Variation across Everyday Conversations: Factor Analysis of Conversations using Semantic Categories of Functional Expressions

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Abstract

To achieve effective dialogue processing, it is important to clarify the kinds of conversations people have in their daily lives. However, the characteristics of everyday conversation have not yet been sufficiently investigated. In recent years, the Corpus of Everyday Japanese Conversation (CEJC), which is a large-scale corpus constructed by recording everyday conversations, has been developed. By analyzing this corpus, we may be able to grasp the perspective of everyday conversations. In this paper, we aim to investigate the linguistic variation of everyday conversations in a variety of situations. We conducted factor analysis of the CEJC using semantic categories of functional expressions that represent subjective information. From our analysis, we discovered seven factors that characterize everyday conversations. In particular, this analysis suggests that everyday conversations are expressed by a combination of a dialogue's purpose (e.g, "Explanation" and "Suggestion") and its manners (e.g., "Politeness" and "Involvement").

1 Instruction

Recent advances in natural language processing based on deep learning have rapidly improved the naturalness of dialogue systems (Hosseini-Asl et al., 2020; Adiwardana et al., 2020). In order for such systems to effectively engage in conversations relevant to various situations, it is essential to clarify the kinds of conversations people actually have in their daily lives. However, investigation into the full

Figure 1: Examples of dialogue data in CEJC with dialogue situation labels (images are anonymized for publication).

nature of such communication has been insufficient due to the difficulty of data collection.

Recent years have seen the development of the large-scale Corpus of Everyday Japanese Conversation (CEJC) (Koiso et al., 2018). Figure 1 shows examples of the type of data appearing in the CEJC. This corpus contains audio-visual recordings of spontaneous conversations held in a variety of everyday dialogue situations (e.g., chatting with friends at a restaurant or meeting with colleagues in an office), and it is expected to help accelerate the study of daily-life conversations. Several studies have already investigated linguistic phenomena using the CEJC; these include, for example, distal demonstratives (Daiju and Ono, 2018), self-address questions (Endo and Yokomori, 2020), benefactive constructions (Endo, 2021), and prosody (Yuichi and Hanae, 2019). Thanks to these studies, particular conver-

sational phenomena in everyday conversation have gradually become clarified. Many of these studies are based on case studies, and in only a few studies have data-driven analyses been conducted. For example, Iseki et al. (2019) demonstrated that the distribution of the dialogue acts differs depending on a dialogue style. Murai (2019) focused on the speech styles of participants and conducted a macroscopic analysis based on the ending particles of utterances. However, it remains unclear how conversations differ from situation to situation.

In this study, we aim to identify common factors representing the linguistic variation of everyday conversations to explain the differences among the conversations held in various situations. We conducted factor analysis of the CEJC using the semantic labels of functional expressions extracted from transcriptions of dialogues. These labels represent a wide range of the speaker's subjective information. Since the conversations are formed by the exchange of subjective information, these features would provide useful cues for capturing the true nature of daily conversations. In addition, we used the pre-released edition of the CEJC, which is three times larger than the CEJC monitor edition. Therefore, our analysis is expected to extract more comprehensive and wide-ranging factors compared with those in previous studies.

2 Related Studies

2.1 Macroscopic Analysis of Text Corpus

Various approaches have been taken to analyze the global characteristics of a text corpus, such as factor analysis (Biber, 1991), principal component analysis (Burrows, 1986), and cluster analysis (Moisl, 2015). In particular, factor analysis is a method used to discover potential factors that influence observed variables. Biber (1991) applied factor analysis to discourse functions extracted from texts, thus identifying six underlying dimensions to discriminate speech and written texts, such as "Involved versus Informational Production" and "Narrative versus Non-Narrative Concerns."

Inspired by Biber (1991), we applied factor analysis to conversations in various situations while using semantic labels of functional expressions extracted from the conversations. These labels represent the

speaker's subjective information.

