Mobile telephony, mobility and the coordination of everyday life[1]

by

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1 Introduction

Against the backdrop of extensive urban expansion and suburbanization (Chen. 2000; Crawford 1994; Haddon 2001; Hall 1989;Thorns 1972) telephony facilitates the coordination between individuals. However, we have also seen a number of claims about the potential effects that telecommunications can have on mobility. For example, there is the suggestion that telephony and transport stimulate each other (Falk and Abler 1980). Others argue that telephony modifies travel rather than reducing demand (Salomon 1985), and yet, others note the contrary idea that telephony replaces transport (Claisse and Rowe 1993; Claisse and Rowe 1988).

However, to date these discussions have concerned fixed telephony. A range of, mainly qualitative, studies now exist concerning the use of the mobile phone, some of which have indicated implications for mobility. The first step in this paper is to assemble and review this material in relation to certain key issues. These include:

- The role of the mobile phone in the micro-coordination of activities and modification of travel
- Gender differences in relation to mobility, coordination and mobile telephone use
- The question as to whether mobile telephony promotes or reduces travel
- The location of mobile phone use

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This paper then goes on to report the findings of a relatively small scale Norwegian quantitative study that has taken the first steps to explore these facets of the relationship between mobility and the mobile phone.

Reflecting on this study, the final part of the paper considers how this whole line of investigation might be further developed in future research.

1.1 Mobile phone's role in changing the coordination of mobility

Looking broadly at the way in which mobility has been coordinated, one can see three general phases. In the period before telegraphy, communications regarding mobility could only be delivered by being mobile. That is, the speed of the message was the speed of physical transport. With the development of telegraphy, the speed of the messages that could potentially cause or save travel were able to move at many times the speed of physical travel. Thus, one could send a message to a remote person asking them to come or not come without the need for a messenger to physically travel to the "interlocutor" (de Sola Pool 1980) The limitation on this system is that, in order for the message to come through, the person sending a messaged needs access to a sending device, at a fixed location, and also needs to know the physical location of the person who is receiving the message, as encoded, for example, in a telephone number. The third phase, that we are now experiencing removes the condition on fixed locations for the sending and receiving equipment. A person interested in sending a message is, within some very broad boundaries, free to choose where they will initiate the communication. In addition, there is no need to know the location of the person to whom they wish to speak. The development of mobile telephony thus "softens time" in that one does not necessarily need to agree upon an absolute point in time but rather can, to some degree negotiate, or micro-coordinate, over where and when to meet. Given these technical considerations, the nuances with which mobility can be synchronized and the social norms of giving and receiving messages in places where this was previously not possible are both changing.

In this paper, the first question involves further examining the role of the mobile telephone in the coordination of everyday life. This issue has arisen in qualitative analyses (Ling 2000a; Ling and Yttri, forthcoming). Material from both individual and group interviews over the last three to five years indicates that, broadly speaking, there are several motives associated with the adoption of the mobile telephone. Depending on the group, these include accessibility, display, coordination and safety or security. The material also indicates there are generational effects at work here. Specifically, the accessibility and display issues are particularly pronounced among teens and young adults. The use of the mobile telephone for micro-coordination is most noticeable among families with children. Finally, issues associated with safety and security are common among older users. The placement of these age groups within the confines of the various orientations is not, however, absolute. For example, teens (in conjunction with their parents) employ the mobile telephone as a type of security system in certain situations. Teens coordinate activities with friends and family via the device, etc.

In the material from group interviews one often comes across parents describing the use of the mobile telephone to coordinate or perhaps micro-coordinate, their activities (Ling and Yttri, forthcoming). The informants described the arrangement and reorganization of various logistical details on a real-time basis. These comments included such things as driving children to music lessons, purchasing things at the store or relaying messages. There is, however the coda that "It

is something that we need." This is key here. The informant is describing the exchange of information regarding the on-going routine maintenance everyday life. This type of call is not intended as social interaction. Rather they are concrete and focused. Thus, the qualitative material points to the sense that the mobile telephone is a device that allows for the redirection of already established trips. There is the suggestion here that it results in a more efficient use of the transportation system. Rather than having to move from fixed telephone to fixed telephone in order to give and receive messages, one can do this, to use Townsend's phrase, on a "real time" basis (2000). The mobile telephone allows for the nuanced coordination of transportation such that meetings can be arranged, errands can be carried out and people can be reached.

There are different types of micro-coordination that effect transport and travel. In earlier work it was found that the mobile telephone is used in the coordination of various types of work. For, example, in the case of construction the mobile phone is used to coordinate the delivery of various types of equipment and also to check plans with central decision makers. The variations used in the family do not necessarily have the same economic motivation, but previous work has shown that the device is used in the same way.

