

# The ADELE Corpus of Dyadic Social Text Conversations: Dialog Act Annotation with ISO 24617-2

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## Abstract

Social or interactional dialog is less well described than task-based or instrumental dialog, although there is increasing interest in the genre, particularly in light of new spoken and text dialog applications which aim to relate to the user as well as perform tasks. Dialog act annotation aids understanding of interaction structure; essential to the design of successful artificial dialog. Much social text interaction may be closer to social talk than to traditional written language. In this paper we briefly describe social or casual talk, and review how current dialog annotation schemes and particularly the ISO standard 24617-2 (Semantic annotation framework, Part 2: Dialogue Acts) treat non-task elements of dialog. To aid in training a casual talk system, we collected a corpus of 193 dyadic text dialogs, based on a novel 'getting to know you' social dialog elicitation paradigm. We describe the annotation of the dialogs, and propose additional acts to better cover greeting and leavetaking. We report on preliminary analyses of the corpus, and provide an overview of the corpus content and its relationship to spoken language. The corpus, coding manual, and annotations are being packaged and will be made available to interested researchers.

**Keywords:** Casual Conversation, Dialog Corpus, Dialog Acts

## 1. Introduction

Many dialogs and indeed parts of dialogs can be described as task-based or instrumental, with clear goals, as in the case of a service encounter or business meeting. Others, such as friendly chats or longer casual conversations, are more interactional in nature. Acknowledging that modelling casual conversation would prove difficult, early dialog technology research focused largely on practical goal-oriented dialog (Allen et al., 2001). Recently, more attention is being paid to social aspects of spoken and text interaction, with the desire for systems which can engage, entertain, and provide the illusion of companionship to users. Successful design of such systems requires relevant data. Dialog act annotation aids understanding of interaction structure; such understanding is essential for designing artificial spoken or text dialog. Below, we briefly review accounts of casual social talk and discuss how current dialog annotation schemes and particularly the 'ISO standard 24617-2 Semantic annotation framework, Part 2: Dialogue acts' (ISO, 2012) (henceforth ISO standard) treat non-task elements of dialog. We then describe the collection and annotation, using the ISO standard, of 193 text dialogs elicited using a novel 'getting to know you' paradigm. We describe the distribution of dialog acts in the corpus as a whole, report on annotation of the dialog acts used in greeting and leave-taking sequences, and describe proposed new social dialog acts for these sequences. We also outline our ongoing work in this area.

## 2. Instrumental and Interactional Dialog

With live text exchange a part of everyday life we have seen an explosion of casual writing. The structure and content of much of this writing is dialogic and informal, in con-

trast to traditional unilateral written texts. With the popularity of messaging applications, both SMS and more recent developments such as Facebook Messenger, text conversations are commonplace for social and practical goals. Chatbot implementation on the web and through social media platforms has made conversational commerce and customer care through artificial dialog ubiquitous additions to company websites and social media. Spoken dialog applications such as Alexa or Siri now seek to give the impression of a companionable interlocutor as well as performing practical tasks. We are interested in building dialog systems to create the illusion of a more social or friendly interaction, whether for casual or interactional conversation or to 'lubricate' more transactional exchanges. As a first step we have built a corpus of dyadic text conversations where participants play a 'getting to know you game'. We believe the text of such exchanges is closer to the language found in casual conversational speech than to traditional formal written language, as observed in Fairclough's ideas of 'conversationalization' of text (Fairclough, 1992). Below we briefly review relevant literature on casual conversation.

Casual conversation has been viewed as the most basic use of language (Malinowski, 1936). Such conversation has been theorised to aid in the building of social bonds and in the avoidance of unfriendly or threatening silence, rather than simply serving to providing the medium for the exchange of information or expression of thought (Jakobson, 1960; Brown and Yule, 1983). Schneider (Schneider, 1988) noted casual talk did not seem to conform to Gricean maxims governing the efficient transfer of linguistic information, and proposed a set of maxims peculiar to this genre, based on the importance of avoiding silence and maintaining politeness, suggesting that Grice's Co-operative Prin-

