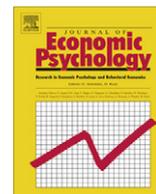




ELSEVIER

Contents lists available at ScienceDirect

## Journal of Economic Psychology

journal homepage: [www.elsevier.com/locate/joep](http://www.elsevier.com/locate/joep)

## Do women have longer conversations? Telephone evidence of gendered communication strategies

Guido Friebel<sup>a</sup>, Paul Seabright<sup>b,\*</sup>

<sup>a</sup> Department of Economics and Business Administration (FB 2), Goethe University, CEPR, Frankfurt, Campus Westend, RuW Building, Room 4.224, Grüneburgplatz 1, D-60323 Frankfurt, Germany

<sup>b</sup> Toulouse School of Economics (IDEI-GREMAQ) and CEPR, Manufacture des Tabacs, 21 allée de Brienne, 31042 Toulouse Cedex, France

## ARTICLE INFO

## Article history:

Received 30 April 2010

Received in revised form 14 December 2010

Accepted 23 December 2010

Available online xxxx

## JEL classification:

D03

## PsycINFO classification:

2720

2970

## Keywords:

Gender differences

Communication

Telephones

Discrimination

Social networks

## ABSTRACT

We investigate whether there are systematic gender differences in communication behavior by telephone. First, we report a study of anonymized billing records of 3103 subscribers to a large mobile operator in Italy and Greece over 2 years from 2006 to 2008. Faced with identical tariffs, women make fewer calls than men, and their calls last 16% longer controlling for other factors. Secondly, we report a study of some 92,000 person-days of calls to call-center employees of a large consumer services company operator at four sites in Germany. Calls randomly allocated to women last 15% longer than those of men controlling for other factors. There is no evidence, however, that this results in the women being any less effective employees than the men; indeed, in operations involving sales where it is possible to measure productivity by this criterion, female employees make slightly more sales per shift than men. It appears instead to reflect systematic gender differences in communication strategies, though it may reflect also an element of preference by both men and women for speaking to women. The findings of both studies are highly statistically significant and are found across all age groups. The magnitude of gender differences is sensitive to the costs of communication. The results have implications for possible explanations of gender clustering in the labor market.

© 2010 Elsevier B.V. All rights reserved.

### 1. Introduction

The question whether men and women engage in different strategies for constructing social relationships has been the subject of both intense academic interest and lay curiosity. It has proved difficult to find clear evidence about this, because it is hard to know whether observed differences in behavior between men and women are caused by differences in their constraints and opportunities, rather than preferences and strategies. We investigate whether there are systematic gender differences in communication behavior by telephone, using two different data sets, one on commercial and one on private phone use.

First, we report a study of anonymized billing records of 3103 subscribers to a large mobile operator in Italy and Greece over 2 years from 2006 to 2008. Faced with identical tariffs, women make fewer calls than men, and their calls last 16% longer controlling for other factors. This study will be referred to as the “private phone use” or “mobile phone” study. Secondly, we report a study of professional phone use of some 92,000 person-days of calls to call-center employees of a large consumer services company operator at four sites in Germany. Calls randomly allocated to women last 15% longer than those of men

\* Corresponding author. Tel.: +33 686530192; fax: +33 561128637.

E-mail addresses: [gfriebel@wiwi.uni-frankfurt.de](mailto:gfriebel@wiwi.uni-frankfurt.de) (G. Friebel), [paul.seabright@tse-fr.eu](mailto:paul.seabright@tse-fr.eu) (P. Seabright).

controlling for other factors. There is no evidence, however, that this results in the women being any less effective employees than the men; indeed, in operations involving sales where it is possible to measure productivity by this criterion, female employees make slightly more sales per shift than men. It appears instead to reflect systematic gender differences in communication strategies, though it may reflect also an element of preference by both men and women for speaking to women. The findings of both studies are highly statistically significant and are found across all age groups.

The estimates of the gender difference we find in the two data sets are highly similar: women make fewer communications each one of which lasts longer. We try to control for differences in constraints and opportunities, and show that the difference in behavior tends to disappear when longer conversations involve significantly higher costs. This is consistent with the hypothesis that women's calling patterns represent a systematically and rationally different behavioral strategy from that of men, whose rationality is shown by its deployment being sensitive to the additional costs it might incur.

Our facts are consistent with evidence from other sources that women have preferences that lead them to invest in a smaller number of social ties, and to invest more in each tie, than men do. As the social ties in which people invest are the systematic outcome of communicative behavior, women may end up with differently shaped social networks.

Forming social ties, and using these ties to build coalitions and networks of social alliances, is central to the behavior of all group-living primates (Byrne et al., 2001). It is well known that there are gender differences in the way such social ties are formed in non-human primates, and it has long been conjectured that there may be similarities in such gender differences between humans and non-human primates (Low, 1999, chap. 10). Non-human primate coalitions among males form for different reasons than coalitions among females, and this gives them typically different size, purpose and duration (de Waal, 1989; Henazi & Barrett, 1999; Pandit & van Schaik, 2003; Silk, Alberts, & Altmann, 2004; van Schaik, Pandit, & Vogel, 2004, 2005). In the terminology owing to Granovetter (1973), males seem to invest in social networks with relatively more "weak ties" while females invest in those with a larger proportion of "strong ties".

