A Corpus of Simulated Counselling Sessions with Dialog Act Annotation

**John S. Y. Lee[1], Haley H. M. Fong[1], L. S. Judy Wong[1],
Chun Chung Mak[1], Chi Hin Yip[1], C. W. Larry Ng[2]**
[1]Department of Linguistics and Translation, City University of Hong Kong
[2]Student Development Services, City University of Hong Kong
Hong Kong SAR, China
jsylee@cityu.edu.hk, heimfong3-c@my.cityu.edu.hk, judy99@hotmail.com,
chuncmak@cityu.edu.hk, ychihin@gmail.com, larryng@cityu.edu.hk

Abstract

We present a corpus of simulated counselling sessions consisting of speech- and text-based dialogs in Cantonese. Consisting of 152K Chinese characters, the corpus labels the dialog act of both client and counsellor utterances, segments each dialog into stages, and identifies the forward and backward links in the dialog. We analyze the distribution of client and counsellor communicative intentions in the various stages, and discuss significant patterns of the dialog flow.

Keywords: dialog act, dialog corpus, counselling, Cantonese

1. Introduction

With the rapid growth in demand for counselling in recent years, corpus-based analysis of counselling conversations has seen increasing interest (Althoff et al., 2016; Pérez-Rosas et al., 2017; Inoue et al., 2012). These corpora can be useful both for practitioners and for various tasks in chatbot development. First, they can lead to better understanding of the characteristics of successful counselling, for example the linguistic markers of empathy (Pérez-Rosas et al., 2017) and the use of forward- and backward-oriented language (Zhang and Danescu-Niculescu-Mizil, 2020).

These corpora can also help identify the client's communicative intention, or dialog act (DA), and thereby determine the most appropriate DA for the counsellor's reply. Research has shown that the communicative intention of the interlocutor can inform response retrieval (Li et al., 2017). DA has been extensively studied in the general domain (Amanova et al., 2016), with support from large-scale resources to facilitate DA modeling (Stolcke et al., 2000; Kim et al., 2010a; Cadilhac et al., 2013). Supervised models have also been implemented to classify the client DA and forecast the DA of the counsellor's response (Cao et al., 2019; Park et al., 2019).

We present a corpus that is designed to support the development of counsellor chatbots in Cantonese, the most widely spoken variety of Chinese (Matthews and Yip, 2011). Similar to corpora developed by Stiles et al. (1988) and Cao et al. (2019), it annotates both client and counsellor DAs, hence facilitating analysis of the communicative intentions of both parties.

To the best of our knowledge, this is the first publicly available corpus[1] of counselling sessions in Cantonese.

---

[1]https://github.com/CantoneseCounsellorChatbot

Subcorpus	Speech	Text
# dialogs	29	57
# turns per dialog	72.03	53.68
Counsellor turn length (# chars)	35.44	30.71
Client turn length (# chars)	29.63	24.66

Table 1: Corpus statistics for the speech-based (Section 2.1) and text-based dialogs (Section 2.2)

A significant feature of the corpus is the annotation of not only the DAs, but also forward and backward links to indicate the relationship between utterances in the dialog. After presenting the corpus material (Section 2), we give details on our annotation scheme (Section 3) and inter-annotator agreement (Section 4). We then analyze the client and counsellor DAs (Section 5) and the dialog flow (Section 6).

2. Corpus material

Transcripts of authentic counselling sessions have been made available for research purposes in various languages, including English (Althoff et al., 2016) and Korean (Park et al., 2019). However, we are not aware of any similar dataset in Cantonese. In other domains such as language learning, professionally produced, albeit simulated materials have been found to be useful when naturally occurring data is not readily available (Li et al., 2017). Following this paradigm, we constructed a corpus of 86 simulated counselling sessions from two sources.

