this distance was made up by short but frequent, back-and-forth journeys in the kitchen.

Swedish physiologists tracked all bodily movements and used sophisticated breathing apparatuses to calculate the amount of oxygen needed to perform tasks, while simultaneously monitoring the caloric consumption of housewives (Figure 3). Scientists were determined to quantify the housewife’s body and immediate environment to answer a host of questions. How often did she reach up or bend down? Did she use a bench when cutting vegetables? Where was the sink in relation to the stove? What were the ideal dimensions of a working surface? The data that was subsequently collected led to the köksstandard or ‘kitchen standard’, implemented nationwide in 1950.

When she came to Canada, Bülow-Hübe brought her experience as kitchen designer in Sweden and the influences of Swedish research that paid attention to women’s movements in domestic spaces. This emphasis on the housewife’s body undoubtedly influenced Bülow-Hübe’s turn towards a focus on women’s kinetics and her insistence on the female body as a generator of design. This shift represented a departure from more prevalent approaches at the time. As the Journal of Architectural Education (2001) and particularly the article by Lance Hosey, “Hidden Lines: Gender, Race and the Body in Graphic Standards” point out, in the 1960s and for decades after, the female body remained pretty much absent. According to Hosey, Graphic Standards, an influential design publication started in 1934 still in use today, did not acknowledge the female body until its 1981 seventh edition. The representational figure it used to show anthropomorphic data and body movement range, remained located within architecture’s obsession with the adult, broad-shouldered, white male. Women’s body measurements slowly made an appearance, going through awkward iterations where truncated limbs were shown next to a male figure like for example a pair of women’s feet wearing high heels unlike her flat-shoed male counterpart. Even in Graphic Standards’ sixth edition in 1970, body measurements for women were included in parentheses or, in a few cases, demarcated by a dotted line. Focusing exclusively on the female body to illustrate design standards, as Bülow-Hübe did, was thus highly unusual in mainstream architectural graphics. Quantifying the range of movements possible by the female body, albeit in the context of the kitchen, superseded the notion that women’s bodies could conform to any design or that housewives could somehow transform
their inflexible kitchens into an ideal working space. Kitchen design was, at the time, regarded as one of the areas that would be well served by “female intuition,” in contrast to the rational methodology demanded in other areas of design. And, indeed, many clients saw Bülow-Hübe’s perspective as a woman as a key feature in her kitchen design expertise. For Bülow-Hübe it was clearly not “feminine intuition” but rather professional and scientific research that formed the basis of her work.48 When she started her kitchen research in 1967 she had already been utilizing sophisticated quantitative research methods in her design work for some time. Bülow-Hübe self-consciously distanced herself from the stereotypical female roles of housewife, cook, and mother and placed greater emphasis on her role as researcher.

**Kitchen Storage**

The first segment of the CMHC study consisted of three sub-sections: a field study and inventory of supplies in average households of four to six persons; an investigation of buying patterns in two national supermarket chains, Dominion and IGA; and, a study of the measurements of packaging sizes for most grocery and household supplies. The purpose of the project was to survey a cross-section of Canadian households to inventory the equipment and food stored in the kitchen. In the 1960s, it was automatically presumed that the single worker occupying the kitchen was a housewife.49