1.2 Gender, Mobility and the Mobile Phone

The fourth area of interest concerns gender. Both mobility and telecommunications have been considered specifically in relation women's role in the maintenance of the home and domestic life. Analysis has shown, for example, that women often have more complex, and thus more limited transport alternatives, precisely because of that domestic commitment (Hayden1984). Hjorthol (2000) has demonstrated that women work closer to home and because of this they have less choice concerning the geographical labor market. Women's mobility is conditioned upon the domestic responsibility and thus their trips are more often the combination of several tasks. This is particularly true in families with pre-school or primary school children. Put into the Falk and Abler's context (1980) women have greater "effort distances" than men.

Looking into the telecommunications portion of this equation, there is the sense in which the telephone allows for a type of multi-tasking, enabling women to be both away from the home but also in contact with it and so able to carry out those responsibilities. Rakow and Navarro, as well as Vestby, speak of 'remote mothering', i.e. using the telephone to communicate with children who have come home from school and need to check in with their parents. (Rakow and Navarro 1993; Vestby 1996 see also Moyal 1989;Rakow 1988; Rakow 1992; ;).

The mobile telephone has also been considered in this light - indeed, Rakow and Navarro specifically considered this technology. More generally, this has to be placed within the argument that because of the mobile one is not chained to a specific location (Lange 1993). In the context considered here, we have empirical examples of how the mobile allows one to, for example, attend to domestic errands while also being available for job related interaction (Klamer et al. 2000). This is done against the backdrop of the increasingly private use of public space (Keane 2000; Ling 1997).

1.3 Mobile telephony and the promotion or reduction of mobility

Apart from the role of mobile telephony in changing journeys already in progress via the process of micro-coordination, there is a second question: whether this technology generates or reduces mobility overall - i.e. whether it leads to extra traveling or to less. As a first step to understanding the significance of this issue, we can reflect upon more general discussions of mobility in society.

Taken in a wider perspective, the degree to which we are mobile on the whole is an important issue for a number of reasons. Certainly, it is a concern for transport planners. Moreover, one key issue from an environmental perspective concerns sustainable travel - especially in relation to the pollution from cars - given the green critique pointing to the unsustainability of current levels of mobility, or what has been termed 'hypermobility' (Adams, 2000). Questions have also been raised concerning the limits to mobility because of the amount of time which people are ultimately willing to spend on traveling (Vilhelmson, 1999). Meanwhile other authors have drawn attention to work processes affecting the 'nomadisation' of our lives (de Gournay, 1996); to how we are locked in to certain levels of mobility by the spatial location of work, shops, leisure facilities etc. which have created a need for certain types of travel (Sørensen, 1999); and to the subjective imperative to travel: how very experience of being modern is linked to our mobility (Sørensen, 1999).

Against this background of interest in mobility, we have the question of how much ICTs may reduce or indeed create more journeys. For example, we have one strand of writings about telework, (and by implication the ICTs involved in that work) which deal with the possible effects of this work practice on travel. This was captured in the original term 'telecommuting' in relation to which was the explicit suggestion that transport would be replaced by telecommunications (Nilles 1991)[2] and more recent appraisals such as Gillespie et al, (1995). Moreover, we have questions about the potential effects on mobility of communications and transactions in the form of home shopping, home banking, distance learning etc. (The COST269 Mobility Workgroup, 2001). To date, though, far more emphasis has been placed on ICTs such as the Internet rather than the relation of the mobile phone to mobility.

What evidence, then, do we have that specifically relates to the mobile phone? There are some, albeit contradictory, clues about the mobile phone's influence on mobility from a recent European study[3].

- There were instances of people who were out of the home using the mobile phone to ask another to join them, leading to journeys which otherwise might not have taken place (Klamer et al, 2000). Certainly some participants thought that in general the mobile phone had led to an increase in their own mobility.
- In that same study, some participants claimed they actually made fewer journeys for socializing because of the mobile phone. However, others argued that it was in reality other factors, such as time pressures, which really made such journeys problematic. It was only when peo-

[2] That optimism has been replaced by a generally more sober estimation of its potential (Haddon 1999).

[3] The EURESCOM-P903 project contained a qualitative using 6 focus groups in 6 countries: the Czech Republic, Denmark, France, Italy, the Netherlands and Spain.

ple could not travel for these reasons that the mobile phone was used and was useful for making contact. Hence, the mobile phone did not itself necessarily directly cause a reduction in mobility, but rather compensated for it.

- Some participants doubted whether the mobile phone had much effect overall compared to other more important factors influencing the total degree to which people traveled.

