

# **Quantitative Methods and Feminist Geographic Research**

In *Feminist Geography in Practice: Research and Methods*,  
edited by Pamela Moss (2001). Oxford: Blackwell. (In press)

Mei-Po Kwan  
Department of Geography  
The Ohio State University  
Columbus, OH 43210.

## **Introduction: Quantitative Geographical Methods**

Quantitative methods not only involve the use of numbers such as official statistics. They include the entire process in which data are collected, assembled, turned into numbers (coded), and analyzed using mathematical or statistical means. In research relying mainly on quantitative methods, the focus of the data collection effort is to gather quantitative data or qualitative information that can be quantified in some way (as in attitudinal studies). Once coded, these data are then explored using various methods, ranging from simple measures such as frequency counts and percentages, to complex techniques such as log-linear models. Results of quantitative analysis can be presented in the form of summary statistics, test statistics, statistical tables, and graphs. They can also be represented in complex cartographic or three-dimensional forms with the assistance of GIS, or Geographical Information Systems.

Since spatial data violate many assumptions of conventional statistical methods, such as independence of each individual observation and constant variance, quantitative analysis of geographic data calls for spatial statistical methods that were developed to overcome the problems of applying conventional statistical methods to geographic data. This is a specialized collection of techniques required when dealing with data that describe the spatial distribution of social or economic phenomena, many of which are of interest to feminist geographers. Without applying the appropriate geostatistical methods, analysis of geographical data may lead to erroneous results and conclusions. There are other new

developments in quantitative geographical methods which are particularly relevant to feminist research. The recent development of local statistics facilitates the analysis of the relationships between the local context and women's everyday experiences. Recent use of GIS-based geocomputational and geovisualization methods represents another area with potential for feminist research (Kwan 2000a).

Quantitative methods have been used in feminist geographic research since the early days of feminist geography. The original intention was to produce a more accurate and less "biased" description of the world by studying the world through women's perspective and experiences (Moss 1995). Recent debate in feminist methodology provides helpful insights for the use of quantitative methods in feminist research (Mattingly and Falconer-Al-Hindi 1995). As a feminist geographer, it is important to understand the limitations and value of quantitative methods, when quantitative methods are appropriate, and how to approach using them. In this chapter, I examine critical issues concerning the use of quantitative methods in feminist geographic research and illustrate some of the steps for undertaking quantitative feminist research using my recent work as an example.

### **Feminist Critiques of Quantitative Methods**

Quantitative geographical methods were developed during a period now commonly called the "quantitative revolution" in geography. These methods were developed with the intention to make geography a scientific discipline not unlike physics, where the validity of the knowledge was justified according to positivist principles. With a positivist epistemology, the purpose of geographic research was to seek universally applicable generalizations. The researcher was considered a detached observer capable of acquiring objective knowledge of the world through discovering empirical regularity in social, economic or spatial phenomena.

Early feminist geographic research emerged to show the neglect of women's experiences and to include women as subjects in geographic research using largely quantitative methods (McDowell 1993). As questions about women were added to geographical inquiry

using methods similar to quantitative geography, early feminist geographic research was considered positivist and empiricist because it was based upon the principles of scientific objectivity, value neutrality, and the search for universally applicable generalizations. Feminist geographers who did these kinds of studies, as feminist critics argued, intended to make geography a better “science” through correcting male bias and using more stringent scientific methods. Their work was considered empiricist as they privileged claims to knowledge based primarily upon observable “facts.” Feminist critics also asserted that “truths” put forth as universally applicable are valid only for men of a particular culture, class, or race (WGSG 1997). They are also critical of the tendency to derive analyses of universal causality from inferential statistics.

Quantitative methods were criticized by feminists for other reasons. For instance, since quantitative methods depend on some quantifiable attributes of the phenomena under study, they are not capable of reflecting the complexity and richness of women’s lives. This is a serious limitation since a substantial portion of women’s experiences cannot be expressed by numbers and is therefore not quantifiable. Further, the “live connections” with research subjects are often lost through the use of quantitative data, making it difficult to tell women’s feelings and their interactions with others. This in turn makes it difficult to obtain a contextualized and holistic understanding of the complex processes involved in determining their everyday experiences. Quantitative data and methods are therefore “disembodied” – as abstracted and decontextualized information is used in the process (WGSG 1997).