2.2 Categories of Everyday Conversation

There have been several studies on the categorization of everyday conversations. Eggins and Slade (2005) separated spoken language samples into casual conversations and pragmatic conversations, and they analyzed the interactional patterns of casual conversation. Tsutsui (2012) categorized the chain structures that compose casual conversations and then clarified the language form required for each chain, from the viewpoint of language education. In addition, several types of conversations, such as invitation (Szatrowski, 1993), request (Mitsui, 1997), and counseling (Kashiwazaki et al., 1997) have been analyzed, but these studies did not discuss how these conversations differ. In addition, the previous studies conducted small-scale analyses on the basis of case studies using limited datasets. In contrast, our analysis aims to identify the factors that discriminate various everyday conversation based on a data-driven approach. The CEJC, which is a large-scale corpus of everyday conversations, permits such a data-driven macroscopic analysis.

3 Corpus of Everyday Japanese Conversations

The CEJC is constructed using video cameras and IC recorders to capture conversations embedded in the naturally occurring activities of daily life. We used the CEJC's pre-released edition, which contains 152 hours of conversations. This edition includes data of everyday conversations recorded by 33 informants selected by considering the balance of gender and age groups.

The audio data were recorded with IC recorders (Sony ICD-SX734) for individual participants as well as a central IC recorder (Sony ICD-SX1000) placed at the center of the dialogue scenes. For video recording, the Panasonic HX-A500 was used for the outdoor and moving situations, while a spherical camera (Kodak PIXPRO SP360 4K) and two portable video cameras (GoPro Hero3+) were used for the other situations. In particular, a single GoPro Hero3+ was employed for many of the recordings. The corpus contains transcriptions with detailed annotations, including speaker labels and the

starting and ending times of utterances. The number of recordings is 427 in total. In this study, we also used the transcriptions of the selected dialogues for our analyses.

4 Methodology

4.1 Factor Analysis

In the factor analysis, common factors, which are factors common to multiple observables, were extracted. We used linguistic features, such as semantic labels of functional expressions as described in Section 4.2, as observed variables. In this method, the observed variables are represented by a linear combination of factor scores and factor loadings:

$$\boldsymbol{x}_i = A\boldsymbol{f}_i + \boldsymbol{\epsilon}_i. \tag{1}$$

Here, $\boldsymbol{x}_i \in \mathbb{R}^d$ is observed variables and $\boldsymbol{f}_i \in \mathbb{R}^n$ represents factor scores of the i-th sample. $\boldsymbol{\epsilon}_i \in \mathbb{R}^d$ is the unique factor of the i-th sample. $A \in \mathbb{R}^{d \times n}$ is the factor loading matrix. n is the number of factors and d is the feature dimension. The obtained factor loadings and factor scores are used to interpret the extracted factors. These extracted factors are often rotated in order to improve the interpretability of the dimension.

The analysis in this paper is based on exploratory factor analysis. In this approach, it is necessary to set the number of factors empirically since no factor structure is assumed in advance. Generally, researchers decide on the number of factors by referring to the eigenvalues and factor loadings obtained from the analysis.

4.2 Features

Feature selection is important for factor analysis. In Japanese, various kinds of subjective information (e.g., modality, thoughts, and communicative intentions) are represented by functional expressions following predicates. We extract the frequencies of semantic labels of functional expressions registered in a dictionary of Japanese functional expressions (Matsuyoshi et al., 2007) and then use these frequencies as the features. This dictionary contains various semantic labels as shown by "Semantic labels" in Table 1. For example, the semantic labels of *interrogation*, *completion*, and *politeness* are extracted from the utterance "Could you tell me what

Table 1: Semantic labels of functional expressions and personal pronouns employed as features.