There is one further question not addressed in this study and that is whether the option provided by mobile telephony enables us, indeed tempt us, to pack in more activities into the day. In one sense, this relates to the wider issue of time use, the timing of activities and the 'busyness' of life but this all has implications for mobility

1.4 Location and mobile phone calls

A third question, somewhat distinct from the various changes in mobility discussed above, relates to the issue of where we use mobile phones. One distinction within the study of mobility in everyday life can be made between the use of ICTs generally when traveling, i.e. when underway, as opposed to their use in sites away from the home (and perhaps away from work) (Haddon, 2000). However, to date we do not actually know how much the mobile phone is used en route as opposed in these other sites and hence this will be addressed in the findings reported below.

To clarify the distinction a little further, we have a set of questions and research which focus on the relation between ICTs and travel behavior - and this would include micro-coordination en route, the utilization of travel time to make mobile phone calls, calling from the mobile to say when you will arrive, be late, etc. (The COST 269 Mobility Workgroup, 2001)[4]. On the other hand, we have studies of particular sites and events– i.e. particular space-times– such as the restaurant meal (Ling 1997) or the holiday in the Norwegian *hytte* (Ling et al, 1997) that have their own specific social dynamics, expectations, rules etc. – which in turn have a bearing on the experience of using ICTs such as the mobile phone.

Turning to existing studies, there seems to be little research on where phones are used, but there is at least some on where mobiles are switched on. A European five country quantitative study[5] examined how often mobile phones were switched on in one's own home, restaurants and bars, shops, shows or plays, buses or trains, cars or other people's homes (Haddon, 1998). In all the countries studied the location where mobile phone users were least likely to have their phones switched on was when attending some event like a play or show, reflecting the rules of those particular settings. In contrast, the car, as a relatively private space, was where people from all the countries said they were most likely to have the mobile on – with the likelihood that they had them on while underway.

However, this study also highlighted another factor about location. Most of the discussion about the mobile phone and representations of its use refer to spaces outside of the home. Yet between about a fifth (18% in the UK, 22% in Germany) and about a third (32% in France, 31% in Spain and 29% in Italy) of interviewees always had their phones switched on when they were at home.

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[4] The picture is made slightly more complicated by the organization of mobility by ICTs prior to travel - thus calls may relate to or even initiate mobility but they do not take place actually en route.

[5] The European 5-country study covered France, Germany, Italy, Spain and the UK and was conducted for Telecom Italia in 1996.

This, then, might count as a first sign that at least some are adopting the mobile phone as their personal terminal through which they can be contacted at all times – as opposed to just using it when they are out of the home and reverting to the domestic line when at home.

Accordingly, the survey reported in this paper asked not only about the use of mobile phones at other sites and about use when traveling but also about mobile calls made and received at home - as well as at work, a site which seems to have received very little attention in discussions of mobile phone use so far.

2 Method

The material described below was gathered in a "diary" survey involving 93 persons living in Bærum, a suburb immediately west of Oslo, Norway. The area is generally upper middle class with a high percentage of single-family homes. Since the sample was somewhat small and since we were interested in focusing on the ways, in which the mobile telephone is used in the coordination of mobility, respondents were selected according to criteria intended to expose these characteristics. Thus, it is not possible to claim that these statistics are generalizable, nor that confidence intervals are particularly small. Of course, if we considered other groups on a national basis, it is possible that the findings here would be contradicted. This stated, the results none-theless point towards the fact that mobile telephony has an impact on transport for the families included in the sample.

The instrument used to collect the data was a diary wherein the respondents were asked to describe each private telephone call made or received (from both fixed and mobile terminals) as well as mobile-based text messages during a 24-hour period. E-mail messages were not considered in this analysis. In addition, respondents were asked to describe each trip[6] taken during the same 24-hour period. In addition, the respondents were asked to record and describe each trip made during the course of the day, regardless of which type of transport was used.

In order to be included in the sample, a person had to be a parent in an intact "dual income" family wherein there were children under the age of 12. In addition, the family needed to have a car and at least one mobile telephone. These dimension describe a relatively small group of persons when considering the total population. The justification for the requirements was to try to find those persons who were the most likely to have a need for routine coordination. We know from earlier work, that the demands on this group are particularly stringent (Hjorthol 2000). The everyday demands for delivering children to various day-care, school and extracurricular activities, particularly in a suburban setting, means that the parents need to pay special attention to the coordination of the various activities. From a methods perspective, it is not quite legitimate to prefigure the analysis in this way. However, given the limited budget for the analysis, the desire to take the first steps at quantifying the results of qualitative analysis and also the quasi-exploratory nature of the work this must be allowed as an acceptable strategy. Obviously there is the open research question associated with describing other age, gender, life cycle, and income groups.