There is considerable scientific interest in whether human social behavior displays similar gender differences in network formation, and if so in the direction of causality involved.<sup>1</sup> Experimental data suggest that men and women display different coalition-formation behavior in laboratory settings (Bond & Edgar Vinacke, 1961), that they seem to have different preferences for more versus less competitive interactions (Croson & Gneezy, 2008; Gneezy, Niederle, & Rustichini, 2003), and that men tend to communicate less truthfully (Dreber & Johannesson, 2008). There remains controversy about whether such differences are innate or acquired (Gneezy, Leonard, & List, 2009), though there is by now strong evidence of hormonal factors in some such gender differences (Apicella et al., 2008; Chen, Katusczak, & Ozdenoren, 2009; Dreber et al., 2009). Outside the laboratory there is evidence from surveys that men and women may display differences in the use of communications technologies such as mobile phones (Green & Singleton, 2009; Igarashi, Takai, & Yoshida, 2005; Lemish & Cohen, 2005), as well as other evidence about clustering in social behavior resulting from different behavior patterns (Babcock & Leschever, 2003). However, these surveys mostly rely on self-reported behavior and many fewer studies to date have investigated more objective evidence such as telephone billing records (Smoreda & Licoppe, 2000; Wajman, Bittman, & Brown, 2009).

It is not easy to interpret such findings, and in particular to know to what extent the causality runs from the different opportunities open to female coalitions to the behavior of individuals within them, as opposed to vice versa. There is no dispute that different economic opportunities open to women (such as their lesser representation at board level in major companies, Bilimoria & Piderit, 1994) tend to diminish their opportunities for networking both with men and with other women. What is harder to investigate is the possibility that independent differences in their networking behavior may act as constraints on their economic opportunities.

Finally, if there are systematic gender differences in communication strategies, the evidence is mostly silent as to their origin. Longer conversations involving women could be primarily due different communication preferences of men and women, or to preferences by both genders for longer conversations when speaking to women, or to some combination of the two. Since any conversation is a negotiated interaction between two individuals it would not be easy to imagine means of disentangling these two types of explanation. It is hard to know also whether gendered preferences, if they exist, are biologically hard-wired or are the result of early socialization of girls (Booth & Nolen, 2009).

## 2. Data and methods

We report here call duration data from two studies of telephone use, one based on a random sample of mobile phone users in Italy and Greece, and the other based on a study of call-centre employees in several centers run by a large consumer services company in Germany. Our paper crucially builds on combining these two complementary data sets, because the ideal dataset for measuring gendered communication does not exist (as far as we are aware).

This ideal dataset would be one that (a) sampled men and women randomly so as to ensure that they were representative of the general population, and (b) ensured that men and women faced identical constraints on their calling behavior, including not only the costs of calling but also the set of types of call they could make. So long as occupational choice is voluntary, any setting in which men and women face identical sets of constraints will involve a decision to select into participation. As a consequence there will be differences in the extent to which the two sample groups are representative of their respective

<sup>1</sup> This is distinct from the vast and controversial literature on gender differences in psychology in general, which we do not survey here, though see Baron-Cohen (2000) for an influential recent example.

populations. Conversely, any situation involving random sampling will be unable to ensure that constraints are identical between the sexes; men and women will be included whether their constraints are identical or not.

Our solution to these problems is to compare two datasets, one of which involves conditions relatively close to random sampling while the other involves some degree of selection but imposes identical constraints on the participants.

The first is a study of mobile phone users that reports actual billing data over 2 years from the summer of 2006 to the summer of 2008 for 3103 subscribers, of whom 1964 are in Italy and the remaining 1139 are in Greece. A total of 828 (42%) of the Italian subscribers and 493 (43%) of the Greek subscribers are women. The study is based on a random sample of the population of subscribers to one of the operators in each country, and is therefore likely to represent something reasonably close to a random sample of men and women in the countries concerned since the operator has national coverage and mobile phone penetration is high.<sup>2</sup> There is a degree of over-representation of the middle-aged, though: individuals in their thirties and forties represent respectively 23% and 25% of the sample, with 13%, 16% and 15% respectively in their twenties, fifties and sixties or more. Men and women in each country face identical tariffs (they may have different calling plans but if so these result from their own choices rather than from different prior constraints).

We cannot exclude the possible influences on calling behavior exerted by individuals' existing networks of contacts; this is precisely an example of what we have in mind in writing of differences in constraints and opportunities.