2.1. Speech-based dialogs

Speech transcripts of Cantonese counselling sessions are presented as pedagogical materials in a series of counselling textbooks by Professor Yeung-Chan (2002; 2004; 2006a; 2006b). Produced by professional social

Utterance ID	Utterance	DA type	Backward Link
Client-1	第一日返工開始已經覺得好驚！ '[I was] already scared on my first day on the job!'	Appealing Problem	not shown
Counsellor-1	咁呢份工返幾耐？ 'How long have you been working there?'	Closed Question	Client-1
Client-2	呢份工返一個月到。 'For this job, about a month'	Factual Information	Counsellor-1
Counsellor-2a	一個月， 'A month.'	Reflection	Client-2
Counsellor-2b	日日都係咁驚？ '[You] felt scared every single day?'	Closed Question	Client-1

Table 2: Example utterances in the corpus, annotated with their dialog act (DA) type (Section 3.3) and backward link (Section 3.4)

workers, these sessions are based on authentic cases involving domestic violence, marriage and family relationship issues. Since the speech is pre-planned to some extent, the dialogs are not entirely spontaneous. However, they are of high quality and are free from false starts and other errors. The social workers, in addition to providing emotional support, also offer clients practical help and community resources.

A session is either independent, or forms part of a series between the same client and counsellor. A total of 29 sessions were collected. Five of the sessions were independent; the remaining 24 were part of several series, with each series ranging from 2 to 5 sessions.

2.2. Text-based dialogs

We recruited 18 undergraduate students to chat on WhatsApp with a freelance counsellor who is a native speaker of Cantonese and holds a Masters degree in Counselling. Each WhatsApp session lasted 60 to 90 minutes. Each student participated in 1 to 8 sessions, and was assigned to discuss 2 to 6 symptoms drawn from loneliness (Russell et al., 1978), academic anxiety (Roberts, 1989) and test anxiety (Wren and Benson, 2004). They produced a total of 57 text message dialogs.

3. Annotation

3.1. Stages

We manually labeled each dialog with five stages. Following existing frameworks for stages in a counselling dialog (Ivey and Ivey, 2003; Hough, 2014), we include an **Introduction** stage, typically consisting of greetings and small talk; and a **Closing** stage, for farewell and concluding exchanges.

The remainder of the dialog is labeled according to the three stages of the *Skilled Helper Model* (Egan, 2014). In the **Current Picture** stage, the counsellor demonstrates understanding and sympathy towards the client while gathering information about the issues. In the **Desired Picture** stage, the counsellor prompts the client to think of creative solutions or to envision an outcome he or she hopes to reach. In the **Moving Forward** stage, the counsellor gives suggestions on how

the client can work towards a positive goal. No constraint was imposed on the order of the stages or the number of times each stage can appear.

3.2. Turn segmentation

We combine consecutive text bubbles by the same texter (client or counsellor) on WhatsApp into one *turn*. A turn may be a compound utterance, i.e., comprising more than one dialog act (DA). We segmented each turn into utterances, such that each utterance expresses a specific communicative intention corresponding to one DA type (Section 3.3). For example, the Counsellor-2 turn in Table 2 consists of two utterances of two different DAs, namely, Reflection and Closed Question.

3.3. Dialog act

Various DA annotation schemes have been proposed for the general domain, targeting spoken and written dialogs as well as online chat (Core and Allen, 1997; Wu et al., 2005; Hu et al., 2009).

In the counselling domain, taxonomies for client and counsellor utterances include, among others, the verbal response mode profiles (Stiles et al., 1988), the *Hill Counselor Verbal Response Modes Category System* (Hill et al., 2001), and the *Motivational Interviewing Skill Codes* (Miller et al., 2003). Our annotation scheme synthesizes these taxonomies according to the DAs observed in our data. Before discussing DA types specific to clients (Section 3.3.1) or counsellors (Section 3.3.2), we first present those applicable to both, which include:

- **Closed Question** expects short, explicit answers (*yes/no, who, when, where* questions), while **Open Question** digs deeper into new information (*why* and *how* questions).

- **Disclosure** reveals "thoughts, feelings, perceptions, intentions" (Stiles et al., 1988), as well as past experience.

The following three labels are used for shorter and more formulaic utterances:

- **Greetings** are short pleasantries typically exchanged at the beginning of a meeting (e.g., "hello").

- **Acknowledgment** conveys "receipt of receptiveness to other's communication." (Stiles et al., 1988), including simple acceptance such as "thank you".