Semantic labels:
topic, reason, possibility, purpose, state, nominalization, meaninglessness, parallel, in addition to, unneccessity, prohibition, inevitability, impossibility, comparison, negated intention, negation, repetition, decision, continuation (from), do a favor for, simultaneity, coordinate, obligation, hearsay, addition, degree, politeness, continuation (toward), target, experience, receive a favor, respect, unexpectedness, conjecture, situation, resultative (*teoku*-form), restricted coordination, conjunction, subordinate conjunction, endpoint, recipient, spontaneous, advance, after, causative, improbability, restrictive, continuation, continuation (from), trial, excessive, emphasis, permission, contrastive conjunction, contrastive subordination, interrogation, starting point, wish, interjection, completion, completion, invitation, reminiscence, probability, quotation, intention, request
Personal pronouns:
1st person pronoun, 2nd person pronoun, 3rd person pronoun, infinitive

you have baked?" by using a semantic tagger with the dictionary.

In addition to these labels, the frequency of personal pronouns is employed as a feature inspired by a previous study (Biber, 1991).

In the analysis, these features extracted from each dialogue are used as observed variables to calculate factor loadings and factor scores.

4.3 Interpretation of Factors

The final step of factor analysis is the interpretation of the factors based on factor scores and "salient" features. Here, the factor loading of a feature reflects the extent to which the variation in the frequency of that feature correlates with the overall variation of the factor. Therefore, the characteristics of the factor can be explained by extracting the features with a large absolute factor loading. For example, Biber (1991) excluded the features of a loading having an absolute value less than 0.30 and defined the remaining features as salient features.

Factor scores are weights on the latent factors of each dialogue. The higher the factor score, the higher the degree to which the dialogue is influenced by that factor. In addition, we can examine the im-

pact of each factor on the categories by averaging the factor scores belonging to the same category. In this paper, we adopt the average of factor scores for each situation label to discuss the characteristics of the dialogue in each situation.

5 Dimensions and Relations of Everyday Conversation

5.1 Preparation for Factor Analysis

For the analysis, we extracted the semantic labels of functional expressions and personal pronouns from each dialogue. The number of samples taken was 427. We used a semantic tagger of functional expressions in Japanese predicative phrases[1] (Izumi, 2014; Imamura et al., 2011) to extract the semantic labels from dialogues. The personal pronouns were extracted on the basis of morphological analysis. Pronouns determined by morphological analysis were converted to each type of personal pronoun (e.g., first- and second-person pronouns) according to predetermined rules. In our analysis, the frequencies of these labels were used as the features. Here, the labels that appeared fewer than 20 times in the corpus were excluded. Table 1 summarizes the features used for the analysis. The frequency of each label was normalized to a text length of 1,000 words inspired by the earlier study (Biber, 1991), and then standardized to a z-score.

For factor analysis, we used the factor_analyzer[2] package of Python. Varimax rotation was adopted for the extracted factors. Again inspired by the previous study (Biber, 1991), we defined the features with factor loadings having absolute values of 0.30 or higher as salient features. The factor scores of each dialogue were calculated by a regression method.

The obtained factor scores were averaged for each situation label. As shown in Figure 1, the CEJC dialogues have four types of labels that characterize situations: the conversational style (Style), the place where the conversation took place (Place), the kind of activity performed while talking (Activity), and the relationship between the participants (Rela-

[1]https://www.rd.ntt/e/research/MD0057.html
[2]https://factor-analyzer.readthedocs.io/en/latest/factor_analyzer.html

Table 2: Dialogue situation labels for analysis of CEJC (pre-released edition).

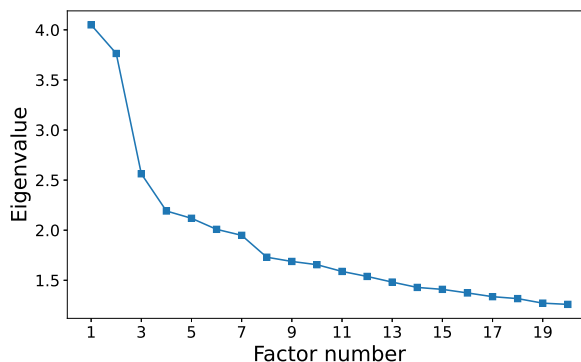| Situation	Labels
Style	Meeting, Discussion, Chat
Place	Car, School/Workplace, Indoors, Outdoors, Other_facilities, Restaurant, Home
Activity	Leisure activities, Work, Social life, Meals, Social life with meals, Work with meals, Rest, Studying, Housework, Social participation, Transportation, Healthcare, Extracurricular activities, Others
Relation	Social relationships, Friends, Family