This is what motivates our second study, in which we look at the calling behavior of employees of four call centers in Germany belonging to a large consumer services company. The call centers provide various services. We focus on 491 individuals with an average age of 42 years; men are on average a little less than a year younger than the women, and the standard deviation of both groups is close to 10 years. Call center agents work on related services, providing information and carrying out sales, logged over the period of May 2007 to December 2008. In total, there are 92,836 observations. Each observation consists of the number and duration of calls of a certain type performed by a single agent in a single day.

Unlike our mobile phone study this is not even close to being a random sample of the population – for one thing, women make up 80% of the sample. However, calls made by call-center employees are initiated by customers of the company and are routed by a computer system to employees without reference to the sex of the employee. Employees are under a range of constraints due to the nature of the job. Most importantly, it is the policy of the firm to provide targets, both in terms of sales and average call duration. Other things equal, lengthy calls are costly to agents, because low performance triggers control and pressure by supervisors, and may involve unattractive additional training, lower chances for promotion and so forth. However, agents are free to make longer calls which may generate more sales, provided the general targets are met. For our purpose it is important that these organizational and hence economic constraints on employee calling behavior are identical for men and women. The freedom to vary call length is indeed crucial in identifying gender-related communication strategies.

### 3. Results of the mobile phone study

Figs. 1 and 2 show the gender difference in the average duration and average number of mobile phone calls made by subscribers in Italy and Greece. We do not have data on individual calls so the duration numbers are based on the monthly per-subscriber average call duration; the duration for males in the whole sample is normalized to one. Due to constraints of commercial confidentiality imposed as a condition of the access to the data, we cannot report the absolute duration of calls. Instead we normalize the length of calls made by men to one; the figures for each category can therefore be interpreted as the ratio of their value to that of the average male in the sample.

Fig. 1 shows that in every age category and in both countries women make longer calls than men, by an average of 19% for the whole sample. These differences, which are particularly marked in the 20–30 age group, are all statistically significant at less than 1%. Fig. 2 shows that this is not the result of generally greater mobile phone use: in every age category except that of Italian women in their fifties, women make fewer calls than men. So women are making fewer calls but are putting more time into each call.

Two qualifications should be noted. First, we do not have information about the number of distinct individuals called by each subject of the study, only about the number of calls made. We cannot therefore distinguish between the hypotheses that women are calling fewer individuals and that they are calling the same number of individuals less frequently.

Secondly, there is an important difference in both average call duration and average monthly call numbers between Italy and Greece. This difference is important enough that the average Greek woman makes more calls, and of shorter duration, than those of the average Italian man. A number of factors may drive these differences. These include tariff structures which typically differ from one country to another (as the strategy of mobile phone operators differs across countries). They also include cultural factors, and factors such as different degrees of female labor participation. With our data, we cannot disentangle these effects; in the regressions we will include a country dummy to measure the composite effect of all those factors that are country-specific.

Notice that we are able to record only the gender of the subject, but not the gender of the called party (this also applies to the call-center study). A significant proportion of calls made by men will be to women and a significant proportion of calls

<sup>2</sup> The mobile telephony penetration rates of Greece and Italy were 119% and 151% respectively in 2009 according to the International Telecommunication Union (<http://www.itu.int>).