- **Short Reply** covers other short utterances that serve as backchannel or otherwise facilitate continuation of the dialog. Unlike acknowledgments, they do not entail accepting or acknowledging the message of the other speaker.

3.3.1. Client-specific dialog act types

A three-way taxonomy for client utterances — changing unhealthy behavior, sustaining it, or neutral — is adopted by Cao et al. (2019). We opted for the more fine-grained tagset proposed by Park et al. (2019):

- **Factual Information** refers to "informative responses to counselor's utterances".

- **Anecdotal Experience** involves "past incidents and current situations related to the formation of appealing problems", such as traumatic experiences.

- **Appealing Problem** is an utterance addressing "the main appealing problem which is yet to be resolved, including client's internal factors or their behaviors related to the problems".

- **Psychological Change** describes "insights, cognition of small and big changes in internal factors or behaviors".

- **Counselling Process** covers requests to the counsellor and logistics issues.

3.3.2. Counsellor-specific dialog act types

We labeled counsellor utterances with the following DA types, based on those used in Hill et al. (2001) and Ivey and Ivey (2003):

- **Feedback** is an expression of encouragement or normalization, typically commenting on a client utterance.

- **Paraphrase** is a rewording or summarization of factual content in the client utterance, while **Reflection** summarizes emotional content.

- **Suggestion** is a call for the client to take positive actions.

3.4. Links

Adjacency pairs are paired utterances that reflect interaction between speakers, such as 'question-answer', 'compliment-rejection', 'greeting-greeting', 'invitation-acceptance/decline', 'request-grant', where the first part is an initiating speech act and the second

part responds to it (Schlegoff and Sacks, 1973; Sacks et al., 1974). Various schemes have been proposed to annotate adjacency pairs in dialogs (Dhillon et al., 2004; Wang et al., 2018). There has also been extensive research on automatic detection of these pairs (Midgley et al., 2007; Boyer et al., 2009).

Our link annotation is inspired by the Dialogue Function Unit (Hu et al., 2009), whose Links are a generalization of adjacency pairs. A forward link (Flink) is the analog of the "first pair-part" of an adjacency pair. In our corpus, DAs such as Open Question and Closed Question always establish an Flink. An utterance that responds to a previous one is assigned a backward link (Blink), regardless of whether the target has an Flink. DAs such as Acknowledgement and Short Reply are expected to have a Blink. Links have been similarly annotated in an online user forum dataset to indicate the earlier post to which a given post responds (Kim et al., 2010b).

We manually labeled Flinks and Blinks for both the client and counsellor utterances. As shown in Table 2, a counsellor utterance (e.g., Counsellor-2b) does not always address the final-position utterance in the immediately preceding client turn. It could address a non-final utterance in that turn, or even an earlier client turn (e.g., Client-1).

4. Inter-annotator agreement

Client DA. Two annotators independently annotated the DA of 1043 client turns. They agreed on the type for 74.98% of the time. Cohen's kappa was 0.56, corresponding to a 'moderate' level of agreement (Landis and Koch, 1977). The most frequent disagreement was between Anecdotal Experience and Appealing Problem. The former typically focuses on more objective descriptions of events, while the latter expresses more subjective personal feelings, but the boundary is not always clear-cut.

Counsellor DA. Two annotators independently annotated the DA of 1736 counsellor turns. They agreed on the type for 71.43% of the time. Cohen's kappa was 0.70, corresponding to a 'substantial' level of agreement (Landis and Koch, 1977). The most common disagreement was between Paraphrase and Feedback. For utterances containing elements of both, it could be unclear which one constitutes the main communicative intention.

Links. Two annotators independently identified the backward links of 135 counsellor and client utterances. They achieved 75.76% agreement and a Kappa of 0.887, which is considered an 'almost perfect' level of agreement (Landis and Koch, 1977).

