



On the Influence of Gender on Interruptions in Multiparty Dialogue

Paul Van Eecke¹, Raquel Fernández²

¹Sony Computer Science Laboratory, Paris

²Institute for Logic, Language and Computation, Amsterdam

vaneecke@csl.sony.fr, raquel.fernandez@uva.nl

Abstract

During conversations, participants do not always alternate turns smoothly. One cause of disturbance particularly prominent in multiparty dialogue is the presence of interruptions: interventions that prevent current speakers from finishing their turns. Previous work, mostly within the field of sociolinguistics, has suggested that the gender of the dialogue participants plays an important role in their interruptive behaviour. We investigate existing hypotheses in this respect by systematically analysing interruptions in a corpus of spoken multiparty meetings that include a minimum of two male and two female participants. We find a number of significant differences, including the fact that women are more often interrupted overall and that men interrupt more often women than other men, in particular using speech overlap to grab the floor. We do not find evidence for the hypothesis that women interrupt other women more frequently than they interrupt men.

Index Terms: human dialogue, gender differences, turn taking, interruptions

1. Introduction

Human conversation is highly spontaneous and interactive. This can lead to the presence of interruptions: a party taking the turn before the current speaker has finished. Since conversation is a social act reflecting, to a large extent, the social dynamics amongst the interlocutors, the frequency and function of these interruptions depend on many factors, including the language that is spoken [1], the number of participants in the conversation [2], and the dominance relations among the different parties involved [3].

Another factor that has often been argued to influence the presence of interruptions is the gender of the participants. This issue is heavily debated in the sociolinguistics literature and the conclusions of the many previous studies do not provide a unified picture [4]. As many of these studies were performed on rather limited and very specific datasets, the hypotheses that they explore require further investigation. In this paper, we review the main hypotheses formulated in previous literature and systematically test them using a substantial corpus of multiparty mixed-gender meeting transcripts. Special attention is given to collaborative and competitive interruptions and to the influence of gender on these two types of interruptions.

The study of gender differences in dialogue is of great importance for society. Policy makers can benefit from a better understanding of gender dynamics in dialogue for ensuring fair and gender-neutral debating, negotiation and decision-making processes. But also applications can benefit from a better understanding of interruptive behaviour in humans. Artificial systems that are sensitive to the human user's interruptions may render

dialogue more efficient and make the user experience more natural [5].

We proceed by first reviewing some of the main hypotheses put forward in the literature. In Section 3, we describe the corpus and the methodology that we use to investigate these hypotheses. Our results are presented in Section 4. We conclude with a discussion of the main findings in Section 5.

2. Gender and Interruptions

Interruptions appear to breach core turn-taking principles, according to which participants take the floor as others have finished their turn, with only one party speaking at a time [6, 7]. They have therefore often been considered signs of power and dominance or indicative of indifference or aggressiveness [8, 9]. Since these social traits are known to significantly vary as a function of gender, it is not surprising that a large body of previous literature has studied the influence of gender on interruptions. Intriguingly, this body of work has yielded rather diverging results. Here we focus on the most common hypotheses that have received mixed evidence.¹

A very widespread assumption supported by several studies is that, overall, men interrupt more than women [10, 11]. However, other work did not find significant differences between genders [12, 13] and some studies even found the opposite effect, namely that, overall, women interrupt more than men [14, 15]. Another common conjecture often warranted by empirical results is that, overall, women are more often interrupted than men [14, 11, 15].

If we consider the gender of both the interruptor and the interruptee, some evidence indicates that men interrupt women more often than other men [16, 13, 15] and that women also have a tendency to interrupt more often other women than men [17, 15]. However, Dindia [18] found that women interrupt more often men than other women, while several other studies did not find any significant differences between the genders [19, 20].

Finally, an additional research question concerns the function of interruptions. James and Clarke [4] hypothesize that women's interruptions are more often collaborative than men's, whereas men's interruptions are more often dominant trials to seize the floor. It is however important to note that their evidence for these hypotheses comes from other characteristics of dialogue than interruptions (gender differences in, e.g., backchannelling behaviour and expression of agreement and interest) and have not been studied in detail. One reason for this might be the difficulty of defining categories for collaborative and competitive interruptions, a challenge which we will ad-

¹For a more comprehensive critical review of the previous sociolinguistics literature on this matter, we refer the reader to [4].

dress further on.