Figure 2: Scree plot of eigenvalues.

tion). Table 2 gives an inventory of the situation labels used for the analysis.

5.2 Determination of Factors

In this paper, the number of factors was determined using scree plots. Figure 2 is a scree plot of the eigenvalues obtained by principal component analysis, arranged in descending order. As shown in the figure, the first and second eigenvalues account for the majority of shared variance. In addition, there are large decreases in values between the second and third eigenvalues and between the seventh and eighth eigenvalues. We determined the number of factors as seven, by considering the trend of the scree plot.

We summarize the salient features of the seven extracted factors in Table 3 and list the average factor scores for all situation labels in Table 4. In Table

Table 3: Salient features of each factor.

Factor 1: Explanation		Factor 2: Request		Factor 3: Narrative	
quotation	0.68	emphasis	0.61	completion	0.54
subordinate conjunction	0.48	request	0.57	continuation	0.43
contrastive conjunction	0.47	conjunction	0.53	after	0.38
reason	0.45	degree	0.47	negation	0.37
topic	0.40	in addition to	0.40	do a favor of (*kureru*-form)	0.36
nominalization	0.33	continuation (from)	0.38	infinitive	0.34
addition	0.32	comparison	0.34	probability	0.33
obligation	0.32	excessive	0.31		

Factor 4: Politeness		Factor 5: Empathy		Factor 6: Involvement	
politeness	0.67	wish	0.62	2nd person pronouns	0.55
interrogation	0.63	comparison	0.49	interjection	0.48
do a favor of (*ageru*-form)	0.46	conjecture	0.48	1st person pronouns	0.40
causative	0.42	interjection	0.36	state	0.33
decision	0.36	restrictive	0.34	Factor 7: Suggestion	
possibility	0.30			invitation	0.43
				experience	0.36
				permission	0.31
				decision	−0.47

4, bold font indicates the top-five scores of labels for each factor. From factor loadings and scores, we identified the seven factors of "Explanation," "Request," "Narrative," "Politeness," "Empathy," "Involvement," and "Suggestion." The rationale for this interpretation is explained in the following section.

Four of the extracted factors ("Explanation," "Request," "Narrative," and "Suggestion") are assumed to correspond to dialogue acts (Austin, 1975). For example, SWBD-DAMSL (Jurafsky and Shriberg, 1997) contains labels, such as "Statement" and "Info-request," that are similar to the identified factors. Therefore, we interpreted these four factors as being related to dialogue purposes. In contrast, the remaining three ("Politeness," "Empathy," and "Involvement") are assumed to be factors related to dialogue manners, that is, how one should interact with the dialogue partner. These results suggest that everyday conversation is composed of a combination of dialogue purposes and manners and thus can be explained by the possible combinations of these factors.

In the next section, we explain our interpretation of each factor in more detail. All utterance examples were translated from Japanese. The parentheses indicate the salient features extracted from the utterance.

5.3 Factor Interpretation

Factor 1: Explanation

As shown in Table 3, the salient features of Factor 1 contain the semantic labels given to the utterances stating the basis for an opinion, such as *quotation*, *subordinate conjunction*, *contrastive conjunction*, and *reason*. Therefore, we interpreted this factor as "Explanation." A typical dialogue example is as follows:

> (T013_018)
> IC01: Uh, I think Yoshinoya restaurant is the best.
> IC02: I don't think so.
> IC02: But, I went there because the food is cheap. (*reason*)

From the factor scores in Table 4, we can see that "Meeting" has a higher score in terms of "Style." It is a reasonable result that utterances aimed at explanation are more likely to appear in meetings. The other labels with high scores are related to "Activity": "Work," "Social participation," "Extracurricular activities," and "Other." It is assumed that the scores of this factor were high because the conversations associated with these activities tend to be deliberative meetings.