Feminists also criticized the assignment of any specific individual’s experience into hard-and-fast categories in the collection and analysis of quantitative data, whether these categories are predefined by the researcher or according to official criteria (Jayaratne and Stewart 1991). The rigid nature of the categories and variables used may fail to reflect the complexities of women’s lived experiences. Very different phenomena may be lumped together in the statistics as if they were the same thing and the statistics may have a problematic connection with the life they claim to represent (Pugh 1990). Further, since pre-existing categories and official statistics were often based on male experiences, using

them in feminist research can be self-defeating. They may actually make it difficult, if not impossible, to reveal the processes underlying the inequality and oppression women experience (e.g. Perrons 1999). For instance, official statistics were often found to be unreliable and even useless for studying women's labor force participation or contribution to the economy because many forms of women's unpaid work are omitted in official definitions of "work" (Samarasinghe 1997). Another example is Pugh's (1990, 107) study on homelessness, where she concluded that "life will always be more complex and ambiguous than any possible usable system of coding and classification."

### **Approaching Quantitative Methods as a Feminist Geographer**

#### *Epistemological considerations*

So, how do feminist geographers go about using quantitative methods in their research? The first thing is to identify alternative, critical practices of quantitative methods that can, at least to a certain extent, address the concerns of feminist critics. Insights from recent debate in feminist methodology are particularly helpful here. One is that using numbers and quantitative methods is not the same as holding what sort of knowledge is valid or privileging certain kind of knowledge over the others (Lawson 1995; McLafferty 1995). The association between quantitative methods and positivist/empiricist geographic research was more historical than necessary or unchangeable. Feminist geographers need to move beyond the kind of scientific objectivity and value-neutrality that characterize quantitative geography of earlier periods.

As feminists now hold, the kind of scientific objectivity that is based upon the existence of a detached, transcendent observer is not only unachievable but masculinist (G. Rose 1993). Feminist objectivity should be understood in terms of the situated knowledges based on particular "standpoints" or limited "positions" of women's lived experiences in particular social and geographical context (Haraway 1991; Harding 1991). Further, the use of quantitative methods by itself does not confer the researcher any authority to make privileged knowledge claims as compared to other forms of knowledges, especially those obtained through qualitative methods. Rather, it helps to situate other forms of knowledge

in the context of the overarching social and economic relations (Moss 1995). Feminist geographers using quantitative methods should limit their conclusions rather than making grand claims about the universal applicability of their results (Rose 1997).

*Beyond the qualitative/quantitative dualism*

Another important point is that criticisms of quantitative methods, as a reaction to positivism and empiricism, can lead to an unuseful oppositional stance that holds qualitative methods as the preferable alternative to quantitative methods (Harding 1989). This however not only perpetuates dualist thinking through holding a qualitative/quantitative dualism that characterizes masculinist thinking, but also ignores the possibility of post-positivist, critical quantitative methods that are consistent with feminist epistemologies and politics (Lawson 1995; Sheppard 2001; Sprague and Zimmerman 1989). It is perhaps more helpful to think of quantitative methods as one of many possible feminist methods that can be used together with other methods. As the analysis of quantitative data can be complemented by a contextualized understanding of women's everyday lives provided by qualitative data, and the interpretation of qualitative data can be assisted by the broad picture provided by quantitative methods, using multiple methods in a single study may provide a more complete understanding of the questions at hand. This strategy of "triangulation" has advantage because the weaknesses of each single method may be compensated by the counter-balancing strengths of another (D. Rose 1993).

In the practice of feminist research, it is important to recognize the limitations and strengths of quantitative methods. Quantitative methods simply cannot provide the kind of rich and contextualized account of women's experiences that qualitative methods can permit (Jayarante and Stewart 1991). They are therefore more suitable for answering certain questions and are less appropriate for addressing others. Feminist researchers need to determine the appropriateness of quantitative methods and its combined use with other methods for a given research question. It is also important to identify the research question based on critical feminist concerns and/or feminist theories before deciding which method(s) one will use in a particular study. The primary issue is what data are needed and which methods are appropriate for addressing the research question.