Looking quickly at the respondents, there were 93 persons who filled out the diary. Of these, there were 52 (approx. 56%) men and 40 (44%) women. The ages of the informants ranged from 24 to 61 with the mean age being 39. With the exception of one missing answer, all the infor-

[6] Trips included those taken on foot, bicycle, automobile, public transport, or a combination of these types.

mants had a driver's license, and all but 4% of the spouses had a driver's license. Interestingly this 4% of spouses without a license were all women. The material shows that 41% of the respondents had only one automobile in their households while 59% had two or more. This is a high rate of car ownership for Norway but it reflects the affluence of the suburb in which the trial took place. When looking at their working lives, with only one exception the men were employed in full-time jobs. By contrast, 56% of the women were in full-time jobs.

When looking at the location of one's work, 67% of the men worked in Oslo i.e. the local metropolitan center, where half of the women said the same. By contrast, 47% of the women worked locally in Bærum while only 24% of the men said the same. The remaining respondents worked in other locations. Thus, the men were significantly more likely to work in the city while women worked locally.[7] Finally, the respondents indicated that in 81% of the cases their spouses had a mobile telephone (this in addition to the respondent's mobile). Looking at this by gender, however, 96% of the women said that their husband had a mobile telephone while only 71% of the men said that their wives had a one. Again, this is a statistically significant difference.[8]

The picture that emerges here is that the respondents are well off when compared to the general population of Norway. However, there are gender differences in the commuting (women are more local) and also in the access to mobile telephony (women have less access). These two latter trends are characteristic for women in Norway (Hjorthol 2000; Ling 2000b).

The travel diary showed that there were 361 trips reported by the respondents. The median length of the trips reported was 7 km and the time was 15 minutes.[9] When looking at the daily pattern of both the calls and trips there are two obvious peaks for both travel and calling. The first occurs from 7:00 to 9:00 and the second from about 16:00 to 18:00. The valley between peaks is deeper for calling than for travel. The other interesting point is that the morning call peak comes slightly before that travel peak. We will come back to this in the discussion below.

3 Results

3.1 Use of the mobile telephone

Taking the use of the mobile telephone first, 43% of the personal calls reported were either made or received via a mobile terminal. As with possession on mobile phones, there is a statistically significant gender difference that follows from men's' greater access to the mobile telephone via their job (Ling 2000b). This will be examined in more detail below.

When looking at the private calls reported in the diary, the respondents reported a total of 394 calls. Of these calls, 77 were related to the arrangement of travel. The data shows that 48 of these travel related calls were made via the fixed telephone and the remaining 29 were made via the mobile telephone.

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[7] Person chi^2 = 4.523 (1), sig. = 0.033.

[8] Person chi^2 = 6.843 (1), sig. = 0.033.

[9] A trip was travel from one point to a second point. Thus, a trip could include several legs, each of which was reported separately. The statistics here are for the "legs" of a trip.

3.2 The effect of the telephone on travel

Turning now to our first two areas of interest, the 77 travel related calls, one question asked whether the telephone call had any effect on respondent's use of the car, offering the options of (a) the call resulted in a trip, (b) the call changed a trip already underway and (c) the call saved a trip. Table 1 shows that mobile use is roughly evenly balanced between causing, changing and saving trips – with slightly more calls causing additional car journeys. There are, however, more substantial differences when looking at travel arranged through the fixed line telephone. More than half of the travel related calls made via the fixed telephone caused travel. This is almost

	Effect on travel		
	Caused	Changed	Saved
Mobile	37,93	31,03	31,03
Fixed	56,25	14,58	29,17

Table 1 *The effect of calls on travel behavior, percent distribution by terminal type (n = 77)*

20% more than with the mobile telephone. In addition, when considering changing travel, this was twice as common with less than half of the calls. This, of course points to the advantage of the mobile telephone in that it allows for this type of real time coordination.

3.3 Gender and the use of the mobile telephony in mobility and coordination

As the reader will recall, one of the selection criteria was that the household should have a mobile telephone that is in active use. The data shows the men dominated in this use of the device. The men reported receiving or making 53% of their private calls via the mobile telephone while only 32% of the women said the same.[10] This finding is also supported by earlier analysis of gender-based use of the mobile telephone (Ling and Vaage 2000)

When considering only the 77 travel related calls, i.e. calls that either generated, saved or changed travel, there were several gender based differences. First, women made or received more of these types of calls. Where men made about 41% of the travel-related calls, women made 58% of these. This follows from the general way in which women are often more deeply involved in the everyday coordination of the household (Ling 1998). When considering the type of terminal used, men were evenly split between making travel-related calls on the mobile telephone (52%) and the fixed line telephone (48%). With the women, about 69% of their travel calls were via the fixed line telephone. The remaining 31% were made on the mobile telephone.