Table 4: Average factor scores of each situation label. Bold font indicates the top-five label scores for each factor.

Situation	Label	Factor 1 Explanation	Factor 2 Request	Factor 3 Narrative	Factor 4 Politeness	Factor 5 Empathy	Factor 6 Involvement	Factor 7 Suggestion
Style	Meeting	**0.904**	0.027	−0.291	0.293	−0.280	−0.373	0.359
	Discussion	0.239	**0.286**	−0.077	0.257	−0.117	−0.236	**0.487**
	Chat	−0.128	−0.080	0.041	−0.091	0.051	0.090	−0.158
Place	Car	−0.072	−0.168	**0.678**	−0.102	0.057	0.071	−0.282
	School/Workspace	0.417	−0.015	−0.152	**0.428**	−0.049	−0.341	0.167
	Indoors	−0.196	−0.043	0.001	−0.265	−0.194	−0.082	0.012
	Outdoors	−0.560	−0.155	**0.254**	−0.217	**0.223**	−0.012	0.179
	Other_facilities	−0.063	**0.429**	0.061	**0.742**	−0.062	−0.145	−0.218
	Restaurant	0.117	0.000	−0.203	−0.047	0.019	0.096	−0.143
	Home	−0.166	−0.075	0.160	−0.333	0.094	**0.239**	0.090
Activity	Leisure activities	−0.899	**1.450**	−0.151	−0.007	0.056	**0.197**	**0.549**
	Work	**0.566**	−0.091	−0.207	**0.467**	−0.119	−0.391	0.136
	Social life	0.040	−0.104	0.081	−0.040	−0.009	−0.103	−0.341
	Meals	−0.229	−0.089	**0.167**	−0.349	−0.300	**0.317**	−0.106
	Work with meals	−0.105	0.177	−0.041	−0.317	−0.221	**0.299**	−0.154
	Social life with meals	−0.130	−0.084	−0.244	−0.047	−0.008	0.121	−0.141
	Rest	−0.043	−0.040	0.084	−0.341	**0.263**	**0.142**	−0.005
	Studying	−0.186	**0.612**	0.162	0.300	**0.606**	−0.171	**1.099**
	Housework	−0.475	−0.027	0.068	−0.401	0.013	−0.034	**0.588**
	Social participation	**0.445**	0.122	0.147	0.407	−0.244	−0.048	0.347
	Transportation	−0.017	−0.123	**0.632**	−0.124	0.144	0.030	−0.306
	Healthcare	0.189	0.076	−0.131	**1.537**	**0.288**	−0.141	−0.597
	Extra-curricular activities	**0.474**	−0.166	0.014	0.202	−0.193	−0.311	0.333
	Other	**0.922**	**0.203**	−0.503	−0.181	−0.131	−0.434	**0.996**
Relation	Social relationships	0.269	0.101	−0.297	**0.493**	−0.125	−0.179	−0.051
	Friends	0.036	0.004	−0.109	−0.045	**0.220**	−0.001	−0.032
	Family	−0.242	−0.081	**0.336**	−0.334	−0.121	0.138	0.070

Factor 2: Request

The salient features of Factor 2 include *emphasis*, *request*, and *excessive*. These features appear when a speaker requests something of his or her listeners. We thus interpreted this factor as "Request." A typical dialogue example is as follows:

> (T011_015)
> IC01: You don't take good care of your books.
> IC04: Alright.
> IC02: You haven't even read Harry Potter.
> IC01: Put it back on the shelf.
> IC02: Yes, please put it back. (*request*)

From Table 4, "Discussion" has a high score in terms of "Style." These results seem reasonable because there are many utterances aimed at making requests in discussion.