### *Data problems*

There are other concerns for the practice of quantitative methods in feminist geographic research. Quantitative data can come from secondary data sources, such as official statistics. They can also come from primary data collection through surveys. Since the counting procedures or classification schemes used to collect official data often ignore significant aspects of women's lives and experiences (e.g. counting women's work and male violence against women), the collection of primary quantitative data is a better strategy than the reliance on official statistics for many issues of interest to feminist geographers. A good example is a study discussed in Reinharz (1992, 82) by two law students who collected data from a judge and police chiefs to show the prevalence of wife battering in the local area.

Another issue is that great care is needed when developing a coding scheme because rigid categorization is a major weakness of quantitative methods. For example, social differentiation should be defined by using many dimension, such as gender, race, ethnicity, class, and sexuality. The use of more refined coding schemes for classifying individuals into social groups would yield better understanding of significant differences between individuals than one based upon any single criterion such as gender. The use of advanced categorical data analysis techniques that can consider several differentiating dimensions at the same time is also preferable to those that are based on a single dimension at a time. Further, presentation of quantitative data should be accompanied by a description of the ambiguity or problems of the classification scheme. Any reservations about the results because of this should also be provided. An evaluation of the sensitivity of the results to different classification schemes will be even more helpful to the audience.

### *Measurement issues and statistical analysis*

Another important issue in quantitative methods concerns the quantification process and the analysis of quantitative data. Before quantitative data can be collected, concepts central to the research question need to be *operationalized*. This means that the researcher has to determine how various phenomena are to be measured and how the required data are to be

collected. Turning concepts such as “class” or “discrimination” into quantifiable measures is far from straightforward. Feminist geographers therefore need to deal with all operational issues with care. For example, how should one measure women’s “household responsibility?” One commonly used measure is the number of children in the household, which is unlikely to be a good measure because it may not have a consistent relationship with the amount and type of domestic tasks women perform.

As conventional geographical concepts and existing quantitative measures may contain serious male bias, the question about the gender sensitivity of these concepts or measures is also important. It is important for feminist geographers to critically re-assess all existing measures and look for any such bias before using them. It may be necessary to develop one’s own method of counting or measurement for the research question (e.g. Kwan 1999b).

It is important to note that some feminists argued against the use of inferential statistics in feminist research, where only non-parametric and descriptive statistics are considered appropriate. Feminist geographers therefore also need to understand the concepts of statistical inference and significance, and to situate these techniques in the context of feminist epistemologies. Although all statistical inferences, including non-parametric statistics, assume some notion of “typicality” in circumscribed populations, using inferential statistics does not necessarily mean making totalizing generalizations or asserting universal causality (Pratt 1989). Inferential statistics are based upon our understanding of the likelihood of occurrence of certain events. They can provide a basis to determine whether the phenomena observed is typical or not for the population subgroups being studied (without arguing that the relationship observed is also true for the larger population). If there are wide variations in what individuals experienced in a sample, it is difficult to argue that it is shared by members of the group. If differences among various subgroups of individuals are statistically significant, such differences are unlikely to be caused by chance alone and therefore deserve a closer look. Inferential statistics can therefore be used in feminist research in a non-generalizing, non-totalizing manner.

## **The Place of Quantitative Methods in Feminist Geographic Research**

Since the strengths of quantitative methods are in describing and analyzing complex patterns of social, economic and geographical phenomena of interest to feminist geographers, they can be used for certain purposes. First, quantitative methods are useful for describing the measurable aspects of women's everyday experiences and analyzing complex spatial relations among geographical phenomena. They are particularly helpful for providing a broad "picture" of the social, spatial or temporal inequalities women experienced at various spatial scales. As McLafferty (1995, 438) argued, quantitative methods can reveal "the broad contours of difference and similarity that vary not only with gender but also with race, ethnicity, class and place." Quantitative methods are therefore especially valuable when there is an urgent need to have a broad "view" of women's current situations (e.g. male violence against women), but detailed individual-level data are not readily available or the limited resources at hand prevent the collection of qualitative data. They also help to highlight the shared experiences of many similarly situated women such as domestic violence and sexual discrimination (Moss 1995).