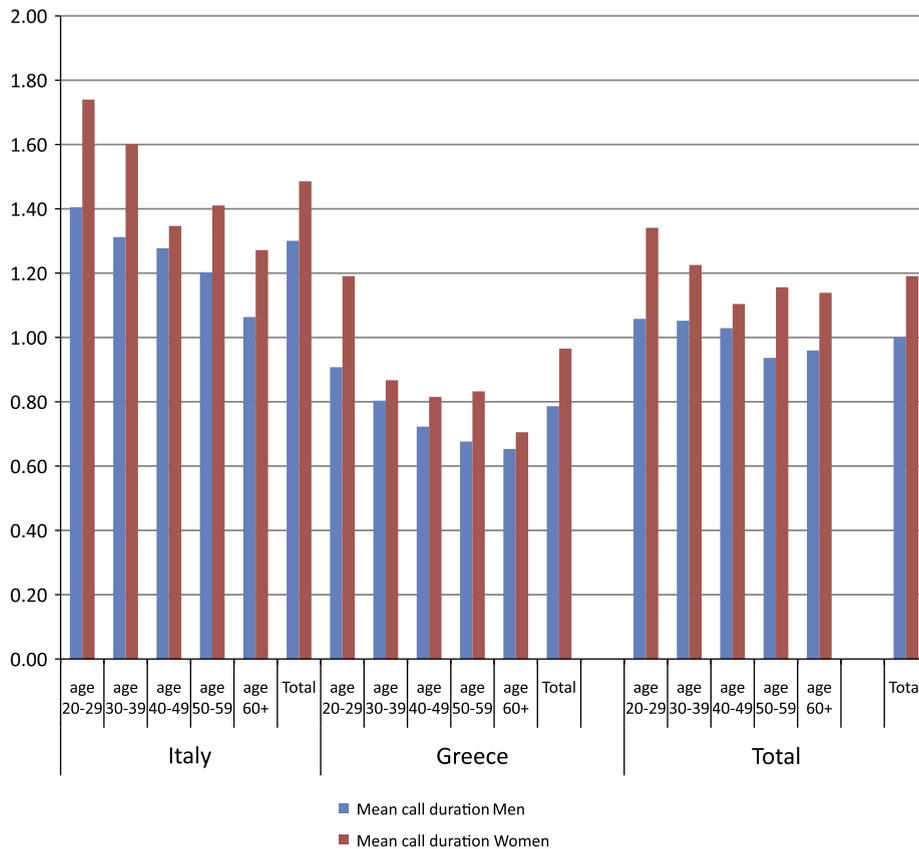


Fig. 1. Gender difference in duration of mobile phone calls by age group, Italy and Greece (male average, whole sample = 1).

made by women will be to men. Since for each such call, by definition, the duration of the call for the woman is the same as the duration of the call for the man, it follows that the difference between the average duration of calls made by women to women and the average duration of calls made by men to men will be greater than the difference reported in our data. We cannot however estimate the extent of this effect, since we do not know the proportion of calls made between men and women.

Table 1 reports the results of a regression analysis of the logarithm of call duration on a number of explanatory variables including gender, country, age and time, using data from the mobile phone study. Because of the logarithmic specification, the coefficients on the various explanatory variables can be interpreted as proportionate (percentage) effects. There are 71,652 observations, representing 24 monthly observations from 3103 subjects.

The first column of Table 1 shows the estimation without controlling for total monthly spending. The time trend is positive at 0.6% increase per month over the study. As expected from the descriptive figures, there is a strong country-specific effect, with Italians talking for 36% longer on average than Greeks. Women talk on average for 9.7% longer than men; this effect has a *t*-ratio of nearly five meaning that it is statistically significant at a tiny fraction of 1%. *t*-ratios are calculated using clustering on individuals, to allow for the fact that different monthly observations for the same individual are not entirely independent but are influenced by factors common to that individual.

The second column of Table 1 controls for each individual's total monthly spend. This specification takes into account that women may be subject to different economic constraints than men, in particular, that they may not have the same average ability to pay as men. Not surprisingly, since women spend less on average than men, when this is taken into account the greater duration of women's calls increases, to 11.2%. However, using monthly spend as a measure of individuals' ability to pay is not appropriate, since it will itself be influenced by individual preferences and not just by ability to pay. Therefore it will lead to biased parameter estimates. Accordingly we report in the final column of Table 1 estimates based on a two-stage instrumental variables approach. We use the number of years for which the individual has been a subscriber as an instrument for monthly spend, since this is likely to be related to ability to pay but not otherwise to preferences for call duration as against greater numbers of calls within an overall monthly budget. We verify using a Hansen test of over-identifying restrictions that the instrumental variable is indeed correctly excluded from the second stage of the estimation. When we do this our estimate of the gender difference increases again, to 16.2%.

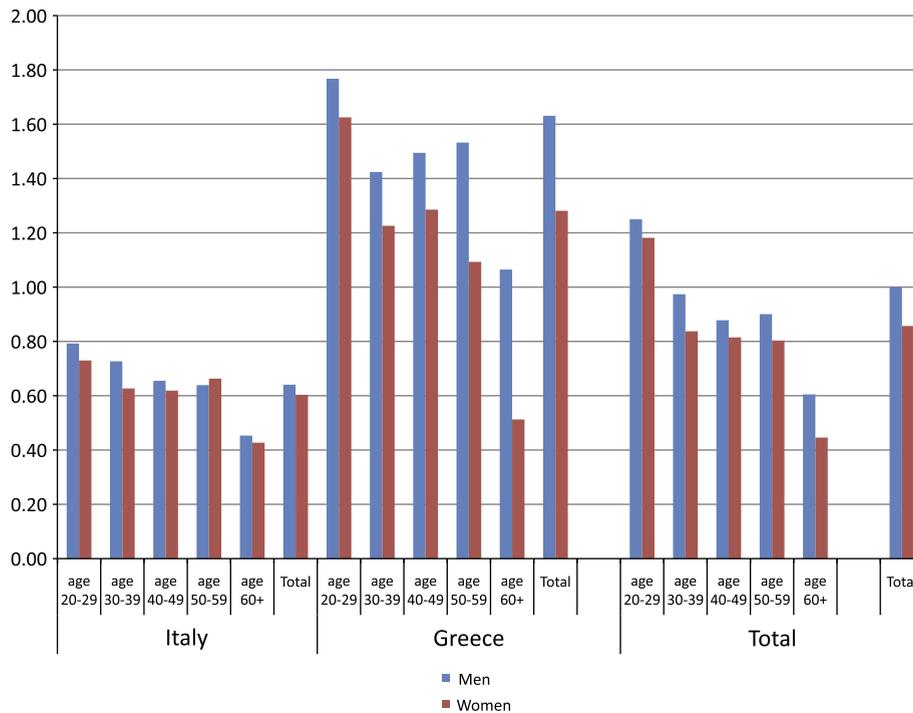


Fig. 2. Gender difference in number of mobile phone calls by age group, Italy and Greece (male average, whole sample = 1).