Stages. Two annotators independently annotated the conversation stages (Section 3.1) for 29 speech-based dialogs. They agreed 74.22% of the time, yielding a Cohen's kappa of 0.60, which is considered a 'moderate' level of agreement (Landis and Koch, 1977). The most common disagreement was between Current Pic-

Client			Counsellor		
DA type	Speech	Text	DA type	Speech	Text
Anecdotal Experience	**39.94**	34.08	Paraphrase	**23.74**	9.06
Appealing Problem	21.42	**26.11**	Closed Question	16.90	**20.88**
Short Reply	**13.34**	9.61	Feedback	13.69	**17.53**
Disclosure	**7.52**	2.49	Open Question	12.24	**19.34**
Psychological Change	5.66	**9.93**	Suggestion	11.51	**13.90**
Acknowledgement	3.96	**6.69**	Reflection	**10.05**	6.93
Factual Information	3.31	**6.58**	Short Reply	**8.30**	7.25
Open Question	**1.54**	1.17	Greetings	2.62	**4.44**
Greetings	1.37	**1.49**	Disclosure	**0.58**	0.14
Closed Question	0.97	**1.65**	Acknowledgement	0.36	**0.54**
Counselling Process	**0.97**	0.21			

Table 3: Dialog act (DA) types of clients and counsellors in speech- and text-based dialogs

Stage	Speech	Text
Introduction	3.53%	2.98%
Current Picture	**46.78%**	**37.26%**
Desired Picture	26.56%	28.15%
Moving Forward	21.27%	28.87%
Closing	1.86%	2.74%

Table 4: Average proportion of a dialog dedicated to each stage (in terms of number of characters)

Stage	Speech	Text
Introduction	0.29	0.38
Current Picture	**1.72**	**1.22**
Desired Picture	0.51	0.84
Moving Forward	0.23	0.44
Closing	0.25	0.47

Table 5: Ratio of client turn length : counsellor turn length in each dialog stage

ture and Desired Picture, typically during the transition between these two stages when both the current and desired situation are mentioned.

5. Dialog act patterns

Table 3 lists the most frequent dialog act (DA) types in client and counsellor utterances.

5.1. Clients

The dominant client DAs are Anecdotal Experience (speech 39.94%, text 34.08%) and Appealing Problem (speech 21.42%, text 26.11%). Both are frequently used by clients when discussing their experience and situation with counsellors. These discussions typically occur in Current Picture. It is the longest of the five stages (Table 4), and is also the stage in which the client talks most in comparison to the counsellor (Table 5).

Psychological Change becomes the most common DA (speech 20.96%, text 29.31%) as the dialog enters the Moving Forward stage, where clients respond to suggestions from counsellors.

Factual Information is concentrated in the Introduction stage, when clients introduce themselves. It is the most common DA among text-based dialogs (61.90%), but in speech-based dialogs it is the second most common (14.52%) behind Short Reply. Acknowledgement is the most common DA in the Closing stage (38.24% speech, 48.00% text).

5.2. Counsellors

Counsellors predominantly use Greetings (30.23% speech, 66.42% text) in the Introduction stage (Table 7). Overall, however, questions dominate the dialog. Over 40% of the counsellor utterances in text-based dialogs are questions (open 19.34%, closed 20.88%), substantially more than the 28.6% reported in the general domain (Li et al., 2017). Next most frequent are Feedback and Suggestion, mostly concentrated in the Moving Forward stage.

In speech-based dialogs, questions also constitute a common DA (open 12.24%, closed 16.90%), but the use of Paraphrase (23.74%) is even more pronounced, far exceeding its use in text (9.06%). The difference may be accounted for by the longer session length, giving counsellors more time to elicit additional sharing from the client via paraphrases. In contrast, the text-based dialogs are shorter, one-time sessions, with a shorter Current Picture stage (Table 4). The counsellor must therefore proceed more quickly to Feedback and Suggestion after asking the necessary questions to clarify the issues. The text environment also enables both parties to edit their replies and to review the dialog history, hence reducing the need to use paraphrases for confirmation purposes.