In summary, we have extracted the following sets of hypotheses from the previous literature. The remainder of the paper will study these in more detail.

1. Interrupting and being interrupted

- (a) Men interrupt more often than women.
- (b) Women are more often interrupted than men.

2. Who interrupts who

- (a) Men interrupt more often women than other men.
- (b) Women interrupt more often other women than other men.

3. Function of interruptions

- (a) Women's interruptions are more often collaborative than men's.
- (b) Men's interruptions are more often competitive than women's.

3. Experimental Setup

3.1. Corpus

For our study, we make use of the the ICSI Meeting Corpus [21], a dataset of spoken language from natural meetings that took place at Berkeley's International Computer Science Institute (ICSI) in the period from 2000 until 2002. The corpus contains a total of 75 multiparty meetings and includes detailed transcriptions, the start and end times of each participant's contributions, as well as manually annotated information on the dialogue act performed by each utterance.

For our analysis, we focus on a subset of 28 meetings with at least two male and two female participants. We refer to this subset as the *multiparty multigender meetings*. The number of participants in these meetings ranges from 5 to 9, with 7 participants on average. Overall, there are 7 unique female participants and 22 unique male participants across the 28 meetings. The multiparty multigender meetings contain a total of 45,665 segments, of which 67.4% are uttered by male participants and 32.6% by female participants.

3.2. Interruptions

Our primary object of study are interruptions, i.e. turn transitions in which a speaker B takes the turn before the previous turn of another speaker A has been concluded, and, as a consequence, remains incomplete. The ICSI Meeting Corpus is particularly suitable for analysing this phenomenon because its Meeting Recorder Dialogue Act (MRDA) annotation scheme includes a tag `<%-->` for interrupted utterances. The tag is defined as follows in the MRDA annotation manual [22]:

The interrupted tag `<%-->` marks incomplete utterances in which a speaker stops talking on account of being interrupted by another speaker. This tag is not to be confused with the abandoned tag `<%-->` which is used to mark instances in which a speaker intentionally abandons an utterance.

The inter-annotator agreement for the DA annotation is rather high, with kappa statistics of 0.80 for the tags grouped into larger categories (such as statements, questions and disruptions) and 0.72 for the tags grouped into more detailed categories [23].

3.3. Overlaps

Our analysis also makes use of speech overlaps. Overlaps correspond to turn transitions for which the Floor Transfer Offset

(defined by De Ruiter et al. [24] as "the difference between the time that a turn starts and the moment the previous turn ends") has a negative value. In particular, we focus on *between speaker overlaps* [25], in which speaker B continues after speaker A has stopped. Since the ICSI Meeting Corpus includes the start and end time of each utterance, overlaps can easily be extracted.

Interruptions are related to overlapping speech, but the two phenomena are by no means always co-present. Indeed, interruptions as defined above may or may not involve speech overlap. Table 1 shows a confusion matrix with the overall counts of overlaps and interruptions in our dataset. Overlaps are more common than interruptions (7,732 vs. 3,270 occurrences), which indicates that often, the overlapped speaker is still able to finish the turn despite the overlap (only 15.9% of overlaps result in an interruption). We also observe that the majority of interrupted utterances (62.3%) do not exhibit any speech overlap in the turn transition.

	overlap	no overlap	total
interruption	1,233	2,037	3,270
no interruption	6,499	35,896	42,395
total	7,732	37,933	45,665

Table 1: Overlaps and interruptions in our multigender dataset.

3.4. Examples

A few examples of segments in our dataset with interruptions and overlaps are shown below. The conversation id, speaker id, beginning and end time, and annotated DA label are indicated for each segment. Female and male participants have id's starting with an *f* (e.g., *fe008*) or an *m* (e.g., *m010*), respectively. Example (1) presents a turn that is interrupted using overlapping speech. Example (2) shows a turn that is interrupted without any overlapping speech. Finally, example (3) illustrates the use of overlapping speech without causing any interruption (note the absence of the `%-` marker in the *a*. turn).