**Table 1**  
Regression of logarithm of average duration of mobile calls on various caller characteristics.

Variable		Basic spec.: ordinary least squares	Controlling for total monthly spend	Instrumental variables
Female	Coefficient	9.7%***	11.2%***	16.2%***
	( <i>t</i> -ratio)	(4.98)	(6.17)	(5.84)
Age category (omitted category: forties)	Twenties	17.6%***	14.6%***	5.1%
	( <i>t</i> -ratio)	(5.85)	(5.10)	(1.23)
	Thirties	10.5%***	8.1%***	Excluded
	( <i>t</i> -ratio)	(4.33)	(3.62)	Excluded
	Fifties	−3.4%	−4.4%*	−6.4%*
	( <i>t</i> -ratio)	(−1.27)	(−1.71)	(−1.76)
Month	Coefficient	0.60%***	0.62%***	0.65%***
	( <i>t</i> -ratio)	(13.03)	(13.74)	(10.52)
Italy	Coefficient	36.4%***	42.9%***	63.4%***
	( <i>t</i> -ratio)	(19.73)	(24.59)	(11.49)
Total monthly spend	Coefficient	Omitted	16.2%***	64.0%***
	( <i>t</i> -ratio)	Omitted	(27.59)	(5.53)
$R^2$		7.4%	16.6%	64.2%
Hansen <i>J</i> -test of overidentification				0.00 (pr = 0.99)
Number of observations		72,772	72,772	71,652
Number of individuals (subscribers)		3103	3103	3103

Note: Each observation is the average duration of calls in 1 month made by a subscriber; there are 24 observations per subscriber. Robust *t*-statistics in parentheses, with clustering on individuals.

\* Statistical significance:  $p < 0.05$ .

\*\* Statistical significance:  $p < 0.01$ .

\*\*\* Statistical significance:  $p < 0.001$ .

Finally, we note that the gender differences we have documented become less marked when the costs of making longer calls increase. The data in the mobile phone study allow us to distinguish between incoming and outgoing calls. The cost per minute to the caller of a call to a mobile phone is on average significantly lower than the cost per minute to the caller of a call from a mobile phone. This should lead us to expect outgoing calls to have shorter duration than incoming calls, and makes it possible to look at how gender communication patterns are affected by the cost of communication.

**Table 2**

Regression of logarithm of average duration of incoming and outgoing mobile calls on various caller characteristics.

Variable		Basic spec.: ordinary least squares	Controlling for total monthly spend	Instrumental variables
Female (incoming call)	Coefficient	11.7% <sup>***</sup>	14.0% <sup>***</sup>	21.4% <sup>***</sup>
	( <i>t</i> -ratio)	(5.75)	(7.17)	(5.81)
Female (outgoing call)	Coefficient	3.0%	4.8% <sup>**</sup>	10.5% <sup>**</sup>
	( <i>t</i> -ratio)	(1.30)	(2.30)	(3.20)
Average outgoing call	Coefficient	-13.7% <sup>***</sup>	-12.6% <sup>***</sup>	-7.8% <sup>***</sup>
	( <i>t</i> -ratio)	(-11.06)	(-10.33)	(-3.96)
Age category (omitted category: forties)	Twenties	14.8% <sup>***</sup>	11.2% <sup>***</sup>	0.3%
	( <i>t</i> -ratio)	(4.92)	(3.99)	(0.06)
	Thirties	10.3% <sup>***</sup>	7.7% <sup>**</sup>	Excluded
	( <i>t</i> -ratio)	(4.36)	(3.61)	Excluded
	Fifties	-4.0%	-4.8% <sup>*</sup>	-6.3%
( <i>t</i> -ratio)	(-1.51)	(-1.97)	(-1.58)	
Month	Coefficient	0.29% <sup>***</sup>	0.31% <sup>***</sup>	0.36% <sup>***</sup>
	( <i>t</i> -ratio)	(6.20)	(6.80)	(5.17)
Italy	Coefficient	38.9% <sup>***</sup>	46.1% <sup>***</sup>	63.4% <sup>***</sup>
	( <i>t</i> -ratio)	(21.01)	(27.24)	(11.49)
Total monthly spend	Coefficient	Omitted	19.1% <sup>**</sup>	69.2% <sup>***</sup>
	( <i>t</i> -ratio)	Omitted	(33.15)	(10.51)
R <sup>2</sup>		7.6%	17.6%	59.0%
Hansen <i>J</i> -test of overidentification				0.08 (pr = 0.78)
Number of observations		133,778	132,502	132,502
Number of individuals (subscribers)		3103	3103	3103

Note: Each observation is the average duration of either incoming or outgoing calls in one month made by a subscriber; there are 48 observations per subscriber. Robust *t*-statistics in parentheses, with clustering on individuals.