[10] Person chi^2 = 16.957(1), sig. < 0.001 (n = 389)

3.4 Who was called

Of the 392 calls recorded in the diaries, about 25% were to the respondent's partner, 10% were to children living at home and 12% were to other kin. The material shows that about 13% of the calls were to friends and 5% to acquaintances. The remaining 35% were to other unspecified persons. In 1988 Claisse and Rowe reported that 40% of household traffic is with members of the family, 36% with friends and acquaintances (1988). While not being exactly the same distribution the material here is not too different from this earlier analysis.

Comparing the use of mobile to fixed telephony in Table 2 one can see that there are different emphases in their use. The four differences of note are first that the mobile is used more than one would expect to call one's partner and, more surprisingly, for calls to the "other" category. This latter group can includes instrumental communications such as control and follow-up of various types of repair personnel and services having to do with the management of the home. It is interesting to note, however that mobile calls to this group have become so commonplace.

Relation	Mobile	Fixed
Partner*[11]	31	22
Kids	9	10
Kin*	8	16
Friends**	7	18
Acquaintances	4	5
Other**	41	29

Table 2 *Percent of calls made to various persons by terminal type, n = 169 mobile and 223 fixed)*

The groups that were underrepresented vis-à-vis the mobile telephone are kin and friends. Previous research and also the material in this analysis shows that calls to friends and kin are typically the domain of women in their role as the maintainers of the social network (Ling 1998). As we will see below, their more limited access to the mobile telephone is a likely explanation for this difference.

3.5 Peak time calls

As noted above there were peak times for both calling and traveling. When looking at the calling data, the peaks came early in the morning and also late in the afternoon. Interestingly, however, the data shows that men are generally responsible for the morning peak of mobile telephone calls[12] while women contributed more to the afternoon peak. Indeed, the material shows that almost 27% of all men's calls were between 8:00 and 10:00. For women the peak is somewhat more distributed but between 14:00 and 18:00, they reported more than 43% of their calls.

Looking specifically at these peak calls provides some insight into where the men and women are and the types of things they are doing during these periods. The material shows that men who called during their early morning peak period were far more likely to be either at work or en route where women who called in their afternoon peak were likely to be at home.[13] The difference in location is also seen in the fact that in the morning peak men used a mobile telephone while women used a traditional fixed device. One can see indications that women were more likely to place calls to children living at home during the morning peak time.

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[11] * = < 0.05, ** = 0.05 to 0.001, *** > 0.001

[12] Person chi^2 = 6.112 (1), sig. < 0.013 (n = 107)

[13] Person chi^2 = 35.656 (6), sig. < 0.001. (n = 119)

Looking at the men, the morning peak time calls seem to be a type of time displacement, i.e. use of the mobile phone to coordinate extra-domestic private life while driving to the job. Following the finding that the mobile telephone is disproportionally used to make instrumental calls, the material here seems to underscore this. If we consider specifically at private mobile-based calls made during the morning peak to non-family/friends, men dominated almost completely.[14] Women were more likely to call friends during the afternoon peak when considering both mobile and fixed telephony.[15] The data show that the women were more likely to call in order to make an agreement with their interlocutor where men noted that they either gave or received a message in these peak time calls.[16]

	Mobile	Fixed
Home	8	49
Job	43	49
Other location	16	2
En route	34	0

Table 3 *Percent distribution of call location for mobile and fixed telephone use, (n mobile = 169, n fixed = 223)*

3.6 Location and the use of the mobile telephone

When looking at all private calls, the respondents indicated that more than 77% of these were made or received either from their homes or from work. When considering only those calls made from the mobile telephone, the picture is quite different as can be seen in Table 3. As one would suspect and in the light of the research cited early, some, but only a few, calls are made from the home (7.7%). This is because one has access to a cheap and accessible alternative, i.e. the fixed telephone. Looking at the calls made or received at work the respondents reported about the same proportion of calls for both the mobile and the fixed systems, i.e. 43% of all mobile calls and 49% of all fixed line calls. The large proportion of mobile calls is likely a reflection of the fact that the mobile telephones for this group of respondents were paid for by employers and they felt free to use the telephones in this context for personal calls. One third of the calls from mobile telephones were made while the respondents were en route and the remaining 16% were made at other locations away from the home. The picture for the fixed telephone is quite different. As noted about 50% of the calls were made at work and the other 50% were made at home. Only about 2% were made from other locations. Thus, for this group, the mobile telephone has almost completely replaced the use of telephone booths or the borrowing of a telephone in locations along the way.