In addition, "Other_facilities," "Leisure activities," "Studying," and "Other" obtained high scores.

Since conversations like discussions tend to occur under situations such as "Other_facilities" and "Studying," the scores of this factor were high. The reason why "Leisure activities" obtained a high score is that directive utterances frequently occur in a sports scene. An utterance example is as follows:

> (T003_019)
> IC03: Hey, try swinging a baseball bat once. (*request*)

Factor 3: Narrative

In Factor 3, the semantic labels representing *tense*, *negation*, and *indefinite* became salient features. These salient features are similar to the "Narrative versus Non-Narrative Concerns" in an earlier study (Biber, 1991). Here, the meaning of "narrative" is "an account of a series of events, facts, etc., given in order and with the establishing of connections between them" from the Oxford dictionary. Actually, the participants tend to share recent and

past events around them under the situation where the score for this factor is high (e.g., talking with family members). Therefore, we interpreted this factor as "Narrative."

A typical dialogue example is as follows:

> (T013_021)
> IC02: We used to have swimming and ski camps. (*completion*)
> IC01: That's right. Yes, skiing, that's right.
> IC02: But it was the time of the student movement, so they had been canceled. (*completion*)

From Table 4, the labels with high factor scores are "Car," "Outdoors," "Meals," "Transportation," and "Family." Family members tend to share events around them in moving vehicles and when taking meals. In addition, conversations about objects the speakers have passed often occur in moving vehicles. A typical dialogue example is as follows:

> (T011_012)
> IC02: Huh? The road was enlarged.
> IC03: Umm.
> IC02: Oh, this has been the right way. (*completion*)

Such conversations are similar to narrative conversations and increase the score of this factor.

Factor 4: Politeness

Factor 4 is characterized by salient features such as *politeness*, *interrogation*, and *causative*. These features are interpreted as being related to politeness (Brown and Levinson, 1987). A typical dialogue example is as follows:

> (T009_022)
> English translation:
> Z201: Two cafe lattes, please.
> IC01: Two lattes, will that be take away? (*politeness*)
>
> Japanese:
> Z201: Hotto no kaferate wo futatsu.
> IC01: Latte wo futatsu, o mochikaeri na-sai masu ka? (*politeness*)

Here, 'nasai' is the honorific expression of 'shi' (do) in Japanese. In this study, we interpreted this factor as "Politeness."

For the labels under "Relation," this factor directly reflects interpersonal distance; the scores are higher for "Social relationships," "Friends," and "Family," in that order. In addition, the scores of "School/Workplace," "Other_facilities," "Work," and "Healthcare" were also high. In these situations, the conversational participants tended to have a business association or a hierarchical relationship.

Factor 5: Empathy

In Factor 5, salient features are semantic labels that represent relatively ambiguous utterances, such as *wish*, *comparison*, *conjecture*, and *interjection*. A typical dialogue is as follows:

> (T010_007)
> IC01: Call for applications, tell them the schedule and the topic...
> IC02: What do you think? (*conjecture*)
> IC01: I think it's interesting.

In human-human conversations, the utterances related to this factor seem to play a role showing and requesting empathy. Therefore, we interpreted this factor as "Empathy."

From the factor scores, "Friends" has a high score in terms of "Relation." This result is reasonable because empathy plays an important role in talks with "Friends." In terms of other situations, "Outdoors," "Rest," "Studying," and "Healthcare" (e.g., visiting a hospital) obtained high scores.

Factor 6: Involvement

The salient features of Factor 6 are *first- and second-person pronouns*, *interjection*, and *state*. These features suggest that this factor represents a conversation about the speakers themselves. Therefore, we interpreted this factor as "Involvement." A typical dialogue example is as follows:

> (T003_017)
> IC03: Have the chorus club's pianist play in the band every year.
> IC02: Hmm.
> IC04: I see, but I hope she does.
> IC01: I hope so, too." (*first-person pronoun*)

The factor scores on this axis were high for "Home," "Leisure activities," "Meals," "Work with meals," and "Rest." These results seem reasonable because speakers tend to exchange their feelings and opinions under these situations.