For this stage of the project, Bülow-Hübe produced and distributed detailed questionnaires to survey household groceries, supplies and cooking utensils in private, ordinary kitchens. A seven-page template mailed out by Bülow-Hübe made it easy for participants to inventory their drawers and cupboards. For example, the data received from the kitchen belonging to Mrs. Hamilton in Brome, Québec consisted of the following: a supply of groceries identified by brands such as Christie’s crackers, Five Rose[s] Flour, Tenderflake Lard, Jello-instant pudding, and Puffa Puffa Rice cereal (in five pages), household supplies, again including brand names like Javex and Heavy Duty Wrap (page 6), and finally on page 7, a detailed list of cooking utensils like cake and loaf pans, toasters, and even the number of paper napkins. Bülow-Hübe then tabulated the total contents of the thirty-seven kitchens that were part of the study and came up with the following conclusions: the average Canadian household kept 150-160 grocery items in her cupboards, had 107 large and small tools, 20 cleaning materials, 110-140 serving utensils, and 40-45 linen and paper items, for a total of 430 kitchen items.50 She then produced detailed drawings of several configurations of these household items (see Figure 4).
In a study remarkably similar to Bülow-Hübe’s research, LIFE magazine sponsored researchers at Purdue University to streamline household tasks by documenting the movements of housewives. The researchers at Purdue, just like in Bülow-Hübe’s study, began by inventoring the
equipment used in typical kitchens and found that the average home contained 300 utensils, of which 216 were considered useful. Similar studies to Bülow-Hübe’s research in Canada were being done at the same time by others in different places.

Although Bülow-Hübe’s sample of thirty-seven households might seem small by today’s social science research standards, it was nevertheless designed to represent eight ethnic groups with families ranging from two to eight persons. Her study revealed that an average Montréal housewife managed approximately 430 items of different sizes in the kitchen. At first glance, the results of this inventory and its significance as it relates to Bülow-Hübe’s interest in the body movement of housewives might not be quite clear. How do storage spaces relate to women’s movements? For Bülow-Hübe, as an experienced researcher-designer, storage space is understood as much more than a place where produce, cans, and goods could be held until consumption. She saw the items stored within these spaces in terms of their implications for increased workload and impact in the kitchen. She was, for example, extremely interested in how items in the kitchen could be stored away without causing too much stress on the bodies and the minds of housewives. In her research report, she notes how most kitchens were designed to accommodate china and fragile items in the top cabinets while the larger, heavier items, had to be placed in the only other storage space provided, the lower cabinets. The impact of this design might be underestimated but Bülow-Hübe pointed out that it was very detrimental on women’s bodies as it resulted in enormous amounts of energy expenditure through the acts of stretching, lifting, and reaching for objects in the kitchen. These findings would also surface in later sections of her research where she carefully examined storage alternatives.

**Optimal Workflow**

The second part of Bülow-Hübe’s research identified the exact locations that housewives performed certain tasks, and suggested alternative layouts to streamline the workflow in the kitchen. This section dealt most explicitly with women’s bodies because of its extensive use of time and motion studies. However, Bülow-Hübe’s method of representation and her emphasis on displaying the movements of bodies in a sequential, nearly filmic manner, are what distinguished her work from many preceding studies. For example Glen Beyer’s, *The Cornell Kitchen*, includes only one drawing of a figure that shows the deviation of a worker’s trunk from the normal angle; the other drawings are all plans or interior elevations of kitchens.

By contrast, in her motion studies Bülow-Hübe tracked what she called “traffic,” through a user’s complex movements. *Figure 5* shows the diagram Bülow-Hübe’s prepared for the CMHC, charting a woman’s
movements through an unnamed kitchen on October 23, 1968, during the making of one liver dinner (three fried and one broiled; started with avocado vinaigrette; zucchini and tomatoes; green beans; fruit salad for desert) for four.\textsuperscript{54}

![Bülow-Hübe diagram charting a woman’s movements through an unnamed kitchen on October 23, 1968 (Courtesy: John Bland Canadian Architecture Collection, McGill University Library)](image)

Each circle represents a real stopping place or clustering of utensils in the kitchen she documented: the stove, the serving area to the right of the stove, cooking and baking utensils, a dining table, a double wall oven, fridge, china and cutlery, vegetables, sink, area beside sink, spices, hand tools, baking supplies and area to the left of stove. The thicker lines show the dominant traffic routes in the kitchen between the sink and area beside the sink with forty-eight movements; twenty-one movements between the countertop stove and wall oven; twenty movements between the stove and the sink; and, the same number for the preparation area to the right of sink and set off area to the left of the stove.
Historically, time and motion studies were part of a long tradition of using empirical data to make places and people more efficient. They became widespread after the American mechanical engineer Frederick Winslow Taylor formulated his principles for scientific management, starting in the 1880s. In order to standardize the steps in the production process and increase productivity, he introduced time and motion studies that tracked the movement of workers and the time it took them in completing diverse tasks.  