<sup>\*</sup> Statistical significance:  $p < 0.05$ .

<sup>\*\*</sup> Statistical significance:  $p < 0.01$ .

<sup>\*\*\*</sup> Statistical significance:  $p < 0.001$ .

Table 2 shows the determinants of mobile call duration distinguishing between incoming and outgoing calls. Outgoing calls indeed have shorter duration. More important for our purpose is the fact that there is a strong and highly significant difference between the gender coefficient on incoming and outgoing calls. In the basic specification the gender coefficient on outgoing calls is no longer statistically significant. In our preferred instrumental variables specification, however, there is still a highly significant gender effect for outgoing calls, but it is only around half as strong as for incoming calls. Outgoing calls made by women are 10.5% longer than those made by men, while incoming calls to women are 21% longer than those made to men.

#### 4. Results of the call-center study

Table 3 reports estimates of the determinants of the log of call duration, using the call center data. We control for the type of call, for age and length of experience of the employee, for the particular call center and also for fixed effects of shifts, days of the week and months of the year. We also control for differences in type of employment contracts. We do not control for income, partly because we do not have such data but chiefly because the employees are not paying for the calls. When all these factors are taken into account the effect of gender on call duration is very clear: women make calls that last on average 14.9% longer. This effect is remarkably similar to the effect we have estimated in the mobile phone study.

It should be noted that the longer calls made by women do not imply that they are, on average, more or less effective employees than men. On average women in fact make 8.8 sales per shift compared to 8.3 for men, suggesting that they use the discretion they have beyond the targets to make longer calls with higher sales rates. However, only around 1 call in 8 results in a sale, and for many calls it is clear that making a purchase is not the purpose of the call.

Fig. 3 shows the difference in average call duration by gender for call-center employees in Germany, once again classified by age. As in the mobile phone study, in every age category women make longer calls than men, by an average of around 11% for the whole sample. It is interesting to note that the difference is again largest in the 20–30 age group, where it reaches nearly 26%.

The call-center study allows us to draw relatively precise inferences on how changing economic conditions affect gendered communication behavior. The firm in question faced a large and damaging strike during the time for which we have data. It put in place a hotline designed to inform its customers of the latest situation with respect to the strike. Management gave absolute priority to calls in the strike hotline, and gave much stricter instructions than usual about the need to deliver information rapidly and effectively in a minimum of time. In a nutshell, the call center transformed itself from an organization interested in short calls and sales to an organization caring exclusively for providing information in the shortest time possible. The costs to the employees of time spent on longer communications thus became much higher than what was normally

**Table 3**

Determinants of average call center call duration in logarithms, all types of calls (queues).

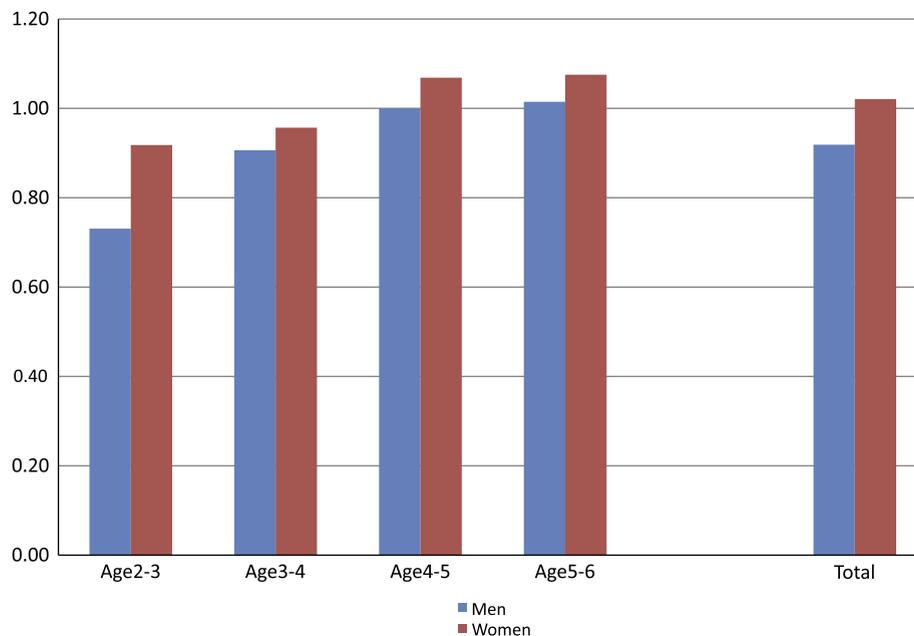
	Gender plus basic controls	Gender plus personal controls	Adding call queues
Female	15.5%*** (2.85)	13.9%*** (2.70)	14.9%*** (3.12)
Age 20–30		–31.0%*** (–5.23)	–33.2%*** (–6.09)
Age 30–40		–13.4%** (–2.74)	–14.0%** (–3.08)
Age 50–60		3.5% (0.80)	3.8% (0.93)
Years' experience		–1.94%*** (–3.34)	–2.17%*** (–3.97)
Booking queue			35.5%*** (10.17)
Overseas call queue			69.3%*** (13.28)
English language queue			44.5%*** (4.10)
Overseas English queue			76.5%*** (7.56)
Strike hotline queue			–37.5%*** (–9.49)
Constant	4.49*** (42.43)	4.77*** (37.28)	4.93*** (44.82)
R <sup>2</sup>	7.9%	13.6%	23.7%
No. observations	92,836	92,836	92,836
No. individuals	453	453	453