- (1) a. we should at least check that everybody here ==
(Buw001 me013 3770.32-3772.5 s.%-)
b. i think everyone here is on the list .
(Buw001 me011 3771.96-3773.64 s^na)
- (2) a. let's just ==
(Buw002 fe008 2636.37-2637.62 s^cs.%-)
b. but they actually had a big list of like things that people had transcribed .
(Buw002 me070 2637.73-2641.66 s)
- (3) a. and you can ask all the questions about how this all fits together .
(Bed010 m010 386.25-389.72 s)
b. that's fine .
(Bed010 m045 389.48-389.88 s^ba)

4. Results

4.1. Interrupting and being interrupted

In the ICSI multiparty multigender meetings, 7.3% of the utterances by men and 6.9% of the utterances by women are interruptions. A visualisation is shown in the left graph of Figure 1. This difference is found to be non-significant ($\chi^2 = 2.28, p = 0.13$),² and we can therefore conclude that our dataset does not

²All χ^2 results reported correspond to Pearson's Chi-squared tests with Yates' continuity correction.

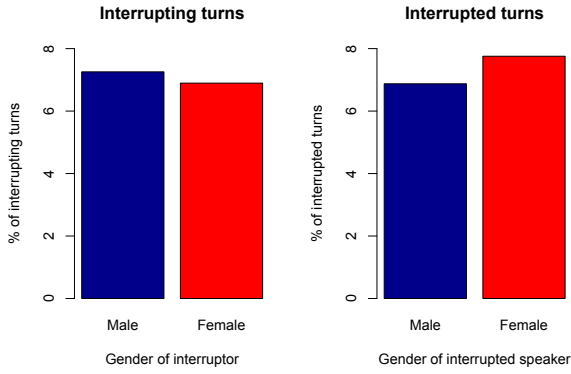


Figure 1: Percentage of interrupting turns (left) and interrupted turns (right) for male and female participants.

support the hypothesis that, overall, men interrupt more often than women.

When it comes to the gender of the interruptee, we find evidence for the hypothesis that female participants are more often interrupted than male participants. 7.8% of female utterances get interrupted, whereas this is the case in only 6.9% of male utterances, a significant difference ($\chi^2 = 11.62, p < 0.001$). This can be seen on the right hand side of Figure 1.

4.2. Who interrupts who

Let us now consider the gender of both the participant who interrupts and the one who is interrupted. The results for these counts are visualised in Figure 2. We find support for the hypothesis that men interrupt more often women than other men ($\chi^2 = 16.65, p < 0.001$). However, female participants appear to interrupt equally often interlocutors of either gender ($\chi^2 = 1.32, p = 1$).

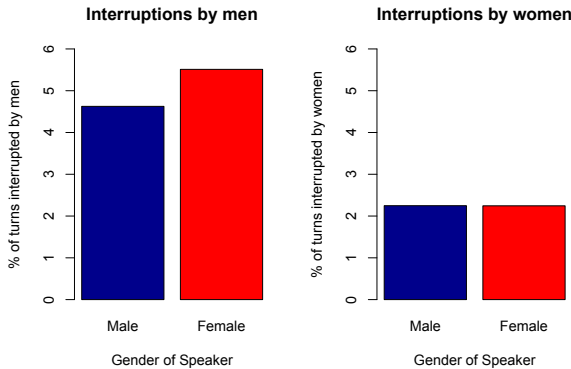


Figure 2: Percentage of interruptions of male and female speakers by men (left) and women (right).

4.3. Function of interruptions

Rather than defining the full range of functions that interruptions can fulfill—an important open question that is beyond the scope of this paper—we concentrate on capturing key aspects that distinguish competitive from collaborative interruptions [26]. We model this distinction by investigating (1) the presence or absence of speech overlap in interrupted turns, and

interrupted	overlap	no overlap	total
male	816 (39%)	1300 (61%)	2116
female	417 (36%)	737 (64%)	1154
total	1233 (37%)	2037 (62%)	3270

Table 2: Overlap in interruptions of male and female speakers.