It is interesting to note that although Taylor popularized time and motion studies, women writing about domestic work had acknowledged the idea of scientific management much earlier. In her influential work, The Grand Domestic Revolution, architectural historian Dolores Hayden shows how Catharine Beecher and her sister, Harriet Beecher Stowe, rationalized the home environment as a response to industrialization in America and male-dominated factory work. The two women saw the home as a “laboratory of rational planning” and “the crucible for society’s improvement,” and developed intricate designs for a machine-like dwelling that reflected “Christian industrial efficiency.” In their 1869 book, The American Woman’s Home, the Beechers noted how the spatial division of kitchens was arbitrary and lacked the planned ingenuity of space-restricted kitchens on board trains. They responded with thoughtful designs for the sink, shelves, and storage boxes for various food stuffs, and underscored the importance of specialized and technologically-differentiated places for storage, preparation, and cooking.

Concerns about kitchen design resurfaced in the beginning of the twentieth century following Taylor’s tremendous influence. Time and motion studies lent themselves naturally to the search for efficiency in kitchen design, and thus became the main focus of home economist Christine Frederick at her Applecroft Home Experiment Station on Long Island, New York. The plans that appear in Frederick’s The New Housekeeping of 1912, with dotted lines showing the work paths of the housewife, are an early attempt to graphically map women’s movements. Austrian architect Margarete Schütte-Lihotzky also used time-motion studies to design her famous, mass-produced Frankfurt kitchen. Between the two world wars, Germany’s hyperinflation and economic instability led many housewives to work long hours in factories to supplement their husbands’ low income. Schütte-Lihotzky hence sought to alleviate the double burden of working-class women by designing a highly efficient, no-fuss kitchen. Perhaps cognizant of the Beecher sisters’ observations fifty years earlier, she too cited a railroad dining car as a source of design inspiration.

Like the preceding research, Bülow-Hübe’s detailed studies of kitchen traffic were intended to eliminate unnecessary displacement in the kitchen, to save time and minimize labour. Often the conclusions were similar, like
Bülow-Hübe, the Purdue researchers praised the efficiencies of an L-shaped kitchen, their research found that only 70 steps were required by the housewife in this design compared to 454 in the so-called “strip” kitchen. As part of the final section in her CMHC-funded project, Bülow-Hübe designed the 109 corridor (what the Purdue researchers referred to as “strip”) U- and L-shaped kitchens, ranging from 87 to 114 square feet, and plotted their dimensions on a matrix in order to determine the most efficient layouts.53

Bülow-Hübe’s work went far beyond coining the right kitchen geometry; it was her methodology to arrive at the best kitchen layouts that made her work original. In particular, she accentuated the movement of housewives’ bodies in her drawings. Whereas earlier examples of motion studies in kitchens, like Frederick’s, were commonly mapped onto floor plans, Bülow-Hübe abstracted the kitchen space in order to emphasize movement. A subtle difference exists here that needs to be fleshed out. Frederick began with a traditional, technical floor plan, devoid of human occupation. As the housewife moved through the kitchen, Frederick drew the motion as a dotted line directly onto this floor plan. The final result was a traditional interior plan drawing with an additional layer of information: the paths taken by the housewife. Bülow-Hübe, on the other hand, abstracted the main areas of the kitchen, preferring to show them as nodes of activity laid out in a circular fashion, resembling a constellation of work stations. When tracking the movement of the housewife from one node to another, Bülow-Hübe drew one solid line of equal width between these two nodes. When the same path was taken again, she added an additional line of equal width next to the previously drawn one, thickening the path and making it more visible. In this way, instead of merely showing a dotted line to signal a displacement, Bülow-Hübe used a hierarchy of lines, delineating bold relationships between nodes. Although all the locations were integral to the housewife’s work, their abstraction as a motion diagram, and the graphic calibration of each path, placed a visual priority on the motion itself. Hence, Bülow-Hübe actually depicted the housewife as a series of vigorous movements. The active female body, in turn, served as the structural logic of the diagram and linked the various activities. Through her powerful visual language, then, Bülow-Hübe saw the housewife’s body as a force in itself.