The results reported are for an OLS regression; the dependent variable is the logarithm of average call duration of a single agent over all types of calls during one shift. Queue regressors are the proportion of time spent in each queue. Main omitted age category is 40–50; main omitted queue category is inland enquiries. Controls not reported are times of shift, week days and weeks of the year. Location is also included with personal but not basic controls (there are four sites) as is a control for type of contract (permanent versus temporary); none of these regressors is statistically significant. Robust *t*-values in parentheses, clustering on individuals.

\* Statistical significance:  $p < 0.05$ .

\*\* Statistical significance:  $p < 0.01$ .

\*\*\* Statistical significance:  $p < 0.001$ .



**Fig. 3.** Gender difference in duration of call centre calls by age group, Germany (average, whole sample = 1).

perceived for the call center agents' activities. This is confirmed by the fact that the coefficient on the control variable for calls to the strike hotline in Table 3 is strongly negative (these calls lasted on average 37.5% less long than other calls).

**Table 4**

Determinants of average call center call duration in logarithms, strike hotline only.

	Gender plus basic controls	Gender plus personal controls
Female	−5.5% (−1.64)	−6.1% (−1.73)
Age 20–30		−6.6% (−1.68)
Age 30–40		−8.1% <sup>*</sup> (−2.25)
Age 50–60		−2.5% (−0.70)
Years' experience		−0.2% (−0.50)
Constant	2.64 <sup>***</sup> (63.87)	3.263 <sup>***</sup> (33.542)
R <sup>2</sup>	17.3%	17.7%
N	14,095 426	14,095 426

The results reported are for an OLS regression; the dependent variable is the logarithm of average call duration of a single agent over all types of calls during one shift. Main omitted age category is 40–50. Controls not reported are times of shift, week days and weeks of the year. Location is also included with personal but not basic controls (there are four sites) as is a control for type of contract (permanent versus temporary); none of these regressors is statistically significant. Robust *t*-values in parentheses, clustering on individuals.

<sup>\*</sup> Statistical significance:  $p < 0.05$ .

<sup>\*\*</sup> Statistical significance:  $p < 0.01$ .

<sup>\*\*\*</sup> Statistical significance:  $p < 0.001$ .

Table 4 shows the determinants of call center call duration on the strike hotline. The gender effect has in fact turned negative: calls to female employees on the strike hotline last 6% less long than those to men (though this is more weakly significant, at a little under 10%). It appears that, once the costs of differences in communication strategy become important, those differences disappear; the negative coefficient on calls to women may reflect a slightly greater effectiveness of female employees on average (a hypothesis consistent with the observation that talented women may face greater obstacles in other kinds of work).

## 5. Discussion and conclusions

Overall, our mobile phone data show that, when faced with identical tariffs, men and women have different calling patterns, with women making fewer but longer calls than men on average. The random allocation of incoming calls to employees in the call-center study makes it unlikely that such behavior differences are simply due to differences in calling incentives or opportunities. It seems reasonable to conjecture that they reflect systematic differences in communication strategies. And indeed these differences become less marked once the cost of exercising them increases.

The facts we have identified about communication patterns of men and women are consistent with the possibility that women's social networks contain, on average, fewer but deeper links than those of men. The work of de Waal (1989) suggests that differences in coalition structure in primates may translate into differential responsiveness to economic opportunities. In human beings, many economic opportunities, beginning with those in the labor market, are ones that individuals come to learn about through their social networks. Many jobs, particularly those in high-status occupations, are ones to which individuals are recruited by at least partly informal means. Even if a formal interviewing procedure is in place, the process by which individuals are short-listed for interview often owes a great deal to word-of-mouth recommendation based on personal acquaintance. Since the work of Granovetter (1973) it has seemed likely that networks composed of relatively more weak ties may be more effective at transmitting information about job opportunities to their members. If women are indeed likely to prefer networks with more strong ties, this may have unanticipated costs to them that may contribute to explaining why women continue to be under-represented in a number of high-status occupations.

We are aware that the obstacles to equal career performance of women and men may involve a clustering of opportunities by gender and that the phenomena we have documented are only a part of the explanation. We do not pretend to have cast light on why information about employment opportunities tends to travel through weak links rather than being more widely available – in particular, in the presence of modern information technology. What we have established is that women communicate in different ways and that their network structures may in consequence be significantly different from those of men.