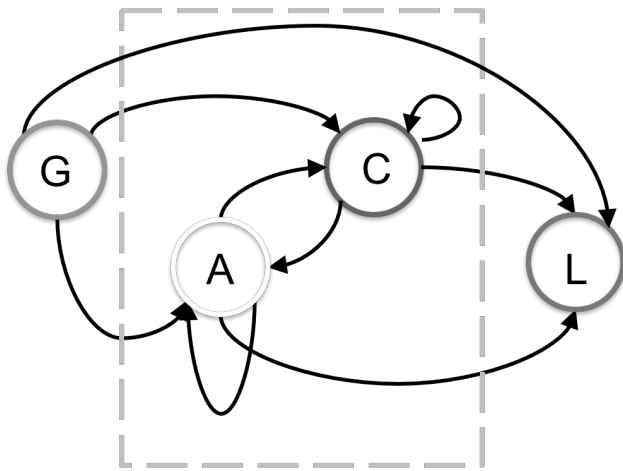


Figure 1: A simplified version of Ventola’s conversational phases. The Greeting and Leavetaking phases occur at either end of the interaction, while Approach and Centring stages can recur and alternate throughout the ‘body’ of the interaction.

ple itself (Grice, 1975) remained relevant. Casual conversation is postulated to be the medium through which people form and refine their social reality (Eggin and Slade, 2004). Casual conversation can include stretches of small talk, discussion, narrative, and gossip. Laver viewed small talk as performing a transitional function from silence and greetings to the ‘meat’ of the interaction, and back to closing sequences and leave taking (Laver, 1975). Casual conversation is not monolithic, its structure has been described in terms of distinct phases; ritualised opening greetings, approach segments of light uncontroversial small talk, and, in longer conversations, more informative centre phases (consisting of sequential but overlapping topics), and then ritualised leave-takings (Ventola, 1979). A simplified schematic of the phases of casual conversation can be seen in Figure 1.

Instrumental and interactional exchanges differ in duration; task-based conversations are bounded by task completion and tend to be short, while casual conversation can go on indefinitely. The task-based vs. casual or social distinction is somewhat misleading as casual or social talk has a very important goal - bonding and maintenance of relationships. This goal is implicit and longterm, and thus dialog success is not as easily measured in casual talk as it is in a simple task based interaction such as buying a pizza, where the goal of the transaction is explicit and success can be measured by the accomplishment of this goal. The design of successful companion applications will require the system to engage in casual or social conversation, and knowledge of the structure and dynamics of such interaction will permit the design of better conversational interfaces. Such knowledge will entail clear and efficient coding of the dialog acts present in such talk.

### 3. Dialog Act Annotation of Interactional Talk

Existing dialog act annotation schemes are largely task-based, perhaps due to the focus on task-based dialog for much of the history of modern dialog systems (Allen et al., 2001). While there have been some schemes based on text conversations (Kim et al., 2010), the vast bulk of schemes have been based on spoken interaction. Several annotation schemes have been developed, often in conjunction with particular corpora or experiments, such as the schemes developed to annotate Trips and Trains, Switchboard, ICSI, and the AMI corpus (Traum, 1999; Core and Allen, 1997; Jurafsky et al., 1997; Shriberg et al., 2004; McCowan et al., 2005). More extensive domain independent schemes such as DIT++ (Bunt, 2006) have also been developed, culminating in the ISO standard.

In existing dialog act annotation schemes, social talk annotation is often restricted to acts such as greeting or apologies. Surveying 14 schemes, Petukova found that 10 schemes included greeting functions, 4 included introductions, 6 had goodbyes, 5 included apology type functions, and 5 contained thanking (Petukova, 2011). Three systems (AMI, MALTUS, and Primula) provided broader tags to reflect ideas of positivity and negativity, politeness, and positive and negative face work. The ISO standard has tags in the Social Obligations Management (SOM) dimension covering nine social communicative functions, essentially social ‘niceties’: initialGreeting, initialSelfIntroduction, returnSelfIntroduction, apology, acceptApology, thanking, acceptThanking, initialGoodbye, and returnGoodbye. We are interested in identifying gaps in coverage of social talk in the ISO standard, and in broadening coverage to include social and casual as well as task-based dialog. Below we describe the collection and annotation of the ADELE Corpus of social text dialogs.

### 4. ADELE Corpus - Collection

A corpus of 193 two-person text dialogs was collected and annotated with the ISO standard to provide initial training data for the ADELE project, a personalized intelligent companion capable of engaged, yet natural and informed, conversational social dialog. Our first objective is to model the early stages or ‘onboarding’ phase when the machine and user introduce themselves and the system collects useful information about the user through a friendly conversation, corresponding to Ventola’s Greeting and Approach stages. Below we briefly describe the scenario and participants, and the interaction platform.