**Kitchens as Networks**

The movement of housewives was expressed in the form of a dense network in Bülow-Hübe’s work. In this way, the study of networks and women go hand in hand. Scholars have observed how kitchen design was a ghetto for professional women designers.64 Bülow-Hübe’s drawings resonate with those of other pioneering women designers such as Canada’s first woman architect Esther Marjorie Hill, whose career in post-World-War-II British Columbia was largely driven by kitchen renovation
commissions she gained through her friends in the Victoria Weavers Guild. Hill exemplifies how the career of women architects builds upon a multiplicity of networks, much like weaving. This traditional women’s work requires hundreds of hand movements to create miniscule interweaving connections between the fibres. Unlike other methods, however, weaving leaves a discernible trace of the hand’s history. In this way, both Bülow-Hübe’s motion study and Hill’s weaving countered the fleeting nature of women’s everyday motions. One possible explanation for the paucity of women’s networks among architects is the low numbers of women in the profession. Until 1970, for example, there were only eighteen women architects registered in Québec. Even in recent years the number of women practicing in Canada remains relatively low, at approximately 13%.

In representing the kitchen as a network, Bülow-Hübe extended the meaning of network beyond movements to include women’s immediate surroundings. Her motion study diagram simultaneously abstracts both the woman’s body and her workplace, melding them into a unified whole which exudes a strong kinetic quality. In so doing, she highlighted the close interplay between the body and its immediate surroundings, which perhaps was a natural leap for her as a furniture designer. Indeed, networks blur the boundaries of the body and its outside environment since muscle contractions collaborate with outside instruments to permit otherwise impossible actions. The optimization of such a network only intensifies the connection between body and technology and weaves denser, more dependent, systems. Perhaps in Bülow-Hübe’s view, the kitchen was to become a prosthesis of sorts, fitted to the housewife, and reducing the number of back-and-forth movements, while favouring optimal work flow. As the designer of multiple pieces of furniture, a sphere just beyond the intimacy of clothing, this design of the kitchen as a prosthesis would have been natural to the designer and perhaps the closest she may have ever gotten to her architectural training in Sweden. In 1969, a sphere-like, science fiction-inspired, highly compact kitchen was developed by German industrial designer Luigi Colani as the densest possible interface between the kitchen and the user. His ‘satellite kitchen’ remains the epitome of this trend, where the user controlled all kitchen functions from his or her seated position, literally making appliances extensions of the body, and eliminating the need to walk from one work station to another by placing them at arm’s length.

Bülow-Hübe’s careful measurement of a housewife’s movements during meal preparation by straight thick lines also anticipated the pioneering work of subsequent feminist architects and urban planners who criticized planners’ assumptions about the apparently “meandering” movements of women and children at home. In the book by the Matrix collective published in 1984, Making Space: Women and the Man Made
Environment, feminist architecture writer Jos Boys criticized the planners of British new town Milton Keynes for their misreading of women’s back-and-forth movements in the city. In particular, Boys questioned the pedestrian walkway system at Milton Keynes that was constructed in response to the slow movements of women laden down with groceries or pushing baby strollers. Planners assumed that the stop-and-go pace of women meant that they had the time to take a more circuitous route, interpreting their movements to be aimless and without purpose or non-productive. Then they used this reading of women’s movements as a justification for paths that curved, doubled back, and zigzagged through the postwar, auto-dependent garden city. It is tempting to imagine that this narrow understanding on the part of planners of the range of women’s movements impeded the full appreciation of efficiency-based kitchen research which presumed women moved productively and efficiently, like factory workers.