As the counsellor proceeds from Current Picture to Moving Forward, there is a decline in the use of backwards-oriented language (Zhang and Danescu-Niculescu-Mizil, 2020), as represented primarily by Paraphrase and Reflection in our counsellor DA tagset, and an increase in forwards-oriented language, such as Suggestion. Relative to the client turn, the counsellor turn lengthens from Current to Desired Picture, peaking at the Moving Forward stage (Table 5). There is a

DA type	Introduction	Current Picture	Desired Picture	Moving Forward	Closing
Speech-based dialogs					
Factual Info	14.52 (**+11.20**)	3.04(-0.27)	0.80(-2.52)	4.79(+1.48)	0.00(-3.31)
Greetings	16.13(+14.75)	0.00(-1.37)	0.00(-1.37)	0.00(-1.37)	20.59 (**+19.21**)
Short Reply	**29.03 (+15.69)**	11.20(-2.14)	12.35(-0.99)	16.77(+3.43)	20.59(+7.25)
Anecdotal Exp.	9.68(-30.26)	**48.96 (+9.03)**	**41.01 (+1.10)**	17.96(-21.97)	2.94(-36.99)
Appealing Problem	6.45(-14.97)	26.42 (**+4.99**)	20.32(-1.10)	11.38(-10.05)	0.00(-21.42)
Psy. Change	0.00(-5.66)	2.77(-2.89)	5.98(+0.32)	**20.96 (+15.30)**	0.00(-5.66)
Counselling Proc	1.61(+0.64)	0.28(-0.69)	0.40(-0.57)	1.20(+0.23)	**17.65 (16.68)**
Acknowledgement	0.00(-3.96)	1.11(-2.85)	4.38(+0.42)	10.18(+6.22)	**38.24 (+34.27)**
Disclosure	14.52(**+7.00**)	4.98(-2.54)	11.55(+4.04)	11.38(+3.86)	0.00(-7.52)
Closed Questions	1.61 (**+0.64**)	0.83(-0.14)	1.20(+0.23)	1.20(+0.23)	0.00(-0.97)
Open Questions	6.45(**+4.92**)	0.41(-1.12)	1.99(+0.46)	4.19(+2.66)	0.00(-1.54)
Text-based dialogs					
Factual Info	**61.90 (+55.32)**	4.35(-2.23)	4.62(-1.97)	3.36(-3.23)	0.00(-6.58)
Greetings	33.33 (**+31.85**)	0.00(-1.49)	0.00(-1.49)	0.00(-1.49)	0.00(-1.49)
Short Reply	0.00(-9.61)	11.48(+1.87)	8.85(-0.76)	8.50(-1.11)	13.33(**+3.73**)
Anecdotal Exp	1.19(-32.89)	**40.11 (+6.03)**	**44.23 (+10.15)**	22.82(-11.26)	6.67(-27.41)
Appealing Prob	2.38(-23.73)	39.97(**+13.86**)	24.81(-1.31)	12.53(-13.59)	2.67(-23.45)
Psy. Change	0.00(-9.93)	0.40(-9.53)	7.50(-2.43)	**29.31 (+19.38)**	18.67(+8.74)
Counselling Proc	1.19(+0.98)	0.13(-0.08)	0.00(-0.21)	0.00(-0.21)	2.67(**+2.45**)
Acknowledgement	0.00(-6.69)	1.85(-4.84)	4.62(-2.07)	11.63(+4.95)	**48.00 (+41.31)**
Disclosure	0.00(-2.49)	0.66(-1.84)	3.65(+1.16)	3.80(+1.31)	8.00 (**+5.51**)
Closed Questions	0.00(-1.65)	0.66(-0.99)	0.96(-0.68)	4.70(**+3.05**)	0.00(-1.65)
Open Questions	0.00(-1.17)	0.40(-0.77)	0.77(-0.40)	3.36(**+2.19**)	0.00(-1.17)

Table 6: Distribution of client DA types (Section 5.1) in different dialog stages in percentage; the number in brackets shows increase or decrease in comparison to the overall percentage