(2) the dialogue acts performed by interrupting utterances.

4.3.1. Speech overlap in interruptions

According to Yang [26], speech overlap by itself cannot be taken to be an indicator of competitiveness, since backchannels and other expressions of agreement are often given in overlap. For our study, however, we restrict ourselves to overlap in the presence of an interruption, i.e., overlapping speech that prevents the current speaker from finishing the turn. Hence, utterances such as backchannels hardly ever occur (as will be confirmed in the next section). Therefore, in line with Gravano and Hirschberg [27], we consider overlapping interruptions to have a more competitive character than non-overlapping interruptions.

In Section 3, we have reported that about 37.8% of the interruptions in our dataset exhibit speech overlap, corresponding to a total of 1,233 overlapping interruptions. Let us first take the perspective of the speaker, for which the data are presented in Table 2. The differences are not significant ($\chi^2 = 1.77, p = 0.18$), leading to the conclusion that our dataset does not confirm that female participants are more often overlapped than men when they are interrupted. When we take the perspective of the interruptor (cf. Table 3), we find that, overall, male interruptors have a tendency to interrupt more often by overlapping than female interruptors do (39.0% vs. 34.8%; $\chi^2 = 5.21, p < 0.05$).

interruptor	overlap	no overlap	total
male	876 (39 %)	1368 (61%)	2244
female	357 (35%)	669 (65%)	1026
total	1233 (37%)	2037 (62%)	3270

Table 3: Overlap in interruptions by male and female speakers.

Finally, we consider both the gender of the interruptor and the interruptee. Here, we find two significant gender effects: men overlap more often when interrupting women than when interrupting other men ($\chi^2 = 18.14, p < 0.001$), while women overlap more often when interrupting men than when interrupting other women ($\chi^2 = 87.1, p < 0.001$).

4.3.2. Dialogue acts of interrupting utterances

As a second step in investigating the competitiveness and collaborativeness of interruptions, we examine the dialogue acts of the interrupting utterances, using the ICSI MRDA annotation [22]. Comparing the distribution of dialogue act types performed by interrupting utterances to the dialogue act distribution in the entire set of multiparty multigender meetings, we observe that interrupting utterances contain a lower proportion of backchannels and a higher proportion of floor grabbers and yes-no questions. The following examples illustrate interruptions performing these dialogue acts. Example (4), (5) and (6) present interruptions with a floor grabber (tag < fg >), a backchannel (< b >) and a yes-no question (< qy >), respectively. Intuitively, interruptions with floor grabbing mechanisms seem more dominant and competitive than interruptions using

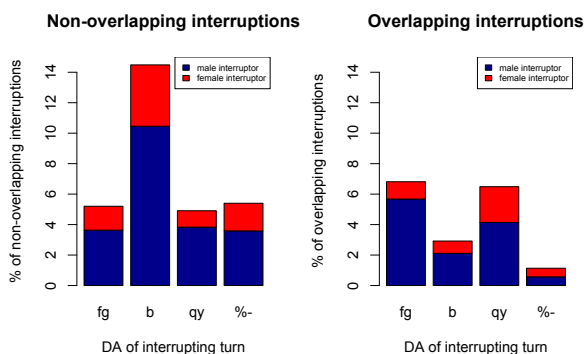


Figure 3: Frequency of floor grabbers, backchannels, yes-no questions and interruptions for overlapping and non-overlapping interruptions.

backchannels, while yes-no questions, which are often clarification requests as in (6), appear to be somewhat in between.

- (4) a. if person x ==
(Bmr005 fe016 1046.71–1047.69 s.%–)
b. well — my feeling on it was that it wasn't really important who said it .
(Bmr005 fe008 1048.03–1052.15 fg)
- (5) a. and then you ca- - then you can do a s- ==
(Bmr014 fe008 834.802–836.032 s.%–)
b. yeah .
(Bmr014 mn014 835.726–836.366 b)
- (6) a. so they doubled ==
(Bed010 m036 2143.34–2143.93 s^bu.%–)
b. because it's within reach now ?
(Bed010 fe0044 2143.75–2144.88 qy^bu^d^rt)