**Energy Expenditure**
The first and second chapters of the CMHC report were combined in the third and last section to uncover the consequences of poorly designed storage spaces and work areas. Here, Bülow-Hübe’s fascination with the interaction of the housewife’s body and kitchen furniture took on a pictorial form. Instead of conducting direct physiological tests on women, as had been done in Sweden previously, she became an educated expert on the subject matter by reviewing several research publications. Extracting the quantitative information these provided, she drew elegant line-drawings that could be readily understood by designers and the public alike.

One notable example is her interpretation of a study conducted in 1959 by Earl C. MacCracken and Martha Richardson at the Home Economics Department of the U.S. Department of Agriculture to investigate the energy requirements for the body when performing tasks which required reaching, lifting, bending and squatting. In one drawing of the American study, Bülow-Hübe compared the average energy expenditures of five test subjects asked to store five-pound bags in different types of cupboards and storage compartments with both hands (Figure 6). The test subjects were normally healthy housewives, ranging in age from twenty to forty-six years, measuring sixty-two to sixty-five inches in height and weighing between 110 and 160 pounds. She reports that the average measured height was 63.7”, weight 143.8 lbs and age 36.8 years. The average basal metabolic rate was taken at 0.97 cal./min. Skillfully drawn on Mylar paper, Bülow-Hübe illustrates open floor cabinets, as well as thirteen-inch and twenty-one-inch deep countertops.
Figure 6. Bülow-Hübe’s drawing of the energy expenditure of women lifting a 5-lb weight from different heights (Courtesy: John Bland Canadian Architecture Collection, McGill University Library)
Keeping the scale consistent, her vignettes follow one another on the page, portraying the body of the average case subject and her position with respect to the kitchen furniture. As the five-pound bag’s position is incrementally changed from one scene to the other, the housewife is shown placing the weight on all the possible shelves in the floor cabinet or counter top. The horizontal arrangement of the vignettes encourages a near cinematic understanding of the housewife’s movements. Moving one’s eyes from left to right, one reads the homemaker’s actions as a stop-motion picture, gently straightening her back and lifting the weight a step higher. In this way, each image shows a simplified relationship of a housewife and her work space, while the entire series denotes the range of possible bodily movements. The hardest action - when the woman bends down and reaches to four inches above ground - requires 238% of her basal caloric expenditure or 3.80 cal./min. Conversely, the easiest task (burning only 1.24 cal./min) is reaching for the object, when found at a height of forty-four inches from the ground, or placed on the lowest cupboard shelf.

‘Canada’s Five Million Kitchens, Are They Really Planned?’
Towards the end of her kitchen research project, in May 1969, Bülow-Hübe delivered a breakfast talk to the Kitchen Manufacturers Association in Toronto. She entitled her speech “Canada’s Five Million Kitchens, Are They Really Planned?” It was a unique opportunity for her to come in direct contact with kitchen manufacturers. By this time, her CMHC research was almost completed, and having designed kitchens for nearly forty years in Montréal and Stockholm, she spoke from a position of authority.

Luckily, the John Bland Canadian Architecture Collection houses the eleven-page original copy she drafted for the occasion and it remains, perhaps, the truest textual testament to her sharp mind. Poignantly written, it delivered a clear feminist stance towards kitchen design and research, the crucial role that women play in kitchens, and how kitchen design ought to explicitly cater to women’s movements. The text is delightfully peppered with Bülow-Hübe’s humour and a confident dose of depreciation.