[14] Person chi^2 = 12.813 (1), sig. < 0.001. (n = 51)

[15] Person chi^2 = 11.297 (1), sig. < 0.001 (n = 119)

[16] Person chi^2 = 13.025 (4), sig. = 0.011 (n = 332)

3.7 Speculation as to the number of kilometers generated and saved

Beyond the qualitative analyses, we also have more quantitative material. In a small questionnaire carried out in 2000 we have tried to determine the degree to which mobile and fixed telephony generate or save automobile traffic.

	Generated travel	Saved travel
Mobile	77	88
Fixed	189	118

Table 4 *Kilometers generated and saved via the use of fixed and mobile telephones, Bærum Norway, 2000*

From the small analysis we did here in Bærum, it appears that mobile telephony actually saves more automobile traffic than it generates. The material in Table 4 shows that for the day covered by their diary the mobile telephone generated about a total of 78 km in travel while it save almost 90. The situation with the fixed telephone is somewhat different. According to the data, the fixed telephone generated about 190 km while it saved just under 120 km.[17]

4 Further discussion

Now we turn to a discussion of the material presented above. In this portion of the paper we will look into some of the gender aspects of mobility and mobile telephony, potential cohort effects and finally some speculations as to future work.

4.1 Gender and the need for micro-coordination

The question arises as to why women should use the mobile less for micro-coordination. This is counter intuitive: in terms of the social expectations of their role one would anticipate that they should be more active users of the device. There is more use of the fixed telephone for the coordination of everyday life and there are also more geographically remote tasks to be carried out by women. One would expect that the more logistics to be managed, the more naturally the device would fit into their lives.

The material here as well as that reported in other places shows that women generally have less access to the mobile telephone. A partial clarification is that they also have less access to mobile telephones as a perquisite of their jobs (Claisse and Rowe 1988; Moyal 1989; Ling 1998; Rakow 1988). Women's telephone use comes out of the private economy while that of men comes out of their employers'. Thus, one sees a curious type of cross subsidizing, i.e. the job telephone for

[17] The method for calculating this analysis was that calls that stimulated traffic were multiplied by the median trip length reported in the questionnaire. The same was done for the calls that replaced trips. The calls that changed travel en route were treated as being about 40% of a median trip since the trip was already begun and since the rerouting might not have been carried out if the respondent did not have a mobile telephone.

men subsidizes their coordination of private life while the woman's privately held mobile telephone subsidizes her ability to juggle work and home.

One sees another dimension of this when looking into the question of who women call during the morning peak. For those few calls that they made during this period, women were more active calling to children living at home during the morning peak. However, for men living in homes where there were small children (0 – 3 years of age) or where there were pre-adolescents (9 – 12 years of age) they were more generally active in their use of the telephone, that is, they used their telephones during this period *but not to call home*. As suggested above, their calling may have been focused on instrumental maintenance coordination. The data seems to show, however, that it was the women that were calling home to awaken their pre-teen children and make sure that they were on their way to school, a type of remote mothering (Rakow and Navarro 1993).

4.2 Cohort effects

The material here shows that mature women are not the biggest users of mobile telephony in spite of their apparent need. However, other analysis has shown that teenaged girls are heavy mobile telephone users. Indeed, in some situations they use them more intensely than same aged boys (Ling and Vaage 2000). The similarity holds for those younger than their mid-20's. Among older age groups men dominate both the ownership and use of the mobile telephone as we have seen in the material here. The general question is the degree to which this is a characteristic of a life phase or of a cohort. That is, to what degree will today's teen girls carry the habit of mobile telephone use with them as they mature? If, indeed the life phase effect is stronger, then one would expect that teen girls would reduce their use of the device as they moved into young adulthood. On the other hand, it is perhaps more likely that as they mature, they will carry their use with them as they move into other phases of life.

Thus, one might anticipate that the expectations associated with mobile telephony become a part of their adult perspective. This would mean that the differences seen in the material here might well be minimized with time. However, there is still the question of payment. While there have been adjustments in the income levels of men and women, there are still disparities. In addition, there are disparities in access to jobs where perquisites such as mobile telephone access are available. Thus, one might expect that some of the differences in mobile telephone use will be reduced in the near future as the current generation of teens establishes themselves in the job market; it is more difficult to think that it will be eliminated.

4.3 Mobile phones and the generation of reduction of mobility

When we look at the figures concerning where calls affected travel we have to ask how are the respondents interpreting this and what is the causality implied. The interest in the initial discussion is if more or less travel takes place overall because of the existence of the technology per se. So, for example, one might imagine the following line of thought: "I had planned to see someone, but when I phoned them instead there we discussed what we needed to and there was no need for that trip." Or, alternatively "I am in the vicinity of someone, and because I have a mobile phone I phone suggesting they come and join me or I join them" - whereas without the mobile I would never of thought of this. But one can also imagine another scenario where

"I had already talked about meeting someone when we last met and I use the mobile to finalize the details. If I had not had a mobile phone, I might have used a fixed line, or we might have agreed all the journey details at the last meeting." But the point is that the travel behavior would have occurred anyway and using a phone of some sort to make contact was only the last action - a trip resulted out of the call but the phone itself or the call did not provide the motivation for the trip.