#### 4.1. Scenario

The scenario used was designed to elicit dyadic social dialog. The dialogs were text-based, between English speaking adults connecting remotely via a web-based interface. Each participant was given a persona with information on home, relationships, nationality, job, hobbies and interests. The objective was to discover this information about the interlocutor and also to discover any facts or interests in common. Participants were instructed to be friendly and chatty. In order to promote friendly chat rather than ‘interviewing’ behaviour, one point was given for each utterance, one for

each trait discovered about the opposing interlocutor discovered, and five points were given when commonalities were discovered.

## 4.2. Interaction Platform Design

The data were collected using a Dialog Interface, a Google Chrome extension for the team collaboration tool Slack<sup>1</sup>, developed in HTML5, CSS3 and JQuery. Interactions were scheduled using a Matching Engine, a RESTful API developed in Java JAX-RS and Jersey that creates new conversations between pairs of available participants and assigns each one a randomly-generated persona. All data were collected in the dialog database (PostgreSQL). Through the Dialog Interface, participants could converse with their partner in the experiment, record the persona traits of their partner, view their own traits and mark which were common.

## 4.3. Data Collection

The conversations were collected over two months in late 2016. There were 37 participants (26M/11F, age 18-43), all either native English speakers or at least IELTS International English Language Testing Service level 6.5. All participants were postgraduate students or employees of Trinity College Dublin, recruited by advertising within the College. During the experiment, the participants interacted over the Dialog Interface to discover attributes of their partner's persona. When all the attributes of a persona were discovered, participants marked the conversation as finished. If they wished, they could continue their participation and be re-assigned a new fictitious persona and another anonymous participant to start a new conversation with. Thus, a participant could take part in more than one conversation over the course of the data collection, but not with a previous partner.

## 5. ADELE Corpus - Annotation

A total of 193 completed dialogs were collected. The conversations were annotated using a modified version of the ISO standard, based on 'gold standard' examples of dialogs from the Switchboard corpus annotated using the ISO standard, and presented on the Dialog Bank website (Bunt et al., 2016). A pilot annotation of a subset of the corpus was carried out by two annotators to determine the suitability of the ISO standard to these dialogs and whether extensions were necessary.

One purpose for the annotated corpus was to train a spoken dialog system which would be able to play the roleplaying game described above with a human partner. Therefore, lexical tags were added to the information transfer dialog acts whenever relevant information was included in a participant's contribution. These tags reflected the topic being discussed. In order to distinguish between utterances which moved the dialog forward (by informing the interlocutor of one of the pieces of information needed to accomplish the task) and follow up (friendly comments on this information), any inform act which was not a 'first mention' of relevant information was tagged as a comment, with lexical tags used to mark which topic the act referred to. The

lexical tags took the form **[topic]** where the value for topic could be any of the persona attributes in the task, and the tags were appended to the dialog act tags for the relevant functional segments, so the annotation **inform[food]** describes **'I love Chinese food'**.

During the course of the pilot annotation, annotators noted that there were recurring dialog components in extended greeting/introductions and leave-taking (henceforth GIL) sequences which could not easily be satisfactorily annotated using the set of dialog act tags in the SOM dimension of the ISO standard. The fragment below illustrates some of these difficulties in an extended greeting/introduction sequence.

1. A: Hi
2. B: Hello, I'm Ann. I'm from Mexico City. Yourself?
3. A: Hi Ann, nice to meet you. I'm John.
4. B: Hey John, nice to meet you too. How are you today?
5. A: Good, good. You? I'm from Paris, living in London now.
6. B: I'm in good form!.

In the fragment there are four instances of **hello**, **hi**, or **hey**. The first two can be accounted for by the ISO but not the latter as there is no 'generic' greet tag, but only initialGreet and returnGreet. The expression **nice to meet you** and response **nice to meet you too** in lines 3 and 4 are clearly formulaic greetings but it is unclear how to annotate them. A similar situation obtains with the **How are you today? – Good, good and You? (ellipsis of How are you?) – I'm in good form!** in lines 4-6. If the first part of these adjacency pairs are annotated as setQuestions and the second parts as informs or answers, these tags could be placed in the SOM dimension. However, these composite treatments are clumsy to implement during annotation and do not reflect the illocutionary force of the expressions as clearly as existing SOM tags (initialGreet, returnGreet) do for the **Hi** and **Hello** in lines 1 and 2.