To begin, Bülow-Hübe confesses that she is a researcher-designer, but not a cook. She points out how not being the typical housewife herself actually gives her critical distance with respect to kitchen design. When one is sure of a method, it may be applied readily without questioning whether things could be done differently. In particular, she warns against confident husbands who assume the role of the Sunday cook whenever they feel like it since the limited perspective provided by preparing one meal per week can easily undermine the reality of a housewife’s full-time job. A worse scenario still, Bülow-Hübe warns, is a Sunday cook who is also a designer. For then, he might design the
kitchen to suit his six-foot frame, rendering the housewife’s daily work even less manageable. What was crucial for Bülow-Hübe was to remain cognizant of the user: a woman.

In Bülow-Hübe’s view, the social pressure on women to adhere to domestic work necessitated an equal obligation to understand women’s movements, rather than cooking itself; since women’s work was mostly situated in the kitchen, this necessitated a deep understanding of how kitchen design could most effectively support kitchen work. To make her point about the kinetics of housewives’ work, Bülow-Hübe describes the case of women with disabilities where the body cannot be assumed to be indefinitely adaptable. She specifically discusses the limitations of a woman in a wheelchair. In order for women to function in the kitchen, it needs to be designed with their specific needs in mind. In the same vein of thought, energy expenditure studies on housewives need to be understood by designers, since they provide a rational, quantifiable explanation for the position of work and storage areas. In all instances, Bülow-Hübe underscores how kitchen design should allow housewives to move comfortably in kitchens, and therefore, follow principles established by the research on women’s movements. By emphasizing her lack of personal experience as a cook, Bülow-Hübe emphasized her role as an objective scientist, suggesting her interest in women in the kitchen was in an effort to improve standards rather than any insider knowledge she might provide as a woman herself. Many women architects of the same period articulated a similar distancing from stereotypical women’s interests. Montréal architect Eva Vecsei, for example, referred to domestic projects as “little pink touches” in an interview with the Montreal Star in 1965.72

At the end of her talk, Bülow-Hübe critiques current kitchen design on several accounts. Why did kitchens in Canada not reflect current research findings? First, all the research has never been compiled into one cohesive document, making foreign studies inaccessible in Canada. As for the few published kitchen planning manuals, they contained good recommendations in the form of statistics in figures, but lacked factual information that a planner could readily use in a kitchen design. This perhaps explains why Bülow-Hübe was so adamant about illustrating her findings, or those of others, in terms of women’s movements – explicitly showing the interaction of body and furniture. The designer-researcher was especially astounded by the manufacturers of mass-produced kitchens that were aware of innovative research and the recommendations for ideal heights and spatial layouts, but failed to apply them. She pointed to the gap in the design-research-Manufacturing process and called for a stronger collaboration between all stakeholders. She delivered a strong feminist
critique of kitchen research and design by addressing the underlying socio-political structure that defines what gets designed and built. On two separate occasions Bülow-Hübe pointed to women’s flexibility as being a prime reason for the lack of initiative to improve kitchens. First she exclaims,

I even venture to say that most women, if they were not by nature so used to adapt themselves to all kinds of situations, would find a lot to criticize. But, being women and not organized and unionized workers, they just put up with it, whereas I am sure that if it was the men who did the housework every day of the year they would organize themselves and then go on a strike. 73

Later, as one of the conclusive statements in her talk, she comes back to the idea of a strike, this time imagining a scenario where women, not men, decide to walk off the job. Interestingly, she points to men’s propensity to take control and implement changes when it affects them directly. She offers,

I would just like to know what would happen to our kitchens if there was a revolution and all the women walked off the job. First there would be long line-ups outside every restaurant but then, after a week or so, all you men would go home and try your hand at the stove. It would probably not take long before some remarkable changes in kitchen planning emerged. 74

Conclusion
Sigrun Bülow-Hübe’s kitchen research and design revolved around understanding the dynamic nature of house work and the important place of kitchens in women’s lives. Instead of perceiving women as malleable enough to fit any spatial layout, she firmly believed that understanding women’s movements would lead to the design of better kitchens.