A good example is the research by McLafferty and Preston (1992) which used aggregate census data to analyze the complex relationships among gender, race, ethnicity, occupational status and commuting distance. Their studies showed that the well-known gender differences in the length of the commute trip varied considerably among race and ethnic groups. Although the categories employed in their quantitative analysis like gender or ethnicity can be questioned, and the data they used did not give a contextualized understanding of the lives of the people they studied, their research indicated that quantitative methods can still be used to describe and analyze the similarities and differences among groups of women at different times and places.

Another way in which quantitative methods are useful in feminist geography is that the presentation of quantitative data or results of quantitative analysis is often more forceful in political discourse than the use of qualitative data. This is especially true as "hard" data obtained using quantitative techniques often appear to be more convincing to public policy

makers. Surveys may have the power to change public opinion in ways that a limited number of in-depth interviews may not. For instance, Seager and Olson (1986) documented the extent to which women were unequal and subordinate to men throughout the world using official statistics. They concluded that women are worse off than men everywhere – they have less autonomy, less power, less money, but more work and responsibility. Several studies had already shown that women in general have more spatially restricted lives than men – they work closer to home and travel less – and are often employed in female-dominated occupations and earn less than men (e.g. Tivers 1985; Hanson and Pratt 1995). As Lawson (1995) argued, descriptive data like these powerfully present the unequal power and gender relations within the household and the economy at large. In describing certain measurable aspects of women's lives, descriptive data reveal the social and political processes that help to perpetuate the inequality and oppression women experience.

In light of this, quantitative data and methods may be a powerful instrument for initiating progressive social and political change. They may help reduce the marginalization or oppression of women. For example, using a large survey data set, Rosenbloom and Burns (1994) documented that working mothers rely heavily on the car to balance their domestic and child care obligations. Travel demand management measures that aim at reducing travel without taking their needs into account will have considerable negative impacts on their lives. This result can be used to steer public policies to better meet the need of working mothers. Another example, cited in Jayarante (1983), is the court decision of a sex discrimination law suit that began to make statistics as acceptable legal evidence.

Closely related to this is that the analysis of quantitative data may stimulate questions about the process of oppression or gender relations that generate the numbers. This may help reveal research areas that urgently require attention and indicate directions for more in-depth and qualitatively-oriented research. For example, in a study by Tempalski and McLafferty (reported in McLafferty 1995), quantitative analysis helped identify the lower-middle income neighborhoods in New York City where the problem of low birthweight is serious. With these results, healthcare and social work professionals can undertake in-

depth qualitative research in these areas to obtain a better understanding of the problem. Quantitative methods can also be used to reveal and challenge the male bias in existing geographical concepts and methods. For example, in my research on conventional measures of accessibility, I found that all conventional accessibility measures failed to take women's need to undertake multipurpose trips and their space-time constraints into account and therefore suffered from a serious male bias. This led me to formulate and implement space-time measures of individual accessibility that can better reflect women's individual access to urban opportunities (Kwan 1998; 1999b).

### **An Example: Gender, Work and Space-time Constraints**

The example described below is from my recent research on the complex relationships between women's commuting distance, employment status, and space-time constraints. Detailed theoretical arguments, methods, and results are elaborated in separate publications (Kwan 1999a, 1999b, 2000b). The project was built upon earlier studies that include many excellent examples of using quantitative methods in feminist geographic research (e.g., England 1993; Hanson and Pratt 1990, 1995; Johnston-Anumonwo 1995, 1997; McLafferty and Preston 1992, 1996, 1997).

#### *Research question*

I formulated my research question in light of two recent trends. First, as more and more women participate in the labor force, some of them have been able to achieve relatively high occupational status and income. Second, as the proportion of women who can use their own automobile to commute increases, many women now have much better spatial mobility than before. Many believe that these two trends together will lead to changes in the allocation of domestic responsibilities within a household (at least for those women who have achieved high occupational status and spatial mobility). If this is true, it also means that men will take up a large proportion of household responsibilities. These changes in the domestic division of labor in turn will hopefully be associated with changes in the gender relations within the household. My study attempted to find out whether these trends actually lead to changes in the allocation of household responsibilities within the

household. I also sought to examine whether the constraints associated with women's need to perform domestic responsibilities are still important in determining their employment status and commuting distance.