To make annotation more efficient, additional acts were created in the SOM category to more easily mark such sequences and similarly problematic sequences in leave-taking sequences. For greeting sequences, the new tags were **ntmy** and **repNtmy** to tag utterances such as 'It's nice to meet you', and responses such as 'Likewise' or 'Nice to meet you too', **hay** and **repHay** sequences like 'How are you?', and responses such as 'Fine.', and **greet** for extra 'Hello' and 'Hi' utterances. For leave-taking, the new tags were **wntmy** and **repWntmy** for 'It was nice to meet you' and 'It was nice to meet you too'. Table 1 shows the new GIL acts common examples of how they occur in the corpus, and counts. The annotation process, development and analysis of these acts are more fully described in (Gilmartin et al., 2017).

The entire corpus of 193 dialogs was then annotated using this expanded scheme. Conversations were annotated using a Microsoft Excel spreadsheet adapted from those on the

<sup>1</sup><https://slack.com/>

Act	Common Examples	Functional Area
ntmy	Nice to meet you	greeting
repNtmy	Good to talk to you Nice to meet you too Good to talk to you too	greeting greeting greeting
hay	How are you?	greeting
repHay	How's it going? Fine	greeting greeting
greet	Hello Hi	greeting greeting
wntmy	It was lovely to meet you	leave-taking
repWntmy	Nice talking to you It was nice to meet you too Likewise	leave-taking leave-taking leave-taking

Table 1: Acts introduced for the ADELE annotation and common surface forms

DialogBank website<sup>2</sup>, which were designed for annotation using the ISO standard. The DiAML-TabSW version of the Excel template was used. For each utterance, each dialog act and the relevant functional segment was given a unique identifier and noted on a separate line with details of sender, addressee, and relevant rhetorical relations.

Greeting sections were marked as beginning with the first utterance of the conversation, and ending with the last production of a formulaic greeting/introduction or greeting/introduction response. Leave-taking sequences were marked from the first attempt to close the conversation to the final utterance of the conversation. The data contained 9231 turns or ‘utterances’ where a turn was defined as the text entered before a user pressed the return key to send their contribution. The vast bulk of utterances were tagged with a single label (7811, 84.7%), 1209 (13%) had two tags, 181 (2%) had three tags, while 26 (0.3%) and 3 utterances had four and five tags.

Of 10889 dialog act tags, 2336 or 21.5% were included in GIL sequences. 1329 tags related to greeting and 1007 to leave-taking. GIL sequences sometimes contained other acts unrelated to greeting, introduction, or leave-taking, as in the above example where the dialog acts contained in **I’m from Mexico City. Yourself?** in line 2 are an inform and setQuestion related to the task. The question is answered on line 5 near the end of the greeting/introduction sequence. The number of dialog acts directly involved in GIL sequences was calculated by disregarding such ‘interlocking’ acts.

Greeting/introduction alone accounted for 1034 labels, while leave-taking alone accounted for 786 labels, making a total of 1820 acts of greeting/introduction and leave-taking, or 16.7% of all dialog acts tagged in the corpus. The leave-taking totals include 194 Leave-taking Introductions – utterances which introduce the closure of the dialog.

<sup>2</sup><https://dialogbank.uvt.nl/>

These utterances could be included in the Discourse Structuring dimension, in which case the total for GIL drops to 1626 or 15% of all dialog act labels, which is the most conservative estimate of the proportion of GIL tags in the corpus. The total SOM acts in the corpus including SOM categories outside GIL from the ISO standard amounts to 1824 or 17%. In terms of the prevalence of the new greeting tags, in 187 conversations the hay (How are you?) tag appeared 68 times, the ntmy (Nice to meet you) tag appeared 101 times, and the extra greet tag appeared 66 times (each conversation contained two initialGreet). The response tags repHay and repNtmy appeared less frequently, with 49 instances of repHay and 25 of repNtmy. For the leavetaking tags, there were 139 wntmy (It was nice to meet you) tags and 47 repWntmy tags. These figures are summarized in Table 2.

Act	Common Examples	Functional Area	Count
ntmy	Nice to meet you	Greeting	101
repNtmy	Nice to meet you too	Greeting	25
hay	How are you?	Greeting	68
repHay	Fine	Greeting	49
greet	Hello	Greeting	66
wntmy	It was lovely to meet you	Leave-taking	139
repWntmy	It was nice to meet you too	Leave-taking	47

Table 2: Distribution of new GIL acts

Description	Count	%
Words	50,439	-
Utterances	9,954	-
- 1 dialog act	7,998	80%
- 2 dialog acts	1,524	15%
- 3 dialog acts	336	3%
- 4+ dialog acts	96	2%
Dialog Acts	12461	-
- Informs	6265	50%
- Questions	2136	17%

Table 3: Words, Utterances, and Dialog Acts in the ADELE Corpus

## 6. ADELE Corpus Description

The 193 dialogs contained a total of 50,438 words over 9954 utterances (as shown in Table 3), where an utterance was defined as the text entered before the user pressed return. The number of words and utterances per conversation both have log-normal frequency distributions, as shown in Figure 2. The mean number of words per conversation was 250.41, and mean utterances per conversation was 47.76. The number of words per utterance, also shown in Figure 2 ranges from 1 to 49.

### 6.1. Dialog Structure in the ADELE Corpus

In the ADELE Corpus the ratio of statements to questions is almost 3:1, which, in conjunction with the prevalence of single act utterances, demonstrates that the conversations did not follow a simple ‘ping-pong’ question-answer structure (a more rigid question/answer dialog would have a ratio of statements to questions closer to 1:1).

### 6.2. Dialog Acts in ADELE Corpus

The majority of utterances (7998) contained a single dialog act, 1524 contained two dialog acts, with 336 containing 3

dialog acts, 74 with 4 dialog acts, 19 containing 5 and 3 containing 6 dialog acts. It should be noted that the ISO allows multiple tags to attach to the same functional segment (part of utterance which can be described by a dialog act) or utterance.

Of the total 12461 dialog acts annotated, the most common were informs (statements) with 6265 tokens. For the purposes of this corpus, first mentions of relevant information were tagged as informs (2704) while other informs (subsequent mentions or comments) were tagged as comments (3561). There were a total of 2136 questions. Set questions (wh-questions) accounted for 1303 acts, while 'return' set questions (e.g. 'and yourself?') totalled 445, and propositional questions (yes/no questions) totalled 331. There were 58 check questions and 10 choice questions. It should be noted that these question totals do not include 'how are you?' questions which were separately tagged as **hay** acts, and that greeting and leave-taking 'nice to meet you' expressions were not tagged as informs, but as **ntmy** or **wntmy**.

### 6.3. Lexical Density of ADELE Conversations

In order to informally check our assumption, that text chat would be close to spoken conversation, we calculated the lexical density of each of the ADELE conversations and compared their mean with the mean lexical density of conversations in the Cardiff Conversation Database of informal dyadic spoken conversations (Aubrey et al., 2013). Lexical density is a measure of the density of information in a sample of language, calculated as the ratio of lexical ('content') words to the total number of words. This measure is used in genre differentiation and spoken language has been found to have significantly lower lexical density than written text (Ure, 1971; Halliday, 1989; Biber et al., 1999). Lexical density can thus be used as an indicator of how casual the language in a sample is, and compared with other samples. Figure 3 shows the distribution of lexical density values per conversation in the ADELE corpus. The mean value is 0.48. For comparison purposes we calculated the mean lexical density for the conversations in the Cardiff Conversational Database (CCDb), a collection of short dyadic informal spoken conversations. The CCDb mean lexical density was 0.46. All lexical density statistics were obtained using the Web-based Lexical Complexity Analyser (Ai and Lu, 2010).

## 7. Conclusion

We have described the collection, annotation, and preliminary analyses of the ADELE corpus, a new collection of casual or social dyadic text interactions. The dialog act annotation has resulted in the creation of new dialog acts, expanding the coverage of greeting, introduction, and leave-taking sequences. We found the structure of the conversations to differ from the series of 'question-answer' sequences prevalent in task-based dialog, with the ADELE conversations having a 3:1 ratio of statements to questions. There is a high proportion of Social Obligation Management (SOM) acts, and particularly Greeting, Introduction, and Leavetaking (GIL) acts, in the ADELE corpus. To provide context, Petukova reports percentages of SOM acts in

three task-based corpora (AMI, OVIS, and DIAMOND) as ranging from 0.5 to 7.8% of total dialog acts (Petukhova, 2011). The prevalence in the ADELE corpus (15%) is much higher. The bulk of SOM acts in ADELE are greetings/introductions and leave-taking, which is likely due to the more sociable nature of the interactions in ADELE, and to the nature of the 'getting to know you' scenario. It would be very interesting to see how the GIL acts added to the tags for ADELE were accounted for in other corpora. Using lexical density measures as an indicator of 'conversationableness' of the data, we found that lexical density of the ADELE conversations is close to that of the casual spoken language in the Cardiff Conversational Database, which provides some support for claims that the language of casual text-based interaction is closer to spoken conversation than traditional written text.