Figure 3 shows a breakdown of the most relevant DAs by the gender of the interruptor, distinguishing between overlapping and non-overlapping interruptions. We can see that backchannels are far less present in overlapping interruptions, while floor grabbing utterances, although more prominent in the presence of overlap, can be observed in both overlapping and non-overlapping interruptions. If we take floor grabbers as indicators of competitiveness and backchannels as markers of collaborativity, this suggests that non-overlapping interruptions are more often collaborative than overlapping ones. We can also see that non-overlapping interruptions are more often themselves interrupted than overlapping ones (tag <%->).³ This suggests that overlapping interruptions tend to be more successful in grabbing and keeping the floor.

When we zoom in to the differences across genders, we find that male participants interrupt more often with overlapping floor grabbers than female participants (6.42% vs. 4.48%: $\chi^2 = 4.46, p < 0.05$). This supports the hypothesis that men's interruptions are more often competitive than women's. Taking the perspective of the interruptee, only one result is significant: men are more often interrupted with yes-no questions than women (6.14% vs. 4.33%: $\chi^2 = 4.37, p < 0.05$).

When considering the gender of both interruptor and interruptee, we find that the male participants do not tend to use different floor mechanisms for interrupting male and female participants. Female participants also showed no significant differ-

³Only interruptions to which no other DA could be attributed are counted under the <%->-tag here.

ences in this respect, except for the fact that they hardly ever use yes-no questions to interrupt women, while they do use them to interrupt men (6.50% vs. 1.80%: $\chi^2 = 9.59, p < 0.005$).

5. Discussion and Conclusions

Some of the hypotheses stated in Section 2 could be confirmed by our study, but others could not. Considering the overall interruptions, our data did not provide evidence for the hypothesis that men interrupt more often than women (hypothesis 1(a)). We did however find evidence for the hypothesis that women are more often interrupted than men (hypothesis 1(b)).

When we take into account both the gender of the interruptor and the gender of the interruptee, our dataset confirms that men interrupt more often women than other men (hypothesis 2(a)). In contrast to some previous studies [17, 15], we did not find support for hypothesis 2(b), namely, that women interrupt more often other women than men. This divergence with previous results may be due to differences in the definition of interruption. For instance, although Yuan et al. [15] acknowledge that interruptions and speech overlaps are different phenomena, they choose to focus on overlaps as a proxy for interruptions. Our definition of interruption is more fine-grained and our setup allows us to distinguish it from overlaps. If we consider the frequency of overlaps (not only in interruptions, as we did in Section 4.3.1, but in the entire multigender dataset, as shown in Table 1), we do find strong evidence that women overlap significantly more often with other women than with men ($\chi^2 = 311.43, p < 0.001$), in line with the findings of Yuan et al. [15]. This confirms that interruptions and overlaps are indeed different phenomena, and shows that they are influenced differently by gender-related factors.

The last hypotheses that we investigated (hypotheses 3 (a) and (b)) stated that interruptions by men are more often competitive and less often collaborative than interruptions by women. As the corpus did not contain broad annotations for competition or collaboration, we studied the issue indirectly by two aspects that are argued to be indicative of these categories. We found that the male participants had a tendency to interrupt more often with overlapping speech and with floor grabbers than female participants. Taking overlapping interruptions and floor grabbers as indicative of competitiveness, these findings provide evidence for this hypothesis.

Although our study certainly sheds a new light on the influence of gender on interruptive behaviour by systematic analysis in a relatively large corpus, the results should still be interpreted with the utmost care. We should always keep in mind that the corpus consisted of very specific conversations (meetings at a computer science institute), by quite specific speakers (highly educated scientists) on specific topics (work/research related). Moreover, other potentially important factors influencing interruptive behaviour, such as hierarchical relations, age, cultural background and role in the meeting, were not annotated in the corpus and could therefore not be factored out. Further investigation on corpora containing more diverse conversations of which more information about the participants and their mutual relations is available will certainly provide more generalisable results.

6. Acknowledgements

This research was funded by the Marie Curie Initial Training Network ESSENCE (grant agreement no. 607062) and by the NWO VIDI grant *Asymmetry in Conversation* (276-89-008).

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