Factor 7: Suggestion

The salient features of the last factor are *invitation*, *experience*, *permission*, and *decision*. These features are often found in dialogues for the purpose of recommendation and suggestion. Therefore, we interpreted this factor as "Suggestion." A typical dialogue example is as follows:

> (T003_001)
> IC01: If you finish questions 9 and 10 today, you will have finished the whole thing.
> IC03: I'll do it tomorrow.
> IC01: I think you'd better do it today. (*invitation*)

The factor scores were high for "Discussion" in terms of "Style." This is a reasonable result because suggestions and recommendations are the key elements in such conversations. In addition, "Leisure activities," "Studying," "Housework," and "Other" were high scores. These results suggest that a speaker tends to make utterances for recommendation and suggestion under these situations.

5.4 Discussion

Our analysis clarified that everyday conversations are composed of a combination of dialogue purposes and manners and that they have seven components. Our interpretation of the results can be considered reasonable regarding the factor scores, factor loadings, and dialogue examples. In this section, we discuss the characteristics of each situation label on the basis of Table 4.

For the labels under "Style," we found that the conversations held for explanation were conducted in "Meeting." In addition, "Discussion" was formed by the combination of request and suggestion. These interpretations are assumed to closely reflect the characteristics of actual conversational styles. In contrast, the score of "Chat" is not high on any factor. This suggests that this type of conversation has characteristics of all of the extracted factors rather than being distinct from them. This is a reasonable result considering the definition of "Chat" in Japanese, which is a conversation about miscellaneous matters.

For the labels under "Place" and "Activity," the conversations differ situation by situation to some extent since the factors that had high scores were different from each other. However, some labels have a similar trend in the scores. For example, we found a similar trend of the scores among "Outdoors," "Indoors," and "Home" for "Place." Furthermore, "Work," "Social participation," and "Extracurricular activities" were similar to each other for "Activity." Here, the chats with family members account for a large proportion of the former labels, and discussions between social relationships account for a large proportion of the latter labels. These results suggest that the dialogue style and the relationship with the interlocutors have a significant impact on the dialogues.

For the labels under "Relation," we found intuitive characteristics of each label. "Social relationships," "Friend," and "Family" obtained high scores for "Politeness," "Empathy," and "Narrative," respectively. Although these techniques have already been introduced in some dialogue systems (e.g., an empathetic dialogue system (Rashkin et al., 2019)), our analysis shows that the importance of these factors changes depending on the relationships of the dialogue partners.

6 Summary and Future Studies

In this paper, we conducted factor analysis using the CEJC to clarify the characteristics of everyday conversation. We employed semantic labels of functional expressions as features, and we discovered seven factors that distinguish everyday conversations in various situations. Four of the extracted factors were axes related to the purpose of the dialogue: "Explanation," "Request," "Narrative," and "Suggestion." In addition, three factors were found to be related to the manners of dialogue: "Politeness," "Empathy," and "Involvement." Consequently, our findings suggest that everyday conversations are composed of a combination of dialogue purposes and manners.

The findings of this paper can be applied to constructing dialogue-based applications. For example, a dialogue system must be designed to cover the extracted purposes and manners in order to participate effectively in everyday human-human conversations. BlenderBot (Roller et al., 2021), which has achieved high performance in neural-based response generation, is trained to acquire multiple skills required for chat-talks, such as empathy and knowledge-based conversation. Our analysis suggests that such dialogue systems can be improved in the naturalness of their conversation for everyday situations by training them with a dialogue that covers the extracted factors.

In future studies, we plan to collect dialogue data that satisfy the acquired factors and examine the response-generation methods of dialogue systems that participate in everyday conversations.

Acknowledgement

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