DA type	Introduction	Current Picture	Desired Picture	Moving Forward	Closing
Speech-based dialogs					
Greetings	**30.23 (+27.61)**	0.14(-2.48)	0.00(-2.62)	0.00(-2.62)	22.50(+19.88)
Paraphrase	9.30(-14.44)	**30.88 (+7.13)**	**24.09 (+0.35)**	9.78(-13.97)	2.50(-21.24)
Reflection	3.49(-6.56)	13.21 (**+3.16**)	8.91(-1.14)	5.33(-4.72)	2.50(-7.55)
Closed Question	19.77 (**+2.87**)	17.94(1.04)	18.81(+1.91)	12.89(-4.01)	0.00(-16.90)
Open Question	16.28(+4.04)	16.69 (**+4.45**)	9.57(-2.67)	2.22(-10.01)	0.00(-12.24)
Short Reply	2.33(-5.98)	11.96(+3.66)	3.96(-4.34)	3.56(-4.75)	15.00 (**+6.70**)
Suggestion	8.14(-3.37)	1.25(-10.26)	9.90(-1.61)	**42.67 (+31.16)**	**40.00 (+28.49)**
Feedback	10.47(-3.23)	7.93(-5.76)	22.77 (**+9.08**)	21.33(+7.64)	12.50(-1.19)
Disclosure	0.00(-0.58)	0.00(-0.58)	1.65 (**+1.07**)	1.33(+0.75)	0.00(-0.58)
Acknowledgement	0.00(-0.36)	0.00(-0.36)	0.33(-0.03)	0.89(+0.52)	5.00 (**+4.64**)
Text-based dialogs					
Greetings	**59.12 (+54.68)**	0.25(-4.19)	0.17(-4.27)	0.00(-4.44)	1.09(-3.35)
Paraphrase	0.00(-9.06)	14.29 (**+5.23**)	11.26(+2.20)	3.20(-5.86)	1.09(-7.97)
Reflection	0.00(-6.93)	12.64 (**+5.71**)	7.28(+0.36)	1.69(-5.33)	0.00(-6.93)
Closed Question	16.35(-4.53)	**25.28 (+4.41)**	**24.34 (+3.46)**	14.95(-5.93)	4.35(-16.53)
Open Question	23.27(+3.93)	20.86(+1.52)	22.85(**+3.51**)	13.88(-5.46)	9.78(-9.56)
Short Reply	1.26(-5.99)	7.71(+0.47)	4.97(-2.28)	7.12(-0.13)	29.35 (**+22.10**)
Suggestion	0.00(-13.90)	2.53(-11.38)	8.61(-5.29)	**40.04 (+26.13)**	10.87(-3.03)
Feedback	0.00(-17.53)	16.43(-1.09)	19.87(+2.34)	17.26(-0.27)	**43.48 (+25.95)**
Disclosure	0.00(-0.09)	0.00(-0.09)	0.17(+0.07)	0.18 (**+0.09**)	0.00(-0.09)
Acknowledgement	0.00(-0.54)	0.00(-0.54)	0.50(-0.05)	1.60 (**+1.06**)	0.00(-0.54)

Table 7: Distribution of counsellor DA types (Section 5.2) in different dialog stages in percentage; the number in brackets shows the increase or decrease in comparison to the overall percentage

Backward link	Client	Counsellor
Preceding turn (final utt.)	74.19%	89.29%
Preceding turn (non-final utt.)	5.88%	6.33%
Turn once removed	5.05%	1.40%
Earlier turn	5.53%	0.82%
None (Initiating utterance)	6.82%	1.61%
None (First-turn utterance)	2.53%	0.58%

Table 8: Breakdown of different types of backward links among client and counsellor utterances

Client DA	Counsellor DA	Chi-square
Factual Information	Greetings	343.72
Greetings	Greetings	157.65
Anecdotal Experience	Paraphrase	103.97
Appealing Problem	Reflection	100.27
Psychological Change	Suggestion	72.04
Open Question	Suggestion	55.73
Acknowledgement	Short Reply	52.56
Short Reply	Suggestion	39.70
Closed Question	Suggestion	31.89
Anecdotal Experience	Suggestion	31.68

Table 9: Dialog acts of linked client and counsellor utterances with the highest chi-square statistic

significant shift in DA type at this stage, as the counsellor offers advice and guides the client to the desired picture. As fewer questions are asked, Suggestion becomes dominant (42.67% speech, 40.04% text).

In the Closing stage, Feedback is very common in the text-based dialogs (43.48%), with encouraging expressions such as "You can do it". In the speech-based dialogs, counsellors often repeat earlier suggestions, or continue to offer new ones (40.00%).