The concepts used in the study are based upon earlier research on the geographies of women's everyday lives using time-geographic concepts (e.g. Tivers 1985). The time-geographic concept most relevant to feminist research is "space-time constraints," which impact upon women's daily lives in significant ways and stem from two main sources. First is the limited time available for a person to perform various activities within a particular day – commonly referred to as time budget constraint. The second source, referred to as fixity constraint, arises from the fact that activities that need to be performed at fixed location or time (e.g. child-care drop-off) restrict what a person can do for the rest of the day.

Past studies observed that space-time constraints significantly affect women's job location, occupational status, and activity patterns. One limitation of this literature is that none of these studies attempted to measure fixity constraint directly and assess the extent to which it impacts upon women's employment status and commuting distance. My research attempted to address this limitation through collecting quantitative data about the spatial and temporal characteristics of individuals' activities and analyzing their relationships with women's household responsibilities, job location and employment status.

#### *Formulation of operational measures*

Before setting out to collect the data, I had to resolve operational issues about how to turn the notion of space-time constraints into something measurable. Based upon previous work on this area, I decided to solicit information about the space-time fixity of each activity a person performed through an activity-travel diary survey. The diary recorded details of all activities and trips made by the respondent in two designated travel days. I included four specially designed questions in the diary to obtain information about the spatial and temporal fixity of each activity (see Kwan 2000b). Using answers to these four questions, I

designated three types of fixity: (a) spatially fixed activities; (b) temporally fixed activities; and (c) activities which are both spatially and temporally fixed.

Another operational issue involved identifying the purpose of each activity performed by the respondent. A common approach in past studies comprised categorizing activity purposes and then coding the written description by the respondent. One major difficulty of this approach is that the primary purpose of an activity may not be reflected from the written description of the activity given by the respondent. For example, an activity can be performed for different purposes by the same person (e.g., grocery shopping may be undertaken for meeting household need or for social or recreational purposes), and the same activity may be performed for different purposes by different individuals. To overcome this problem, I included a question in the activity diary to record the primary and secondary purpose of an activity according to the respondent's subjective evaluation. Five activity purposes were initially provided to the respondent as guidelines, but they can also provide their own answers in an open-ended question.

#### *Data collection*

After resolving operational issues, I developed the survey instrument. It includes two main parts: a household questionnaire and a two-day activity-travel diary. Using this survey instrument, I collected data from a sample of adults (over 18 years of age) in households with one or more employed members in Franklin County, Ohio, in 1995. The household questionnaire collected information about the socio-economic characteristics and transport resources of all household members. The two-day activity-travel diary collected detailed information about the activities and trips of the respondent for two designated days. Data collected included street address, travel mode used, car availability, routes taken, the primary purpose of each activity, a subjective fixity rating for each activity, and other individuals present when performing each activity.

Because the small number of ethnic minorities in the sample does not allow for meaningful statistical analysis, they were excluded from the analysis (this would not have been the case if qualitative information had been collected). The final subsample consists of three

groups of European Americans (white): 28 full-time employed female, 13 part-time employed female (who work less than 35 hours a week), and 31 full-time employed male.

### *Analysis and results*

I analyzed the differences in fixity constraint experienced by individuals of these three groups using simple descriptive statistics and analysis of variance (Kwan 2000b). The results show that women employed part-time encounter more fixed activities in their daily lives than the other two groups. Many of these fixed activities are associated with household needs that have a strong restrictive effect on the locations of their out-of-home activities and job location. Further, despite the fact that women employed full-time travel longer to work than men, they experience higher level of fixity constraint than men. This result is surprising considering the high occupational status and high level of access to private cars of the full-time employment women in the subsample.

The results of a canonical correlation analysis I performed reveal that, for individuals in the subsample, the level of day-time fixity constraint depends more on one's gender and the extent to which household responsibilities are shared with other adults in the household, than on some conventional variables of household responsibilities such as the presence or number of children in the household (Kwan 1999a). To analyze the complex interrelations among women's day-time fixity constraint, non-employment activities, household responsibilities and employment status, I estimated a nonrecursive structural equation model with latent variables for the women in the subsample (Kwan 1999a). The results show that fixity constraint has a significant impact on women's employment status (where women with higher levels of fixity constraint are more likely to work part-time).