The factors mentioned above provide some preliminary evidence that the content of the ADELE corpus is social and casual, and similar to conversational speech. However, the tight central tendency for utterances per conversation is not a feature of casual talk, which tends to be open-ended and thus variable in length. The clear central tendency in the distribution of interaction duration in the ADELE corpus is probably an artefact of the nature of the task – there are a fixed number of topics spoken about and participants would tend to move on after discussing each topic, thus limiting conversation length.

Our dialog act annotation of the ADELE corpus demonstrates the need for more investigation of the dynamics and structure of conversations which are not strictly task-based, and for consideration of how such conversations are described in terms of dialog acts. We began by tackling the 'edges' of the interactions in Greeting and Leavetaking. The 'meat' of such conversations tends to weave in and out of different types of interaction – discussion, narrative, gossip, and highly interactive chat or smalltalk. Interactional success depends on 'keeping the conversation going' for extended periods, in contrast to task-based interaction where efficient accomplishment of short term practical goals drives success. In a service encounter such a buying a pizza, the topic can change as soon as the information requested is attained. However, in casual conversation, such changes may be less abrupt, with topic shading allowing friendly conversational flow to be maintained. Maintaining casual conversation involves local activity by participants to choose and develop topics of interest. We are currently using the ADELE data to explore the dynamics of topic changes in conversations which are not strictly task-based to inform the design of companionable text and spoken dialog systems.

We are also validating the expanded annotation scheme used for ADELE with naïve annotators, further investigating the characteristics of the language and dialog acts in the corpus in comparison with other corpora of spoken and written language, continuing our investigation of dialog structure and dialog acts in the Approach and Centring stages of casual conversation, and using the corpus in the ongoing development of the ADELE system. We plan to release the corpus, annotation manual, and annotations to the research community.

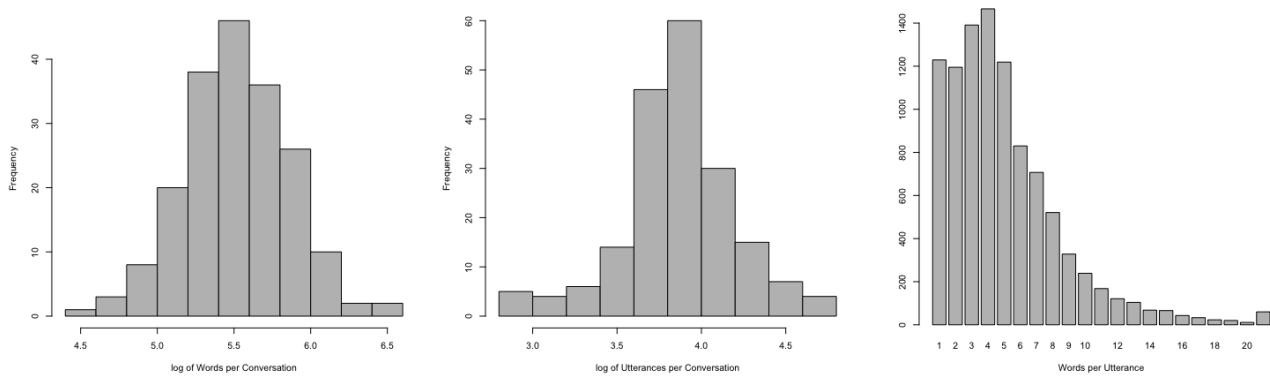


Figure 2: Frequency distributions for  $\log(\text{Words per Conversation})$ ,  $\log(\text{Utterances per Conversation})$ , and  $\text{Words per Utterance}$ , for the ADELE Corpus.

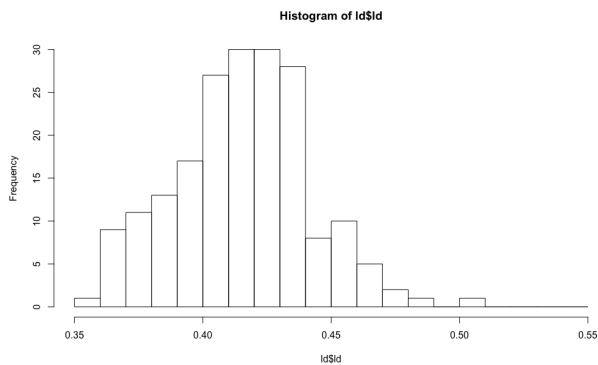


Figure 3: Histogram of Lexical Density per Conversation

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