## Acknowledgements

The authors are grateful to the Editor, two referees, Nicoletta Berardi, Michael Kosfeld, Jonathan Sandbach, Neele Siemer, Heiner Schumacher, Levent Yilmaz and participants in seminars in Århus, Frankfurt, Motu (Wellington) and Toulouse for comments, help and advice. The usual disclaimer applies. The authors declare no competing financial interests.

## References

- Apicella, C. L., Dreber, A., Campbell, B. C., Gray, P. B., Hoffman, M., & Little, A. C. (2008). Testosterone and financial risk preferences. *Evolution and Human Behavior*, 29(6), 384–390.
- Babcock, L., & Leschever, S. (2003). *Women don't ask: Negotiation and the gender divide*. Princeton: Princeton University Press.
- Baron-Cohen, S. (2000). *The essential difference: Men, women and the extreme male brain*. London: Penguin.
- Bilimoria, D., & Piderit, S. K. (1994). Board committee membership: Effects of sex-based bias. *The Academy of Management Journal*, 37(6), 1453–1477.
- Bond, J. R., & Edgar Vinacke, W. (1961). Coalitions in mixed-sex triads. *Sociometry*, 24(1), 61–75.
- Booth, A., & Nolen, P. J. (2009). *Choosing to compete: How different are girls and boys?* DP 7214, London: Centre for Economic Policy Research (March).
- Byrne, R. et al (2001). In *Tree of origin: What primate behavior can tell us about human social evolution*. Cambridge, MA: Harvard University Press.
- Chen, Y., Katusczak, P., Ozdenoren, E. (2009). *Why can't a woman bid more like a man?* Working paper no. 275, CERGE-EI.
- Croson, R., & Gneezy, U. (2008). Gender differences in preferences. *Journal of Economic Literature*, 47(2), 1–27.
- de Waal, F. (1989). *Peacemaking among primates*. Cambridge, MA: Harvard University Press.
- Dreber, A., Apicella, C. L., Eisenberg, D. T. A., Garcia, J. R., Zamore, R., Lum, J. K., et al (2009). The 7R polymorphism in the dopamine receptor D4 gene (DRD4) is associated with financial risk-taking in men. *Evolution and Human Behavior*, 30(2), 85–92.
- Dreber, A., & Johannesson, M. (2008). Gender differences in deception. *Economics Letters*, 99, 197–199.
- Gneezy, U., Leonard, K. L., & List, J. A. (2009). Gender differences in competition: Evidence from a matrilineal and a patriarchal society. *Econometrica*, 77(5), 1637–1664.
- Gneezy, U., Niederle, M., & Rustichini, A. (2003). Performance in competitive environments: Gender differences. *Quarterly Journal of Economics*, 1049–1074.
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 78, 1360–1380.
- Green, E., & Singleton, C. (2009). Mobile connections: An exploration of the place of mobile phones in friendship relations. *Sociological Review*, 57, 125–144.
- Henazi, S. P., & Barrett, L. (1999). The value of grooming to female primates. *Primates*, 40(1), 47–59.
- Igarashi, T., Takai, J., & Yoshida, T. (2005). Gender differences in social network development via mobile phone text messages: A longitudinal study. *Journal of Social and Personal Relationships*, 22, 691–713.
- Lemish, D., & Cohen, A. (2005). On the gendered nature of mobile phone culture in Israel. *Sex Roles*.
- Low, B. S. (1999). *Why sex matters: A Darwinian look at human behavior*. Princeton: Princeton University Press.
- Pandit, S. A., & van Schaik, C. P. (2003). A model for leveling coalitions among primate males: Toward a theory of egalitarianism. *Behavioral Ecology and Sociobiology*, 55, 161–168.
- Silk, J. B., Alberts, S., & Altmann, J. (2004). Patterns of coalition formation by adult female baboons in Amboseli, Kenya. *Animal Behavior*, 67, 573–582.
- Smoreda, Z., & Licoppe, C. (2000). Gender-specific use of the domestic telephone. *Social Psychology Quarterly*, 63(3), 238–252.
- van Schaik, C. P., Pandit, S. A., & Vogel, E. R. (2004). A model for within-group coalitionary aggression among males. *Behavioral Ecology and Sociobiology*, 57, 101–109.
- van Schaik, C. P., Pandit, S. A., & Vogel, E. R. (2005). Toward a general model for male–male coalitions in primate groups. In P. M. Kappeler & C. P. van Schaik (Eds.), *Cooperation in primates and humans: Mechanisms and evolution* (pp. 151–171). Heidelberg: Springer Verlag.
- Wajman, J., Bittman, M., & Brown, J. (2009). Intimate connections: The impact of the mobile phone on work/life boundaries. In Gerard Goggin & Larissa Hjorth (Eds.), *Mobile technologies: From telecommunications to media*. London: Routledge.