The proximity of the body and furniture, which permeated her abstract and pictorial drawings of housewives, also characterized photographs of Bülow-Hübe. Unlike other designers, she often made shameless cameos in photographs taken of her interiors. She frequently appeared to be testing, adjusting, or simply enjoying the furniture, almost as if to stand in for absentee occupants. On other occasions, she would smoke a cigarette or demonstratively hold up a particular piece that had piqued her enthusiasm. The ever-fashionable Bülow-Hübe can be seen in many different settings, but never a kitchen, possibly on the account of her earlier confession that she was not much of a cook.
After completing her kitchen research, she was hired as Senior Design Consultant at the Office of Design (later Design Canada), where she established an extensive registry of Canadian industrial designers, creating an open forum and collaborative opportunities for design professionals, manufactures and clients. In parallel, she initiated the Design Canada’s Scholarship and Grants Program, which would permit Canadian students to enrol in design schools in the United States and Europe, and broaden their artistic and technical experiences. After retiring from the Office of Design in 1977, she maintained a home in Brome, a quaint town in the Eastern Townships region of Québec, where she pursued a low-key consultancy. She died of cancer in May 1994.

One of Bülow-Hübe’s last projects and not included in the John Bland Collection, from 1992, is an L-shaped dollhouse for twelve- and fourteen-year old Mariah and Sarah Rumsby. Perhaps inspired by the box-like arrangement of Habitat, the playhouse is constructed from two ordinary shoeboxes. The tiny dwelling is modest, with living room and kitchen in one box and bedrooms and bathroom in the other, joined by simple gable roofs and punctuated by a front door, sliding glass doors and a series of square windows. The late-life project shows Bülow-Hübe’s continuing commitment to the re-use and rethinking of everyday objects; floor lamp stands are actually lip balm containers for example; the tiny silver plates are the foil tabs from the inside caps of vanilla extract bottles; the fabric scraps are extras from the chairs she made for her own country home; and not surprisingly, the play kitchen is her recommended L-shaped configuration. The girls’ mother, Barbara Rumsby, remembers how Bülow-Hübe had hoped that Mariah and Sarah might become interested in architecture through playing with the tiny building and imagining how one moved around it. Opportunities for women’s professional engagement, innovative design, movement through domestic space, and the education of ordinary Canadians were important to Sigrun Bülow-Hübe in every aspect of her productive life and articulated most clearly in her work as designer.

Notes
1. We are grateful to Judith Adamson, John Fellows, Jennifer Garland, Cynthia Hammond, Ann Marie Holland, Rhona Richman Kenneally, Julie Korman, David Macauley, Valerie Minnett, Lara Rabinovitch, Barbara Rumsby, Silvia Spampinato, Dorothy Stern, David Theodore, Julia Tischer, Robyn Wilcox, and two anonymous reviewers for their helpful insights during the writing of this paper. Note: all translations from Swedish primary sources are by Don Toromanoff.
3. The archive includes dozens of articles, unidentified clippings, and commercial brochures she used as references in her kitchen research, many of which are listed in the two-page bibliography of the report. Also included in the archive are her requests for copies, thank-you notes to the senders, and remarks on the texts. Typical references are from academic centers of kitchen research such as Cornell University and University of Illinois: Glen H. Beyer, ed., The Cornell Kitchen: Product Design Through Research (Ithaca: Cornell University, 1952); Robert Wanslow, Kitchen Planning Guide (Urbana: University of Illinois, 1965); Esther Crew Bratton, Some Factors of Cost to the Body in Standing to Work and Sitting to Work Under Different Postural Conditions (Ithaca: Cornell University, 1959); clippings from the Journal of Home Economics, Journal of the American Dietetic Association, and Canadian Grocer.


6. The other woman represented in the John Bland Canadian Architecture Collection is landscape architect Cornelia Hahn Oberlander (1924).