Overall, these findings suggest that, women in the subsample face higher levels of fixity constraint than men in the subsample, regardless of the length of their commute trips and their employment status. The experiences of these women therefore allow us to question the belief that increasing female participation in the labor force will lead to significant change in women's gender role and space-time constraints. The results also suggest that the situation of women may not change much without first changing the gender relations

and redressing the division of domestic labor within the household. Despite the belief that recent trends in the increasing number of women with higher occupational status and improvement in their access to private means of transportation will lead to changes in traditional gender roles, the results of my study call into question such a belief.

### *Presentation of results*

There are several qualifications about these results. First, given the specific subsample and context of the study, its results cannot be generalized to other gender/ethnic subgroups or sociospatial contexts. For instance, given the high socioeconomic status and travel mobility of the individuals in the subsample, the results may seriously understate the fixity constraint and mobility problems faced by individuals of other gender/ethnic subgroups (especially minority women). Further, the survey data used in the study do not allow for the examination of other important factors such as labor market processes and the negotiation between the female and male heads of household. The interaction between these factors and women's space-time constraint is an important issue for future research. In view of these limitations, I realized that complementing the results with ethnographic data of the individuals could have led to a better understanding of the complex processes involved (for example, women's fear of violent crime may impose significant space-time constraint on their activity patterns).

### **Using Quantitative Methods as a Feminist Geographer**

My study focused on an important aspect of women's everyday lives that also partly reflects gender relations within the household. I developed and used measures which I considered more appropriate and more capable of reflecting the complexities of women's daily lives. I collected individual-level data from a sample instead of using secondary data, thus avoiding the many omissions one may encounter when using government surveys. I used advanced statistical techniques to analyze the complex interrelations among women's domestic responsibilities, occupational status and space-time constraints. In the study, I also developed GIS-based computational and geovisualization methods for exploring the data without first reducing the original data to statistical aggregates, thus retaining the

particularities of each individual subject. To make the interpretation of the results less disembodied, I also talked to some of the subjects to clarify issues over the phone, which gave many insights into how to represent these details in the data.

Given that a purpose of feminist geography is to improve our understanding of the gendered nature of social life and to provide knowledge useful to the struggle for gender equality, quantitative methods can play a role in feminist geographic research. When using these methods as a feminist geographer, special attention has to be paid to epistemological issues. In addition, as misuses of quantitative methods can lead to erroneous and misleading findings, it is important to understand the proper procedures for undertaking quantitative geographical analysis and what conclusions the data or method allow. This knowledge would also be useful for a feminist geographer to identify the masculinist bias in existing quantitative data and methods.

## References

- England, K. 1993: Suburban pink collar ghettos: the spatial entrapment of women? *Annals of the Association of American Geographers* 83, 225-42.
- Hanson, S. and Pratt, G. 1990: Geographic perspectives on the occupational segregation of women. *National Geographic Research* 6, 376-99.
- Hanson, S. and Pratt, G. 1995: *Gender, Work, and Space*. London: Routledge.
- Haraway, D. 1991: *Simians, Cyborgs, and Women*. New York: Routledge.
- Harding, S. 1989: Is there a feminist method? In N. Tuana (ed), *Feminism and Science*. Bloomington: Indiana University Press, 17-32.
- Harding, S. 1991: *Whose Science? Whose Knowledge? Thinking from Women's Lives*. Ithaca, NY: Cornell University Press.
- Jayaratne, T. E. 1983: The value of quantitative methodology for feminist research. In G. Bowles and R. D. Klein (eds), *Theories of Women's Studies*, London: Routledge and Kegan Paul, 140-161.
- Jayaratne, T. E. and Stewart, A. J. 1991: Quantitative and qualitative methods in the social sciences: current feminist issues and practical strategies. In M.M. Fonow and J.A. Cook (eds), *Beyond Methodology: Feminist Scholarship as Lived Research*. Bloomington, IN: Indiana University Press, 85-106.
- Johnston-Anumonwo, I. 1995: Racial differences in commuting behavior of women in Buffalo, 1980-1990. *Urban Geography* 16, 23-45.
- Johnston-Anumonwo, I. 1997: Race, gender, and constrained work trips in Buffalo, NY, 1990. *Professional Geographer* 49, 306-17.