We are inclined the interpret the figures in the first sense, because certainly in the case of the qualitative research on the mobile phone cited earlier, participants spontaneously generated examples of this sort when asked to think about what difference a mobile made to mobility - and we find examples of this sort in other qualitative research.

In which case, a few observations can be made. First, we seem to see here one more way in which mobile phones and fixed line telephones are perceived to be different from each other, here in terms of outcomes - fixed lines seem to generate more trips. Although the paper did not specifically seek to address debates about the fixed line, that it interesting it itself given the claims about the effects of traditional telephony. While there were some percentage differences, the most striking thing about the mobile calls is that the various examples seen in the qualitative research, some of leading to new travel, some to less, seem to roughly balance out - and indeed, if the other data on car use were to be generalizable, then some travel might be reduced. So from this first data, those concerned about transport problems and/or sustainability need not be too anxious about this technology.

4.4 Location

It is perhaps a little surprising that so many of the mobile phone calls in this study took place at the workplace of the respondents. This may be accounted for using different explanations. More and more the mobile telephone is seen as a type of perquisite associated with one's job. Thus, its use for private calls is simply a type of "bad" habit that one picks up. From the perspective of the employer is may well be that by tolerating the private use of the mobile telephone at work, they, in turn can extend their, and their customer's ability to reach the individual into the more traditionally private spheres of life. Thus, there is a type of overall efficiency argument that is in the background here. Further, one can only speculate that some of these employees move around at work but need to be reachable immediately. There is some research on the private use of the fixed phone at work (de Gournay C.,1997) but more on private use of the whole range of telecommunications options (mobile, e-mail) in this context deserves more attention, particularly when different workplaces have different rules about private use of such communication media.

The limited use of the mobile in the home is in line with previous research and has already be interpreted from two perspectives: it is low because of the cheaper fixed phone alternative but it exists at all because some people use the mobile as their main personal phone.

In the Norwegian context (and considering this particular sample), we would speculate that use en route would often mean use when in a car. [18] Therefore, before generalizing too much from these results one would want to consider how the patterns might differ for those sections of the

[18] More than 76% of the trips reported in the travel section of the diary were made by car, another 10% were made using pubic transportation.

population using public transport, and in countries where there is relatively more use of public transport. However, the fact that use en route is substantive (in this study), accounting for a third of all mobile calls, means we can ask about the extent to which the mobile has changed the experience of traveling, and in particular how it has changed how we can utilize travel time. It might also be interesting to explore how much of that use underway is actually for the micro-coordination discussed previously, in which case the logistics of everyday life might increasingly be organized 'just-in-time'.

4.5 Developing further research

The general points about the small and unrepresentative sample have already been made in the discussion of methods. Nevertheless, the research reflects the first steps towards investigating the relationships between mobility and mobile phones - indicating, for example, how the mobile telephony has some impacts on travel behavior. Obviously, the areas of study indicated in this paper could be explored with different samples, but in this last section, we would like to explore other ways in which such research could be developed. One first observation is that this study has only considered cases when it is claimed that the mobile phone or fixed phone is leading directly to (or changing or reducing) travel. Yet, we can already point to qualitative research on mobile phones which note the 'gifting' or 'social grooming' calls where it is the symbolic act of calling that matters as much as the content or what is achieved (Nafus and Tracey, forthcoming; Ling and Yttri, forthcoming). The point is that such social calls may help to create generally closer relationships and enhance sociability that, in turn may indirectly influence the desire to make personal contact. Clearly, this process of calls indirectly influencing travel patterns is not measured in the structure of the present survey. Although it is worthwhile to signal we are at least aware of this dimension, it is perhaps less obvious how one would incorporate in into future research.

However, there are some facets where it is clearer to see how one might go forward. For example, behind any hard statistical data there are always the cognitive and social processes by which responses are constructed. In relation to this particular field of mobility it would be interesting to know how the participants of this (or any future) study made the judgments they did when they reached an evaluation that certain telephone calls generated, changed or saved the need for trips. For instance, were some journeys, or types of journeys, more prominent, or prominent in their memory, then others? In future quantitative research we would certainly get a more detailed picture, and hence perhaps more understanding of which journeys people are considering if we offered more categories in order to explore what types of travel were involved. If there were to be a qualitative component of future research this could entail interviews to explore how they made the decision to classify a call as generating or reducing travel - which might also provide more insight into exactly how and why calls had an influence on mobility. The upshot is that there are both quantitative and qualitative steps one could take to enhance future studies.