7. Bülow-Hübe described herself as a “researcher-designer,” as opposed to the more common “designer-researcher;” perhaps as a way to underline her research approach. Bülow-Hübe, “Canada’s Five Million Kitchens.” Arnold Kazak was also a partner; Dorothy Stern claims the father of Raymonde Grant, who worked in the store and whom she interviewed, was a “silent partner.” Dorothy Stern, “Form/Function + Female: Sigrun Bülow-Hübe” (Unpublished student paper, McGill University, 2009), 5.


9. A copy of the book is held at the John Bland Canadian Architectural Collection, McGill University, file CAC65/BP/5/PUBL/3.01.

10. Margaret Hodges, “Sigrun Bülow-Hübe: Scandinavian Modernism in Canada” (Master’s thesis, Concordia University, 1996); the essays in the catalogue are written by Judith Adamson and Deborah Miller, see Murray. Sigrun Bülow-Hübe, xi-xvi, xvii-xxviii.


16. A copy of the book is held at the John Bland Canadian Architectural Collection, McGill University, file CAC65/BP/5/PUBL/3.01; Judith
23. For a selection of Swedish newspaper clippings about Bülow-Hübe, see file folder CAC65/BP/5/PR/5.01 at the John Bland Canadian Architectural Collection. Canadian newspaper clippings are in CAC65/BP/5/PORTIF/2.01.
36. These dates correspond to the first and last times she conducted research or wrote for the CMHC publication.


40. Snidare, Kök i Sverige, 5.

41. Although this distance is correct, it is only reported in the Norwegian drama *Kitchen Stories* (original title: Salmer fra kjøkkenet) by director Bent Hamer. This 2003 production discusses research conducted on behalf of the Hemmens forskningsinstitut (HFI) on the use of kitchens by single men in Norway. The introduction shows a vivid account of the research previously conducted in Sweden. For more information, see [http://www.imdb.com/title/tt0323872/](http://www.imdb.com/title/tt0323872/), accessed March 31, 2013.

42. Snidare, Kök i Sverige, 7.


44. Snidare, Kök i Sverige, 30.

45. The John Bland Collection holds all reference books used by Bülow-Hübe. See file folders starting with CAC65/BP/5/DLIT-SW/.


54. This diagram was likely inspired by the methods and graphic language used in previous Swedish studies, where researchers also have focused on “traffic” in the kitchen and displayed it in a circular fashion. The previously mentioned film *Kitchen Stories* (see note 41) shows such diagrams in the opening sequences.
57. Catharine Esther Beecher and Harriet Beecher Stowe, *The American woman’s home: or, Principles of domestic science; being a guide to the formation and maintenance of economical, healthful, beautiful, and Christian homes* (New York: J.B. Ford and Co., 1869), 15; The Beecher sisters suggested an open plan with a central utility core uniting the kitchen, bathrooms, furnace and duct-work for efficient ventilation. The same concept was later used by Frank Lloyd Wright’s prairie. Cromley has documented evolution from the Victorian kitchen to the open plan. See, Cromley, “Transforming the Food Axis” and “Frank Lloyd Wright in the Kitchen.”
60. Llewellyn, “Designed by Women and Designing Women,” 45.
63. See binder number 4 that accompanies Bülow-Hübe, “Kitchen Research Program.”
64. See Adams and Tancred, *Designing Women*, 38.
66. Bülow-Hübe would also take up the activity of looming after her retirement in Brome, Québec, according to Adamson (Adamson, “Sigur Bülow-Hübe,” xv).
68. A study commissioned by the Royal Architectural Institute of Canada in 2003 notes that 18% of Canada’s architects were women. Eva Matsuzaki, *Consultations & Roundtables on Women in Architecture in Canada* (19 December 2003), 17.
71. Bülow-Hübe, “Canada’s Five Million Kitchens.”
72. Adams and Tancred, Designing Women, 62

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Hemmens Forskningsinstitut. HFI Meddelanden 2 (March 1947): 76.