- Kwan, M.-P. 1998: Space-time and integral measures of individual accessibility: a comparative analysis using a point-based framework. *Geographical Analysis* 30(3), 91-216.
- Kwan, M.-P. 1999a: Gender, the home-work link, and space-time patterns of nonemployment activities. *Economic Geography* 75(4), 370-394.
- Kwan, M.-P. 1999b: Gender and individual access to urban opportunities: a study using space-time measures. *Professional Geographer* 51(2), 210-227.
- Kwan, M.-P. 2000a: Other GISs in other worlds: feminist visualization and re-envisioning GIS. Paper presented at the Annual Meeting of the Association of American Geographers, Pittsburgh, PA, April 4-8.
- Kwan, M.-P. 2000b: Gender differences in space-time constraints. *Area* 32(2), 145-156.
- Lawson, V. 1995: The politics of difference: examining the quantitative/qualitative dualism in post-structuralist feminist research. *Professional Geographer* 47(4), 449-457.
- Mattingly, D. and Falconer-Al-Hindi, K. 1995: Should women count? A context for the debate. *Professional Geographer* 47(4), 427-435.
- McDowell, L. 1993: Space, place and gender relations: Part I. Feminist empiricism and the geography of social relations. *Progress in Human Geography* 17(2), 157-179.
- McLafferty, S. 1995: Counting for women. *Professional Geographer* 47(4), 436-442.
- McLafferty, S. and Preston, V. 1992: Spatial mismatch and labor market segmentation for African American and Latino women. *Economic Geography* 68(4), 406-31.
- McLafferty, S. and Preston, V. 1996: Spatial mismatch and employment in a decade of restructuring. *Professional Geographer* 48, 420-31.
- McLafferty, S. and Preston, V. 1997: Gender, race, and the determinants of commuting: New York in 1990. *Urban Geography* 18(3), 192-212.
- Moss, P. 1995: Embeddedness in practice, numbers in context: the politics of knowing and doing. *Professional Geographer* 47(4), 442-449.
- Perrons, D. 1999: Missing subjects? Searching for gender in official statistics. In D. Dorling and S. Simpson (eds), *Statistics in Society: The Arithmetic of Politics*. London: Arnold, 105-114.
- Pratt, G. 1989: Quantitative techniques and humanistic-historical materialist perspectives. In A. Kobayashi and S. Mackenzie (eds), *Remaking Human Geography*. Boston: Unwin Hyman, 101-115.
- Pugh, A. 1990: My statistics and feminism - a true story. In L. Stanley (ed), *Feminist Praxis: Research, Theory and Epistemology in Feminist Sociology*. London: Routledge, 103-112.
- Reinharz, S. 1992: *Feminist Methods in Social Research*. Oxford: Oxford University Press.
- Rose, D. 1993: On feminism, method and methods in human geography: an idiosyncratic overview. *The Canadian Geographer* 37(1), 57-60.
- Rose, G. 1993: *Feminism and Geography: The Limits of Geographical Knowledge*. Minneapolis: University of Minnesota Press.
- Rose, G. 1997: Situating knowledges: positionality, reflexivities and other tactics. *Progress in Human Geography* 21(3), 305-20.
- Rosenbloom, S. and Burns, E. 1994: Why working women drive alone: implications for travel reduction programs. *Transportation Research Record* 1459, 39-45.

- Samarasinghe, V. 1997: Counting women's work: the intersection of time and space. In J. P. Jones III, H.J. Nast and S.M. Roberts (eds), *Threshold in Feminist Geography: Difference, Methodology, Representation*. New York: Rowman and Littlefield, 129-144.
- Seager, J. and Olson, S. 1986: *Women in the World: An International Atlas*. London: Pluto.
- Sheppard, E. 2001: Quantitative geography: representations, practices and possibilities. *Environment and Planning D*, in press.
- Sprague, J. and Zimmerman, M.K. 1989: Quality and quantity: reconstructing feminist methodology. *The American Sociologist* 20, 71-86.
- Tivers, J. 1985: *Women attached: The daily lives of women with young children*. London: Croom Helm.
- Women and Geography Study Group (WGSG), the Institute of the British Geographers. 1997: *Feminist geographies: explorations in diversity and difference*. Harlow, Essex: Longman.