Although we stated our initial interest was in mobile phones, we have already in this analysis started to make comparisons between the mobile phone and the fixed phone. A further step would be to locate the use of mobile telephony within people's entire (electronic) communications behavior. For example, even if the primary interest is in mobile phones we could also consider media such as e-mail or indeed, the mobile could be relegated to being just one medium among others, shifting the focus to telecommunications and mobility.

But this immediately introduces questions of how these different media interrelate and how we shift between them over time. For example, if someone makes a mobile phone call which changes travel behavior, in the past an equivalent call may have been made using the fixed line. In which case, there might be no overall change in someone's mobility compared to the past. On the other hand, there might be occasions where mobile calls do not substitute for fixed line ones but complement them, constituting additional communications - which in turn might lead to 'real' increases, changes or reductions in people's travel behavior. Other research suggests that the picture is indeed complex with both processes of substitution and complementarily between old and new media of communications (Haddon, 2000)[19] and this is certainly a dimension that could generate a more complex analysis of the 'impact' of the mobile phone.

The introduction to this paper focused on how much difference mobile phone made to mobility - at least in terms of the frequency of traveling. But this preliminary analysis reported here from the survey has clearly counted trips as if they are all the same. The next step to a more detailed analysis would be to take into account the fact that this is clearly not the case - certainly in terms of the distances covered and the time taken. A trip to the local shops is not the same as a journey to visit relatives in another part of the country or a holiday abroad. Once again, we have the potential for more complex analyses. And the minor study that was also reported in this paper has at least started on the first steps to considering distances.

The original question was posed about mobility in general, but clearly this was operationalized in certain questions in terms of car travel. Now the very important, and in certain senses culturally specific, role of the car both practically and symbolically in Norwegian society has been documented elsewhere (Sørensen, 1990). But if we want to consider more general travel behavior we would want to also broaden the scope to cover other modes of traveling.

Finally, there are also some considerations that start to depart from the original reasons given for having an interest in mobility in society: there is the question of what different types of mobility mean to people. For example, in the recent qualitative multi-cultural study, certain types of travel had for many people become relatively taken-for-granted rather than problematic experiences, including, perhaps surprisingly, commuting. In contrast, travel for leisure purposes was seen positively and where that had increased in people's lives over a long period it was regarded as a welcome development. If communications, in this case via the mobile phone, does have (potential) outcomes for travel behavior we might also address the issue of how this is subjectively perceived.

5 Conclusion

This paper has attempted to delineate some areas of study relating to the relationship between mobile telephony and mobility. While there has been some speculation and argument about fixed telephony, mobility and coordination in the literature there has been less quantitative research on this aspect of mobile telephony. The first contribution of this paper was to determine the questions to be addressed and to assemble relevant material from a range of, mainly, qualitative studies of the mobile as well as from other pertinent studies.

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[19] This drew upon quantitative and qualitative research conducted by British Telecom which include direct questions on the degree to which mobile telephony and e-mail displaced fixed telephony.

Turning to the findings it should first be noted that private telephone calls in general and mobile phone calls specifically can be used for many purposes such as increasing security, maintenance of the social network, status enhancement via display of a terminal etc. This study shows that only a minority of calls specifically have a bearing upon coordination and travel. However, that minority still accounts for roughly one fifth of calls made and received in this study overall. While a majority of the travel-related calls were from a fixed phone, over a third were from a mobile.

In terms of gender, women make and receive more travel-related calls than men, as expected given their role in the co-ordination of domestic life. However, it is the fixed line that, for a variety of reasons discussed in the paper, still predominates over the mobile in this respect.

If we consider the effect of private mobile calls on travel, as anticipated, the mobile was more important for modifying travel, reflecting the discussion of micro-coordination. Again, one third of travel-related calls had this outcome and the data on who was called would lead us to speculate that this dynamic is often, as expected, taking place between partners - at least in this type of 'busy' household.

When looking only at the generation or avoidance of travel, the mobile phone seems to be neutral in that calls generating travel are balanced by calls reducing it – in contrast, it would seem, to the fixed line that is far more likely to generate travel. When the modification of travel is added to the equation, coordination via the mobile telephone appears to save more travel than it generates. The contrast is starker if we start to consider the distances traveled by car from the secondary study - now the mobile saves some travel on balance while the fixed line still generates it overall.

In relation to the question of where private calls are made and received, it turned out that work dominated, even though the use of the mobile in this setting has been so little discussed. Fitting previous research, the mobile was used at home, but admittedly in a minority of cases. When we turn to that distinction between calling en route and calling from sites outside of the home and work, the former calls were reported to be twice as common.

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