6. Dialog flow

6.1. Within-turn dialog act types

Almost one-fifth (23.45% text, 17.42% speech) of the client turns contain multiple DAs. These turns most commonly have an Appealing Problem or Anecdotal Experience, combined with a Short Reply or Disclosure.

A larger proportion of counsellor utterances have multiple DAs (44.64% text, 27.90% speech), suggesting more complex content in these utterances. The combinations mostly involve Paraphrase, Reflection, Feedback, and Open or Closed Question.

6.2. Stages

All speech-based dialogs proceed in the expected sequence, from Introduction to the three middle stages and finally to Closing (Section 3.1), though some stages may be skipped. Among the 57 text-based dialogs, 25 do not follow this linear progression. The most common "out-of-order" sequence is to have the Desired Picture or Moving Forward stage followed by Current Picture, where a new issue is broached.

6.3. Initiating utterances

The backward link of an utterance shows its relation to the dialog history. The utterance may respond to the final or a non-final utterance in the preceding turn; to a turn once removed; or to an even earlier turn (Table 8, top). Alternatively, the utterance may initiate a new topic or a new dialog (Table 8, bottom).

The vast majority of the counsellor utterances (89.29%) address the final utterance in the preceding client turn. In the remaining cases, the counsellor addresses a non-final utterance in the preceding turn (6.33%), or responds to a client turn once removed (1.40%). It is relatively rare for the counsellor to reach back further in the dialog history (0.82%).

Initiating utterances can be identified by their lack of backward links. Clients are naturally expected to raise new issues, especially in the Current Picture stage, as they reveal their experiences to counsellors; 6.82% of the client utterances fall into this category. Counsellors do so less frequently (1.61%), perhaps reflecting their effort to center the conversation on the client. When a counsellor does initiate a new topic, the most common DA is a question, with Open and Closed Question representing the majority of the initiating utterances (51.90% speech, 72.2% text).

6.4. Backward links

We identified the DA of all counsellor utterances annotated with a backward link (Section 3.4), as well as the DA of the client utterances to which they respond. Table 9 shows the pairs of client DA and counsellor DA with the highest chi-square values.

Greetings. The top two pairs reflect the highly predictable interactions at the beginning of a session, when the greeting or self-introduction from the client is met with a greeting from the counsellor.

Paraphrase and Reflection. The next two entries suggest subtle differences in how the counsellor shows empathy to the client. After the client's sharing of an Anecdotal Experience, the counsellor tends to use a Paraphrase, which summarizes the factual content. In contrast, after the client describes an Appealing Problem, which emphasizes internal factors, the counsellor appears to prefer a Reflection, which summarizes the emotional content.

Suggestion. It is important for counsellors to sense the right timing for offering suggestions. In our corpus, Suggestion most typically follows Psychological Change, when a client expresses insights for changes in internal factors or behaviors. Suggestion is also a common response to an Open Question from the client, especially when it invites feedback from the counsellor. Notably, suggestions are less frequently observed in response to Appealing Problem.

7. Conclusions

This paper has presented the first corpus of simulated counselling sessions in Cantonese. It annotates not only the dialog acts (DAs) of client and counsellor utterances, but also the dialog stages and the forward and backward links in the dialogs. We analyzed the distribution of communicative intentions of the client and counsellor at the various stages. We discussed significant patterns of the dialog flow, including the typical DAs of linked client and counsellor utterances.

This corpus can be expected to support various tasks in the development of counsellor chatbots in Cantonese. The DA annotations can help train models for classifying the client DA. By taking the client DA into account, the link statistics can also potentially improve response generation or retrieval in data-driven counsellor chatbots.

8. Acknowledgements

9. Bibliographical References

Althoff, T., Clark, K., and Leskovec, J. (2016). Large-scale Analysis of Counseling Conversations: An Application of Natural Language Processing to Mental Health. *Transactions of the Association for Computational Linguistics*, 4:463–476.

Amanova, D., Petukhova, V., and Klakow, D. (2016). Creating Annotated Dialogue Resources: Cross-Domain Dialogue Act Classification. In *Proc. LREC*.

Boyer, K., Phillips, R., Eun, