

FROM WOMEN IN TRANSPORT TO GENDER IN TRANSPORT: CHALLENGING CONCEPTUAL FRAMEWORKS FOR IMPROVED POLICYMAKING

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Gender analysis provides a conceptual and methodological basis for developing new insights in research and policymaking in any field dealing with human interaction. The disciplines of the built environment are fields where gender-specific insight can significantly contribute to improved policymaking and professional practices, better incorporating the realities of all individuals. Recent developments in European science policy since 1999 have led to the integration of gender into the upcoming EU Framework Programme for Research and Innovation, known as Horizon 2020. Transport, energy, and climate change are societal challenges that are specifically targeted for research funding in Horizon 2020. These policy developments in science policy can provide the knowledge base for further integration of gender dimensions in specific policy fields, such as transport. While pioneering work in the transport field has already focused on women in transport, I argue for a full integration of gender in all dimensions of transport research. This article presents some conceptual innovations and critical analysis of ideas that have been taken for granted in the field of metropolitan transport. It argues for a full acknowledgment of the idea of a “mobility of care,” and for a reevaluation of current overarching uses of notions such as “compulsory mobility.” This would contribute to a needed rebalancing of the topics of care and employment as being equally important for transport policy.

The subject of women in transportation was first explored in the 1970s, with research undertaken on such topics as the role of gender in city planning and architecture. Four decades of research and teaching on women and gender in the United States, Europe, and elsewhere has allowed for potentially significant changes and advances in new fields of policymaking. The disciplines of the built environment—such as architecture, housing, transport, and urban planning—are some of the fields where new insights from gender analysis can contribute to better policymaking and increased quality of life for everyone.¹

Recent developments in European science policy during the last decade have opened the way for the institutionalization of gender mainstreaming in European research. The main funding instrument for research in Europe, the recently

approved Research Framework Programme known as Horizon 2020, which will be operational in January 2014, fully integrates gender as an important factor in research and innovation.²

After a brief presentation of these recent developments in European science policy, this article presents some insights in the specific field of urban and metropolitan transport, with concomitant implications for the interrelated policy areas of urban and regional planning. It uses gender as an analytical category to propose

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a new concept, the “mobility of care,” coined by this author, and to challenge certain conceptualizations widely used in the field of transport, among them that of “compulsory mobility.”³ The mobility of care provides a framework for recognizing, measuring, making visible, giving value to, and properly accounting for all the travel associated with those care- and home-related tasks needed for the undertaking of everyday tasks. Although globally they tend to be performed mostly by women, as men increase their participation in these tasks, use of gender-aware concepts that integrate care concerns into transport planning will become more significant

for both sexes.

The aim is to build a wider knowledge base of mobility patterns, behaviors, and needs, along with improved operational and policy concepts on which to base more equitable transport policies that would better respond to gender needs, thus benefiting both men and women. I will argue for the need to rebalance priorities in the transport agenda, moving from their current central focus on employment-related mobility towards an equivalent consideration and valuing of the travel requirements of care work. A full integration of gender dimensions at all stages and in all aspects of transport research and policy is needed.

GENDER MAINSTREAMING RESEARCH AND INNOVATION POLICY: THE EUROPEAN EXAMPLE

In Europe, a number of steps have been taken in research policy, which will hopefully begin to impact transport research, as well as research in the various disciplines of the built environment. Gender mainstreaming became enshrined in European legislation in 1999 through its integration into the Treaty of Amsterdam, which amended the original Treaty of Maastricht by which the European Union was created. The Treaty of Amsterdam requires gender mainstreaming of all European policies, following the concept first proposed at the Fourth World

Conference on Women, held in Beijing in 1995.

Gender mainstreaming in European science began as early as 1999, when it was undertaken by the European Commission (EC). Under the mandate of Commissioner Edith Cresson, two organizations responsible for implementing gender mainstreaming were created: the Women and Science Unit at the very heart of the Directorate-General of Research, and the Helsinki Group, an assessment group for the Commission with government representatives from all member states and gender experts from universities. In 2001, the Commission published a preliminary report that provided for the first time a global, data-driven view of the position of women in science in Europe.⁴ In the science policy arena, gender is now one of five priorities of the European Research Area as of July 2012.⁵

The series “She Figures, Statistics and Indicators on Gender Equality in Science,” developed with the support of the statistical analysts in the Helsinki Group and published every three years since 2003, provides a good data source from a European perspective from which to devise and benchmark policy.⁶ Additionally, some countries do produce specific publications with sex-disaggregated data and gender indicators of women and science, such as the “White Paper on the Position of Women in Science in Spain.”⁷

An increasing number of European research studies have since been funded by the EC, and as a whole provide overarching evidence of the persistent inequalities between women and men, both in the public and private sectors. They also describe many of the policy initiatives undertaken by different member states and by individual institutions.⁸ The EC has taken the lead in policy development. It included a pioneering provision for integrating gender dimensions in research within the Sixth Framework Programme, which required that “proposals should indicate whether, and how, sex and gender are relevant variables in the objectives and methodology proposed.”⁹ It funded gender and science training programs that have taken place throughout the continent. Crucially, it has set targets for the presence of women in the research program and in committees. It also recently created a funding scheme soliciting calls for proposals for the structural change of institutions.

More recently, the EC published two important reports that provide roadmaps for gender and science. The first, entitled “Structural Change in Research Institutions: Enhancing excellence, gender equality and efficiency in research and innovation,” was written by a group of experts who were specifically appointed, and whom this author chaired.¹⁰ The report identifies five main sets of problems faced by research institutions and proposes structural change as the means to address them, so that decision making is more transparent; unconscious bias is removed from institutional practices and evaluation procedures; human resources manage-

ment is modernized by considering gender dimensions; excellence is promoted through diversity; and research and innovation are improved by the integration of sex and gender analysis.¹¹ Its recommendations address the different interested stakeholders: member states, science institutions, European-wide organizations, gatekeepers of excellence, and the EC itself. It includes a selection of best practices from around the world.

The second document is the EU-U.S. Gendered Innovations in Science, Health and Medicine, Engineering and Environment Project, which develops practical methods of sex and gender analysis in these fields, and provides over twenty case studies as concrete illustrations of how sex and gender analysis leads to innovation.¹² This project provides practical means to stimulate the creation of gender-responsible science and technology through online-accessible material. Examples of gendered innovations include how sex and gender analysis has led to the development of pregnant crash test dummies that can be used to enhance safety in automobile design; the inclusion of men in osteoporosis research, leading to better diagnoses and treatments, since, in the past, osteoporosis was conceptualized as a disease of postmenopausal women; and to better understanding, diagnosis, and treatment of cardiovascular disease among women.

In order to build on these policy developments, the international COST network genderSTE (Gender, Science, Technology and Environment), which I chair, was launched in 2012. This collaborative initiative funded by the COST, the oldest European program for cooperation in science and technology, aims to better integrate gender dimensions in science and technology at three main levels: by promoting women's careers in science and technology through the structural change of institutions, as recommended by the EC; by promoting better integration of gender in the fields of science, research, and technology through the dissemination of existing knowledge on the topic, particularly from the EU-U.S. Gendered Innovations Project; and by identifying gender dimensions relevant to environment-related Horizon 2020 Grand Challenges and other urban EC initiatives, in the specific fields of city planning, transport, energy, and climate.¹³ This network involves over 150 participants from close to forty countries, representing governments, funding agencies, universities, research organizations, non-profits, and private firms.

The most recent advance in Europe geared to gender mainstreaming research is the full integration of gender dimensions in the proposal for a regulation on the new Research Framework Programme Horizon 2020.¹⁴ Horizon 2020 interprets the role of gender mainstreaming in research and innovations as including both the structural change of institutions to promote effective equal opportunities for men and women in scientific careers, as well as the integration of gender dimensions

in research and innovation content. It is hoped that these provisions that will go into effect January 2014, and thereby impact all European-funded research, will significantly contribute to improved integration of gender dimensions in research in Europe and globally.

PIONEERING WORK: WOMEN IN TRANSPORT

Pioneering work on women in transport has mostly focused on a quantitative perspective, although occasionally more qualitative approaches are used to explore issues such as travel needs, constraints, attitudes, and preferences that shape behavior. The main focus of research is on the analysis of socioeconomic data and sex-disaggregated travel data obtained from various surveys: existing travel surveys by transport authorities, whether at national, regional, or urban scales; activity-based daily surveys; and ad hoc smaller surveys covering aspects not adequately addressed by ongoing surveys undertaken by transport bodies. This research provides both descriptive empirical evidence and explanatory relations between variables. Available datasets on which this research is based are not harmonized, even in Europe, where efforts at harmonizing statistical data from a continental scale are undertaken in many fields of policy and published regularly by Eurostat.

As the bibliography is extensive, I will only mention some basic references that provide overviews of the current state of affairs. In Europe, “Gender Mainstreaming European Transport Research and Policy: Building the Knowledge Base and Mapping Good Practices,” is a comprehensive study on gender mainstreaming transport research and policies.¹⁵ Pioneering work in Europe includes research done by Grieco and Pickup.¹⁶ The proceedings from the various conferences on “Women’s Issues in Transportation,” organized by Rosenbloom, Hanson, Meyer, and others since 1978, include contributions mainly from the U.S., with the addition of other countries in more recent editions.¹⁷ The special issue “Gender and transport: Transaction costs, competing claims and transport policy gaps,” featured in *Research in Transportation Economics* and the edited book *Gendered Mobilities* are the latest collections of work on the topic.¹⁸ Among the policy reports, it is worth mentioning “Promoting Gender Equality in Transport,” from a UK perspective, and the “Women and Transport Report to the European Parliament,” from a European viewpoint.¹⁹

The significant body of research carried out since the 1970s shows consistent and significant differences in travel patterns between women and men. The fol-

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lowing are the main results from this extensive bibliography, of which the above citations provide good overviews. Women tend to travel shorter distances in a geographical area closer to the home; they make more trips; they travel for a wider variety of purposes, which differ to a greater extent than men's; they have less

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access to a car and are the main users of public transport systems; they cease driving earlier than men; they make more chained trips and more multimodal trips; their travel patterns tend to be shaped as polygons, as opposed to the commuting patterns from home to workplace prevalent among men; women are more sensitive to safety concerns and tend to self-limit their movements and activities in urban space because of perceptions of risk; women's smaller body size and strength have specific implications for the design of spaces, vehicles,

and security devices that often are designed according to a standard male reference model; and many more men than women work in the transport sector, where the participation of women is particularly low in positions of responsibility.

Important issues to take into consideration include household structure and stage of life—such as having children, marital status, being a single parent, living alone, or old age. All these greatly influence the travel patterns of women. Income also matters, as it limits transport options. Although women have increased their workforce participation while men have comparatively reduced theirs, horizontal and vertical gender segregation persist in labor markets, as does a gender wage gap for similar work, with women being overrepresented among the poor.²⁰ Urban structure, including factors such as density, mix of uses, availability of transit, and location of housing, facilities, and employment centers, is another important element that impacts differently the travel patterns and the behavior of women and men. Race and ethnicity and their intersection with gender are other important co-variables, as in the U.S., where both gender differences in travel between racial groups, and gender differences within racial groups, have been shown.

Safety and security are also key issues. Women continue to feel unwelcomed in public spaces, including transport system spaces in many parts of world, although recent developments seem to point to a new awareness of violence against women in countries such as India and Egypt. In the developed world, women still do not have access to the city on equal terms to men. The fear and actuality of sexual and physical assault impinges differentially on women and men, girls and boys, limiting their rights to public space. Comfort extends beyond physical safety, and the intrusion of sexualized images into the public realm also poses new challenges

for gender equality.

Finally, statistics show that women are overrepresented in the following social groups: older people living alone, single parents, and working parents who have responsibility for most caretaking tasks. These groups have specific transport needs and suffer the greatest transport disadvantage, as the cited references mentioned above describe.

Overall, the different travel patterns of women and men equate to a comparative disadvantage for women in terms of access to transportation, which, in turn, negatively affects their access to labor markets, professional development, economic status, and personal well-being. More often than men, women face travel constraints and time poverty in cities, and are forced to work part-time, pass over promotions, or are unable to work at all.²¹ These constraints may result in the material impossibility of combining work with caregiving, given the available means of transportation. On the other side of the coin, recent research in the U.S. also points to gender stereotypes which are disadvantageous to certain groups of men, such as African-Americans, who attempt to assert their right to not be feared in public spaces.²² While there is some convergence in the gender differences in transport previously described, with some gaps decreasing with increased overall economic levels, such as access to a private vehicle, differences in travel patterns and behaviors persist in both developing and developed countries.

CHALLENGING CONCEPTUAL FRAMEWORKS: TOWARDS FULL INTEGRATION OF GENDER DIMENSIONS IN TRANSPORT

This mostly quantitative research, which in its earlier times was met with considerable resistance and opposition, is now relatively well-established. It has demonstrated that sex and gender are important categories in transport research and policy. Gender differences in transport persist across the world, even in the context of the substantial social and demographic changes of the last decades, such as increased participation of women in the labor force, changes in household structures, an aging population, reduced fertility rates, greater diversity and instability in employment trajectories for men, and changing lifestyles and gender roles.

While this knowledge is not yet always considered by the wider transport research community, included in university curricula, or incorporated in transport policy, there is no denying that gender issues in travel are significant and persistent, and that they are an important area for further research and policy.

I will argue that to advance this understanding of the gendered realities of transport and to develop transport policies that respond better to the travel needs of women and men, a greater and more systematic consideration of gender as an analytical category is needed to challenge current definitions of research priorities

and outcomes; existing conceptual frameworks; the ways in which research questions are formulated; the implicit, taken-for-granted gender assumptions that may underlie the research process; the currently used standards and reference models; and language and visual representation. Participatory research methods to involve men and women of different ages, economic status, physical condition, race, and other relevant co-variables should be more consistently used.²³

We need to fully integrate relevant insights from gender studies and to identify possible new gender dimensions, unintended or unconscious bias, and omissions that might occur at the various stages of the research and policy cycles. This implies questioning basic conceptual frameworks that underlie current understandings of transport research and policy.

Four decades of gender research have shown that knowledge about humans and the social world is not as neutral as it might seem. Research is historically and socially mediated in such a way that specific points of view tend to be privileged, often in unintended, unconscious ways. Sometimes what is only the particular experience of a specific group is constructed as a universal norm. Gender studies have shown the many ways in which the realities of adult, middle, or upper-middle class white men in good health were construed as the norm in many fields of knowledge, used as a measure by which the experiences of the rest of the population were compared.²⁴

Because any conceptual framework is socially constructed and historically dated, the particular point of view from which concepts are developed limits their capacity to fully express other aspects of the reality they attempt to describe. When this point of view is not made explicit, the limitations of the explanatory power of concepts remain ambiguous. As a result, the usefulness and relevance of concepts for explaining and describing what lies beyond the underlying hidden assumptions also remain unexamined.

Gender analysis allows for unveiling some implicit assumptions that underlie many fields of human knowledge. It provides the tools for highlighting possible limitations, biases or omissions, and for suggesting new conceptual frameworks, research priorities, questions, reference models, terms, and visual representations that do take into account gender dimensions.

These new gendered insights can then contribute, among other things, to developing data collection techniques and data sets that better describe both women's and men's mobility and gender issues in transport, from which more significant empirical evidence can be drawn. In the spirit of advancing towards this better integration of gender analysis in transport, I will focus on analyzing some gender assumptions implicit in conceptual frameworks and propose new gender-aware approaches.

Many current conceptual frameworks on which techniques and categorizations for data collection are based were developed in a context in which promoting economic development and supporting the working man's mobility, whether explicitly or implicitly, were seen as the main objective of transport infrastructure planning. The typically male travel patterns of travel associated with paid employment and journeys to work was, and still is, privileged as the focus of research, with profound implications for the overall development of the transport field. This point of view from which the field has historically developed contributes in many significant ways to define what issues become research priorities and which do not. Early research on women in transport in the 1970s was dismissed by many on the grounds of its supposed irrelevance, because women's mobility, not being obviously linked to the economy, did not seem to be important or significant.

More recently, transportation policy has evolved from its earlier main focus of promoting economic development to also embracing wider objectives of general accessibility and social inclusion. However, it continues to be a discipline where the main tenets are the byproduct of this initial rather single-minded focus on promoting and supporting economic development and men's mobility. In this new context, ensuring proper consideration of gender issues will become a key aspect to developing more equitable transport systems for all. Moreover, because women's participation in the workforce today is a key factor for overall economic development, proper integration of gender considerations into transport planning becomes an important issue for developing transport systems that provide efficient support to the economy. This will also help to move the focus of metropolitan transport from a perspective centered on the infrastructure to one in which the individual needs of those who use transport systems are prioritized.

As transport engineers deal with the planning, functional design, operation, and facility management to provide safe, efficient, rapid, comfortable, convenient, economical, and environmentally compatible transport, unveiling gender assumptions and integrating gender dimensions in current engineering practice can significantly help to provide them with new innovative tools to better respond to the complex demands of contemporary societies and current changing gender roles.

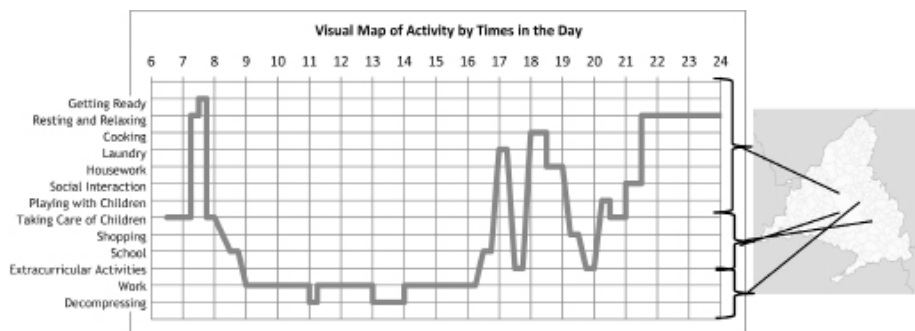
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WORDS MATTER: REBALANCING THE REQUIREMENTS OF CARE AND EMPLOYMENT IN TRANSPORT

One key contribution of gender studies has been the conceptualization of care as an important human activity that needs to be recognized, studied, valued, made visible, and taken into account in policymaking. Care work refers to the activities needed for the normal functioning of life, including the necessary tasks for the upkeep of the home and those required for the care of dependents, i.e., the sick, the young, and the old. These tasks may be realized in the home or in other facilities around the city, and they imply the use of transport systems. As societies evolve, the type and number of activities required in quotidian life increases, as does the number of locations around the city where they take place and the need to use transport systems to get to those places.

The notion of a chain of tasks, which describes the daily tasks carried out by people who have caring responsibilities, is useful to understand the spatial-temporal dimensions of care work, as well as the significant strains that urban structures and transport systems can put on those persons who combine paid employment and care work. The daily chains of tasks performed by persons who have a double workload in the public and private spheres can become quite difficult to accomplish. These chains are more complex than those of people who work solely in paid employment or who only have care responsibilities.

Figure 1. The notion of a chain of tasks allows for a better understanding of the complex spatial and temporal dimensions of the daily activities of persons who combine work in paid employment and care work. Diagonal lines in the graph represent trips in urban space for which suitable transport needs to be made available.



Source: Sánchez de Madariaga, 2004.²⁵

Surveys on the use of time, such as the Harmonized European Time Use Study (HETUS), show that most care work is still performed by women.²⁶ While women have greatly increased their participation in the labor force, men's share of care work is increasing at a much slower rate. Because the double workload of care work and paid employment is still mostly a women's issue, integrating gender dimensions in transport is still of greater concern for women. But as this workload is shared more equally between men and women, it will increasingly become a concern for men as well.

Gender understandings of built environments have posited that, in general, people have two main approaches to urban space.²⁷ One is the perspective of employed persons who inhabit the city as workers and consumers with a carefree everyday life. This applies to the majority of men and single persons of working age. This group is highly mobile and considers residential and other areas of the city mainly for their recreational and leisure uses. The second is the perspective of people who perform unpaid housework and are caretakers of others, whether they also work in the labor force or not, and those who need to be cared for. This includes men and women caretakers and those for whom they care. They are usually less mobile and expect their residential environment to fulfill numerous functions. For this group, the ability of constructed environments and residential areas, in particular, to respond well to multiple functions is paramount, more so than leisure or recreational qualities. For them, transport systems need to be able to support the complex patterns of mobility required for the fulfillment of their daily tasks.

I argue that current ways of categorizing transport statistics are conceptualized mostly from the perspective of the first group. The concept of "compulsory mobility," a widely used notion in transport research and policy, illustrates this point. This term encompasses those trips whose destinations are related to paid employment and educational purposes, although in this second case it refers only to students, not to those who escort them when they cannot travel on their own. The expression "constrained trips or travel" is sometimes used as a lighter term alluding to the same reality, i.e., trips to employment and educational locations. Discretionary travel (non-compulsory or non-constrained would be the English language translation of equivalent terms used in other languages), is defined by default, and includes trips made for all remaining purposes: leisure, shopping,

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visits, strolling, escorting, and the like, with specific categorizations differing in individual surveys.

The notions of compulsory and constrained travel designate trips with fixed arrival times at a given destination. They are built on the following criteria: the destination belongs to the work or public sphere as opposed to the private; there is a legal or contractual obligation for making the trip; and trips are related to a financially compensated activity, whether current or future, as in the case of study. Non-compulsory travel is defined as belonging to the personal or private sphere: the destinations are not employment locations; the person who does the trip does not have a legal contractual obligation to do it; and, finally, the activity for which the trip is carried out is not financially compensated.

These criteria are defined from the perspective of our first group of users of built environments, those who only work in paid employment and do not have care responsibilities. These definitions pool together leisure and personal activities with care-related tasks. Thus, they make no distinction between what is needed for the reproduction of life and must be performed on a regular basis every day—under significant constraints and with considerable effort and dedication—from individuals' leisure activities.

The notion of care is not even considered or mentioned. But as we know from gender studies, care is a core concept for interpreting the private sphere and its relationship with the public domain. A contemporary understanding of the private sphere, informed by gender analysis, needs to properly and explicitly take into account the notion of care. No reasonable conceptualization of the private sphere today can omit the contributions of forty years of gender research to contemporary understandings of the private and public spheres.

The use of language is another key issue. Using common sense language for technical purposes is not as neutral as it may seem. Language carries meaning even when it is unintended, and also when it is purposefully used to denote specifically defined technical ideas. A striking point about this terminology is that naming some trips compulsory and others non-compulsory makes the former look important, as if it is taking precedence over trips in the latter group. These implicit connotations in the technical use of such a highly charged word as “compulsory” may be softened somewhat in the less harsh term “constrained,” but underlying concerns remain.

The widespread use of the term compulsory mobility, or constrained travel, as a main analytical and operational concept by transportation organizations when they analyze data for policymaking creates a bias that obscures both the realities of women's mobility and gender issues in transport systems. These terms are not created from the viewpoint of the gender roles of the individuals who participate

in the trips. If we consider the term “discretionary,” for example, one might ask the question: Discretionary for whom? Is it discretionary, or unnecessary, to escort children to school, purchase food, or manage the home? Certainly, trips to buy food or bring children to school are not discretionary and must be done. Chaperoning trips, in addition, must be done within a specific timeframe and have a fixed arrival time. If “discretionary” refers to the assumption that the arrival time at the destination is not fixed, the complexity of balancing care and work shows that working parents do not have much flexibility or discretion in choosing when to carry out many tasks and the kind of travel that must be done to accomplish them.

From this perspective, it is contradictory and difficult to understand why the trips taken by students when attending school or university are compulsory, while the trips taken by the adults who must accompany them—for the same purpose, to the same place, at the same time—are not compulsory or constrained, but discretionary, considering they are making the same trip.

Ironically, these trips made for supporting daily activities, particularly in the case of working individuals, become more constrained and are far from being discretionary when considered from the perspective of the individual who must undertake them. A significant body of literature on women and transport has pointed out that women’s mobility is highly constrained and that they have few, if any, options from which to choose. Developing the means to better describe these constraints should be an issue of concern. Because of this, having them described under the banner of “non-constrained” or “discretionary” is not useful and, I would venture, contradictory.

If we consider the criteria of contractual legality, it is equally arguable that there is an obligation to take care of children and to bring them to school, just as marriage is a legal contract and taking responsibility for the care of one’s children is a legal obligation of parents. In many European countries, it is also a specific legal obligation of parents to bring children to school, since, unlike in the U.S., home schooling is illegal.

The third criteria—the non-compensated character of the activity for which the trip is made—seems to be tautological, as it follows causally from the first criteria; that is, whether the purpose of the travel is related to employment or not. It is difficult to see how a non-employment related trip can be economically compensated, at least in a statistically significant way.

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It is worth noting the recent literature that estimates the economic value of care work by calculating hours spent and giving them a monetary value according to what would need to be paid if they were provided by markets or as public services.²⁸ If economic value associated with caretaking activities is even relevant criteria, these studies provide us with a monetary estimate that demonstrates what a significant value to the economy they would represent if they were not provided gratis, mostly by women but sometimes by men.

Certainly, describing these patterns of mobility is more difficult than describing commuting patterns to work and study, but this is not a reason to overlook developing the necessary analytical categories. Additionally, because the number of those who perform care work and are employed is increasing, considering these trips as discretionary or non-constrained is an inaccurate description of the reality of a very significant share of the population. Many of these trips must be done in exact and difficult to schedule slots of time that require the coordination of work and educational schedules with the working hours of shops and services and of available transportation means within a given urban structure.

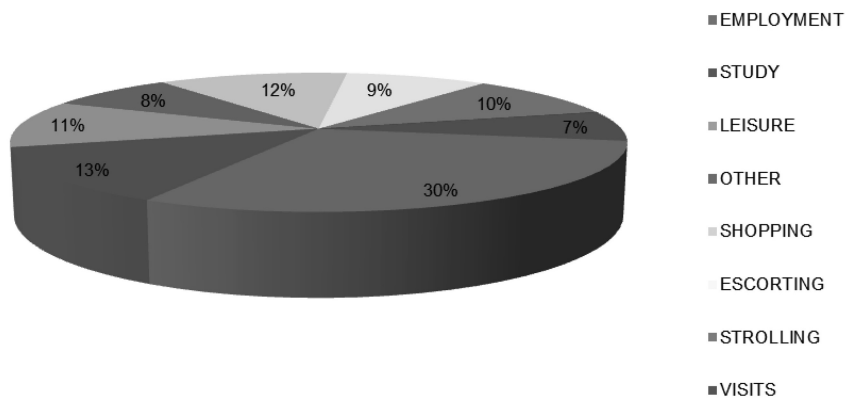
I do not posit that these concepts—compulsory, constrained, and discretionary mobility—should be dismissed altogether. They are undoubtedly useful, if, by grouping together regular daily trips with a fixed arrival time at a destination, they provide a measure for specific engineering problems, such as planning for peak hours. But we need to be aware of what they really do and do not accomplish, of their limitations, and of the ways in which they contribute to hiding and obscuring other realities.

We need to refocus their use and to complement them with other concepts that are better suited for describing the current complexities and the gendered dimensions of people's travel. Concepts such as compulsory and constrained travel do not allow for an accurate description of the trips made for home and family work, which are simply pooled together with leisure trips and sometimes not even counted. Maintaining the concept but changing the name to less charged words, thereby more accurately pointing to what is meant, would also have a positive effect.

Additional concerns arise from standard graphical representations. Unintended gender bias is a frequent problem in visual representations of transport data, which require greater attention. Because visual comprehension is so effective and powerful, and those drafting charts are not necessarily experts in graphical representation, it is important to raise awareness of this topic. Perspective, volume, use of colors, relative position and size of graphs, icons used, categories represented, and titles used are sources of the visual misrepresentation of quantitative information.²⁹ All these are common sources of gender bias in the representation of

transport statistics.

Figure 2. Identifying gender bias in visual representations is important. Note how the use of volume and perspective, together with the combination of similar gradients for employment and education (compulsory mobility), and their location in the front, increases the perception of the importance of employment-related travel, which covers a paper surface almost twice its real share.



Source: Ministerio de Fomento, 2007.³⁰

Pie charts are frequently used, often shown in perspective and with volume, as in this example reproduced in Figure 2. Perspective and volume distort the information because those segments of the pie located in the foreground occupy more space on paper than is proportionate to their real share of the total, by the added surface volume. Data located in the foreground are perceived to be larger than the actual share, so that the choice of which data to show in the foreground is not a neutral issue.

Most often, trips to the workplace are located in this position, as in the original visual representation of the example provided above. Surely this is not done consciously, but neither does it seem to happen by chance. It is most likely the result of unconscious bias, a well-studied psychological mechanism.³¹ By combining trips to the workplace with trips to educational facilities, an example of compulsory mobility, and using similar colors, these two categories become emphasized further, making the remaining purposes for travel appear even less important.

GENDER AWARE CONCEPTS AND CATEGORIES: FROM COMPULSORY MOBILITY TO MOBILITY OF CARE

I have proposed elsewhere the innovative concept of “mobility of care” in an attempt to provide a tool to better understand the mobility of persons who have everyday care responsibilities.³² The innovative concept of mobility of care is featured in the EU-U.S. Gendered Innovations Project, which showcases over twenty case studies on how gender analysis can foster innovation in sciences, medicine, engineering, and environment, as well as a description of twelve gender-aware research methods adapted to these fields of research.³³

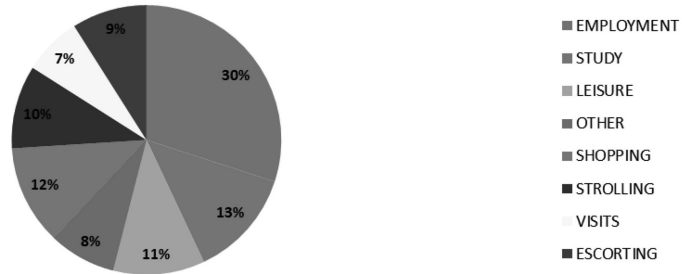
The mobility of care includes all travel resulting from home and caring responsibilities: escorting others; shopping for daily living, with the exclusion of leisure shopping; household maintenance, organization, and administrative errands, as opposed to personal walks for recreation; visits to take care of sick or elderly relatives that are, again, seen as different from leisure visits; and the like.

Many of these care trips are not sufficiently accounted for in transportation datasets. These care trips appear scattered under other headings, are uncounted, and are unnamed as such. Care trips can be hidden under headings such as leisure, strolling, visits, or other trips. Those trips made on foot and short distance trips of less than one kilometer, which are intentionally not included in many surveys, are often not even counted. Trips undertaken for care purposes are not seen as a whole or single category because statistics capture data on escorting, shopping, errands, etc., as separate and unrelated reasons for travel. The overall weight of the mobility of care is systematically underrepresented because the tasks needed for supporting daily living are not seen as part of the wider work of social reproduction and are therefore not named.

Gender-aware visual representations can contribute to a better understanding of the gender dimensions of travel by revealing significant travel patterns normally concealed by gender assumptions embedded in data collection categories.³⁴ The first pie chart (chart A) reproduces an official graph extracted from a government report and represents urban trips made in Spain from 2006 to 2007.³⁵ The graph gives preference to paid employment, educational, and leisure travel over travel related to care activities. In this graph, trips made for care purposes are not named as such. Care mobility is divided into many small categories; hidden under other headings, such as escorting, shopping, leisure, strolling, visits; or not counted at all, since this survey does not consider short trips on foot of less than fifteen minutes or shorter than one kilometer as relating to care activities.

Figure 3. The Mobility of Care.

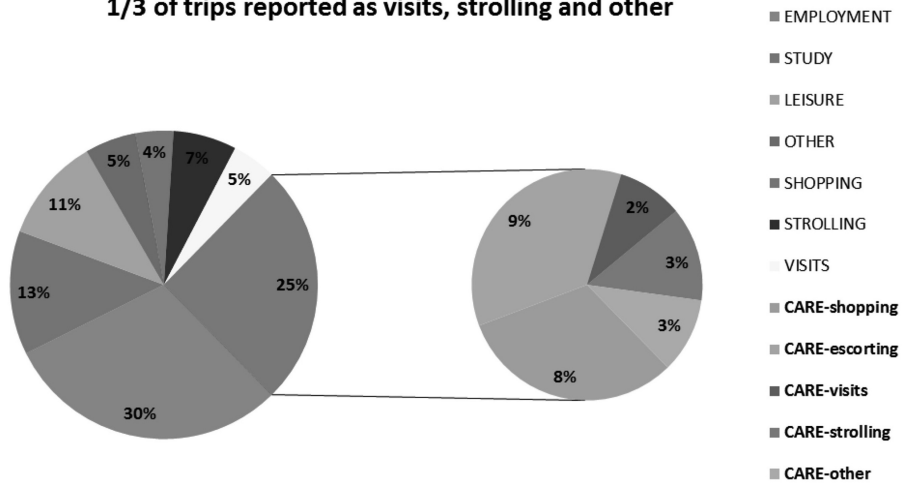
**Proportion of daily trips by purpose in Spanish metropolitan areas
Original data coding (2006-07)**



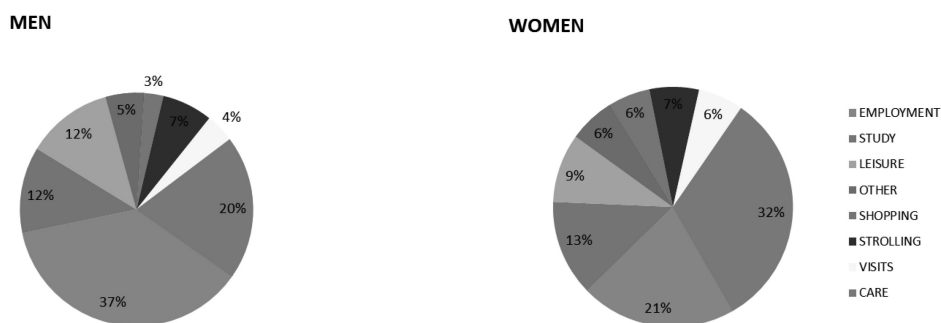
A) Data and chart provided by Movilia, Spain's national urban mobility survey of 2007. Source: Ministerio de Fomento, 2007.

**Proportion of daily trips by purpose in Spanish metropolitan areas
(2006-07). Data recoded with the following designated as care:**

100% of trips reported as escorting
2/3 of trips reported as shopping
1/3 of trips reported as visits, strolling and other



B) Simulation with data recoded as indicated, which allows for the visualization of the mobility of care. Source: Sánchez de Madariaga, 2013.



C) Simulation with data recoded as indicated by sex. Source: Sánchez de Madariaga, 2013.

Chart B, on the other hand, represents travel made for care purposes under the ad hoc assumption that certain proportions of trips described as “escorting,” “shopping,” etc., were made for the purpose of providing care or performing home-related tasks.³⁶ Naming care trips by creating a specific umbrella category and visualizing them in graphical representations emphasizes the importance of travel resulting from non-paid care work and makes it visible.³⁷ This example is based on arbitrary assumptions made by the author on the proportions of escorting (100 percent); shopping (66 percent); and strolling, visits, and other (33 percent each) that could reasonably be considered as care.³⁸ In order to have a better estimate of the real size of care-related trips, specific surveys—properly designed and implemented—would need to be carried out. My purpose here is just to make a rough estimate that allows us to illustrate, graphically or otherwise, the usefulness of integrating the concept of “mobility of care” into the field of transport research and policy. Chart C, specifically created for this article, shows sex differences in care and employment-related travel.³⁹ It shows how the proportion of trips made for employment purposes and for care purposes would be, under these exploratory assumptions, practically inverted among men and women.

Such surveys should contain very detailed items. They should contain clear, specific, and detailed questions formulated to accurately separate trips arising due to care work from those related to employment, and from those properly considered strolling, visiting, or leisure shopping. The most common misrepresentation of care-related travel is its confusion with activities that could be more widely understood for leisure or personal purposes, such as strolling and leisure, and for this reason, it is very important to clearly separate these. It would also be possible to group all these under a general heading of leisure or personal trips. Interviewers

should have the time and the means to explain to the interviewees which sort of trips should be understood as “care-related,” so that stereotypes and cultural understandings contributing to the invisibility of unpaid care work do not prevent care trips from being considered as such. This survey would obviously also have to count trips of less than fifteen minutes and those shorter than one kilometer. It should provide detailed descriptions of chain trips, a common pattern of women’s mobility well known since the 1980s but which is not yet systematically taken into consideration in transport surveys.⁴⁰

A more accurate method for quantifying and describing all of these trips, in addition to combining them under one heading, would be to show how the mobility of care represents a significant share of total travel. In terms of the number of trips, if the arbitrary assumptions made in this article are not too misleading, we can infer that in many places, this category might have a similar size to employment-related travel, and would significantly outweigh travel resulting from both leisure/personal and educational purposes. This would have to be empirically tested by properly designed and implemented surveys. A careful appraising and labeling of care-related travel would provide a much clearer and more precise understanding of gender differences in transport, as well as a solid baseline for the design of transport systems that are more responsive to users’ needs.

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IMPLICATIONS FOR POLICY AND FUTURE DIRECTIONS

The knowledge created by the existing body of research on women and gender in transport is starting to bear some fruit in policy implementation. A number of individually scattered experiences exist in many cities around the world. These include: specific women-only or women-driven bus lines; measures to improve lighting, location, and safety of stops; adaptation of safety devices and of schedules; designated parking slots for pregnant women; and new gender-aware policy tools such as Public Transport Gender Audit tools, which allow for the systematic identification of gender dimensions and provide measures throughout the policy planning and implementation cycle.⁴¹

In this respect, the Austrian experience of the last decade at municipal, regional, and national levels can be mentioned, with a wider array of measures and tools, including gender-sensitive analysis; collection of good practice examples;

development of guidelines, manuals, standards, and quality criteria; gender impact assessment of laws; gender budgeting and funding; and awareness raising and training.⁴²


In order to advance towards full gender mainstreaming of transport policies, a full integration of gender dimensions in transport research is needed.

As most of the research has focused on women in transport, rather than on fully integrating gender into all dimensions of transport, existing practical experiences have also tended to focus on specific women's issues. These represent individual, scattered, ad hoc experiences, not real gender mainstreaming of transport policies. Even if the European institutions have created a legal framework that mandates gender mainstreaming across all policy areas, we are still far from incorporating gender mainstreaming into transport policymaking, whether in Europe or other regions.

In order to advance towards full gender mainstreaming of transport policies, a full integration of gender dimensions in transport research is needed. This in turn, implies challenging conceptual frameworks and applying gender-aware methods at all stages of the research process. This will include, among other things, and as suggested in this article, challenging existing unquestioned notions and proposing new, gender-aware conceptualizations.

Gender analysis of commonly used, accepted, and unquestioned concepts and analytical categories that overemphasize the requirements of the paid economy on transport systems, such as constrained, compulsory, and discretionary mobility, can contribute to rebalancing the current overriding focus on employment towards greater considerations of daily realities that include unpaid home and care work. This will provide a better starting point for developing categories and indicators for data collection that better describe the mobility needs of all individuals. Use of gender-aware conceptual frameworks, such as the mobility of care, also contributes to rebalancing care and employment in our understanding of transport systems. The mobility of care is posed as a counterpart to the well-studied mobility of paid employment, distinct from the mobility of leisure with which it is sometimes confused. It provides a tool for advancing gender perspectives in transport. Within this conceptual framework, employment and care appear as two main purposes for travel, followed by two smaller categories of study and leisure/personal.

Questioning both implicit gender assumptions and developing gender-aware concepts, categories, and theories will enable us to develop a new focus in transport research and policy to address the needs of real people—of men, women, the young, the sick, those with reduced physical capacities, and the elderly. This will

contribute to the creation of better sets of statistical data. This will also support the development of better operational concepts for the interpretation and presentation of data to the public and decision makers. Ultimately, this will strengthen evidence-based policymaking on which to develop a more equitable transport policy. As transport has historically evolved to serve the needs of the economy, significant efforts will be needed to systematically question implicit conceptual frameworks that have become core elements of the field. 

NOTES

¹ “Built environment” is a term that refers to human-made surroundings that provide the setting for human activity. The “disciplines” of the built environments, a commonly used term, refer to architecture, civil engineering, and other disciplines by which humans transform these surroundings.

² “Proposal for a Regulation of the European Parliament and of the Council establishing Horizon 2020” (report, European Commission (EC), Brussels: 30 November 2011), [http://ec.europa.eu/research/horizon2020/pdf/proposals/com\(2011\)_809_final.pdf](http://ec.europa.eu/research/horizon2020/pdf/proposals/com(2011)_809_final.pdf). For additional official documents and other relevant information on Horizon 2020, see http://ec.europa.eu/research/horizon2020/index_en.cfm.

³ Inés Sánchez de Madariaga, “Vivienda, Movilidad y Urbanismo para la Igualdad en la Diversidad: Ciudades, Género y Dependencia,” *Ciudad y Territorio* XLI 161-162 (2009), 581-98; Inés Sánchez de Madariaga, “Housing, mobility and planning for equality in diversity: cities, gender and dependence,” *VVAA Social housing and city* (Ministerio de Vivienda, 2010), 177-97; Inés Sánchez de Madariaga, “Mobility of Care: Introducing New Concepts in Urban Transport,” in *Fair Shared Cities: The Impact of Gender Planning in Europe*, ed. Inés Sánchez de Madariaga and Marion Roberts (Burlington: Ashgate, 2013). Compulsory and non-compulsory or discretionary mobility/trips are concepts widely used in transport policymaking and research. The term “compulsory mobility/trips/travel” is used to designate trips undertaken for employment and educational purposes; discretionary or non-compulsory are those undertaken for any other purposes. These terms are commonly used in transport statistics, policy reports, and academic papers, often without reference to their origin or greater explanation than that provided herein.

⁴ “Science Policies in the European Union: Promoting excellence through mainstreaming gender equality” (report, ETAN Expert Working Group on Women and Science, EC, Brussels: 2000), ftp://ftp.cordis.europa.eu/pub/improving/docs/g_wo_etan_en_200101.pdf.

⁵ “A Reinforced European Research Area Partnership for Excellence and Growth” (report, EC, Brussels: 17 July 2012), http://ec.europa.eu/euraxess/pdf/research_policies/era-communication_en.pdf.

⁶ This series is published by DG Research: “She Figures: Statistics and Indicators on Gender Equality in Science” (EC, Brussels: 2003, 2006, 2009, and 2012), <http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1406>.

⁷ Inés Sánchez de Madariaga, Sara de la Rica, and Juan José Dolado, eds., “White Paper on the Situation for Women in Science in Spain” (report, Ministry of Science and Innovation, Madrid: 2011).

⁸ Some of the reports by the EC include: “Women in industrial research: A wake up call for European industry” (2003); “Waste of talents: turning private struggles into a public issue: Women and science in the ENWISE countries” (2004); “Gender and Excellence in the Making” (2004); “Mapping the Maze: Getting More Women to the Top in Research” (2008); “The Gender Challenge in Research Funding” (2009); and “Guidelines for Gender Equality Programmes in Science” (2009). The following two reports provide overviews: “Stocktaking 10 years of ‘Women in Science’ policy by the EC 1999-2009” (2010) and “Meta-analysis of gender and science research: Synthesis report” (2012). All these documents can be accessed online at the EC website, <http://ec.europa.eu/research/science-society/>.

⁹ “Gender Mainstreaming in the 6th Framework Programme – Reference Guide for Scientific Officers/Project Officers” (Vademecum, EC: March 2003), <ftp://ftp.cordis.europa.eu/pub/science-society/docs/gendervademecum.pdf>.

¹⁰ “Structural change in research institutions: Enhancing excellence, gender equality and efficiency in research and innovation” (Brussels, EC: 2012), http://ec.europa.eu/research/science-society/document_library/pdf_06/structural-changes-final-report_en.pdf.

¹¹ Ibid., 6.

¹² For more information, see Klinge I. Schiebinger, Inés Sánchez de Madariaga and Martina Schraudner, eds., “Gendered Innovations in Science, Health and Medicine, Engineering and Environment” (2011-2013), <http://genderedinnovations.stanford.edu/>.

¹³ Inés Sánchez de Madariaga, “COST network genderSTE: Networking Gender Equality in Research and Innovation in Europe and beyond,” *TRIA* 10, 43-57; www.genderSTE.eu (under construction as of September 2013); http://www.cost.eu/about_cost/governance/genderste.

¹⁴ “Horizon 2020,” http://ec.europa.eu/research/horizon2020/index_en.cfm; “A Reinforced European Research Area Partnership for Excellence and Growth” (report, EC, Brussels: 17 July 2012), http://ec.europa.eu/euraxess/pdf/research_policies/era-communication_en.pdf.

¹⁵ “Gender Mainstreaming European Transport Research and Policy: Building the Knowledge Base and Mapping Good Practices” (report, Co-ordinator for Gender Studies, University of Copenhagen: 2007), <http://koensforskning.soc.ku.dk/projekter/transgen/>. TRANSGEN is a Special Support Action intended to work on the knowledge base for future research and interventions in the European Seventh Framework Program by linking gender mainstreaming and the thematic area of transport. The aim of this project is to develop gender mainstreaming in the field of transport for strategic research and as a political approach, in order to make it more sustainable and compliant with overall EU aims of promoting equality between men and women in all its activities.

¹⁶ See Laurie Pickup, “Women’s Gender-Role and Its Influence on Travel Behavior,” *Built Environment* 10, no. 1 (1984), 61–68; Margaret Grieco, Laurie Pickup and Richard Whipp, *Gender and Transport: Employment and the Impact of Travel Constraints* (Avebury: Aldershot, 1989).

¹⁷ Among many articles, we can cite Susan Hanson, “The Importance of the Multi-purpose Journey to Work in Urban Travel Behavior,” *Transportation* 9 (1980), 229–248; Sandra Rosenbloom, “Trip-Chaining Behavior: A Comparative and Cross-Cultural Analysis of the Complicated Travel Patterns of Working Mothers,” *Gender, Transport and Employment*; Sandra Rosenbloom, “The Transportation Needs of Single Salaried Mothers: A Critical Analysis,” *Journal of Specialized Transportation Planning and Practice* 3 (1989), 247–276. The proceedings from these conferences are available at the website of the Transportation Research Board of the National Academies, <http://www.trb.org/Main/Blurbs/164708.aspx>.

¹⁸ Margaret Grieco and Ronald McQuaid, “Gender and transport: Transaction costs, competing claims and transport policy gaps,” *Research in Transportation Economics* 34 (2012), 1-86; Tanu Uteng and Tim Cresswell, eds., *Gendered Mobilities* (New York: Ashgate, 2008).

¹⁹ Kerry Hamilton et al., “Promoting Gender Equality in Transport,” (Working Paper Series 34, Equal Opportunities Commission, European Parliament, Manchester: 2005); Jeff Turner, Kerry Hamilton, and Meike Spitzner, “Women and Transport” (report, Committee on Transport and Tourism, European Parliament: June 2006).

²⁰ “The European Union and Gender Equality” *The Department of Justice and Equality, Ireland*, http://www.justice.ie/en/JELR/Pages/EU_Gender_Eq.

²¹ “Time poverty” refers to the lack of time women have for leisure and for taking care of their health and themselves, in addition to other areas, because they work both at home and at jobs. Care tasks and transport can take so much time that women may only be able to work part-time.

²² Kristen Day, “Being feared: masculinity and race in public space” *Environment and Planning A* 38 (2006): 569–586, <http://www.envplan.com/abstract.cgi?id=a37221>.

²³ This is a list of possible—not closed, nor limited—approaches and methods on how to integrate gender dimensions in research. A description of these methods is further developed in the EU-U.S. Gendered Innovations Project, <http://genderedinnovations.stanford.edu/>, and http://ec.europa.eu/research/science-society/gendered-innovations/index_en.cfm.

²⁴ Useful references on how gender studies bring forth the realities of women and other under-represented groups for pedagogical purposes include the book series “Teaching with Gender,” which addresses pedagogical, theoretical, and political dimensions of learning and teaching on women and gender. They can be accessed through ATGENDER, The European Association for Gender Research, Education and Documentation, <http://www.atgender.eu/index.php/initiativesmenu/teachingwgen>. For

the health and medical fields, a good source is the Gendered Innovations site already mentioned.

²⁵ Inés Sánchez de Madariaga, “Urbanismo con perspectiva de género” (Fondo Social Europeo-Junta de Andalucía, Sevilla: 2004).

²⁶ “Harmonised European Time Use Survey (HETUS),” online database version 2.0 “Statistics Finland and Statistics Sweden: 2005-2007,” <https://www.h2.scb.se/tus/tus/>; Kerry Hamilton et al., “Promoting Gender Equality in Transport” (Working Paper Series 34, Equal Opportunities Commission, European Parliament, Manchester: 2005).

²⁷ Franziska Ullmann, “Choreography of Life: Two Pilot Projects of Social Housing in Vienna,” in *Fair Shared Cities: The Impact of Gender Planning in Europe*, ed. Inés Sánchez de Madariaga and Marion Roberts (Burlington: Ashgate, 2013).

²⁸ One such estimation, among many for the Spanish case, can be found at María Ángeles Durán, *La contribución del trabajo no remunerado a la economía española* (Madrid: Instituto de la Mujer, 2000).

²⁹ Edward R. Tufte, *The Visual Display of Quantitative Information* (Connecticut: Graphics Press, 1983).

³⁰ “Survey Mobility of People Living in Spain, Movilia 2006/2007” (report, Ministry of Development of Spain, 2006).

³¹ On the topic of unconscious bias, the Implicit Project at Harvard University provides a good bibliography as well as short tests one can take online to measure one own’s unconscious bias. See: <http://www.projectimplicit.net/index.html>.

³² Sánchez de Madariaga (2009), 581-598; Sánchez de Madariaga, “Housing, Mobility and Planning,” 177-197; Sánchez de Madariaga, “Mobility of Care: Introducing New Concepts in Urban Transport,” 581-598.

³³ Available at <http://genderedinnovations.stanford.edu/>, and http://ec.europa.eu/research/science-society/gendered-innovations/index_en.cfm.

³⁴ Sánchez de Madariaga (2013).

³⁵ “Survey Mobility of People Living in Spain, Movilia 2006/2007” (report, Ministry of Development of Spain, 2006).

³⁶ Sánchez de Madariaga (2013); Inés Sánchez De Madariaga, “Rethinking Language and Visual Representations,” *Gendered Innovations in Science, Health & Medicine, Engineering, and Environment*, 2013, <http://genderedinnovations.stanford.edu/methods/language.html>.

³⁷ Sánchez De Madariaga, “The Mobility of Care: Introducing New Concepts in Urban Transportation.”

³⁸ Ibid.

³⁹ Source: author’s own elaboration based on Movilia 2006/2007 data. The charts have been drafted by Inés Novella Abril.

⁴⁰ Sandra Rosenbloom, “Trip-Chaining Behavior: A Comparative and Cross-Cultural Analysis of the Complicated Travel Patterns of Working Mothers” in *Gender, Transport, and Employment*, ed. L Pickup and M. Grieco (London: Gower Publishing Co., 1989).

⁴¹ See Amy Dunckel-Graglia, “Women-Only Transportation: How ‘Pink’ Public Transportation Changes Public Perception of Women’s Mobility,” *Journal of Public Transportation* 16, no. 2 (2013), 85-105; Kerry Hamilton and Linda Jenkins, “A Gender Audit for Public Transport: A New Policy Tool in the Tackling of Social Exclusion,” *Urban Studies* 37, no. 10 (September 2000), 1795-1800; “GOAL – Growing older, staying mobile: Transport needs for an aging society” (project report, co-founded by the EC’s 7th Framework Programme). http://www.goal-project.eu/images/reports/d2-1_goal_final_20120725.pdf.

⁴² Ibid.; Gabriele Heinisch-Hosek, “Welcome to the topic ‘Women and Equality’ of the Federal Minister for Women and the Civil Service,” Division for Women and Gender Equality, Austrian Federal Chancellery, <http://www.bka.gv.at/site/6811/default.aspx>; Elisabeth Irschik and Éva Kail, “Vienna: In Progress Towards a Fair Shared City,” in *Fair Shared Cities: The Impact of Gender Planning in Europe*, ed. Inés Sánchez de Madariaga and Marion Roberts (Burlington: Ashgate, 2013).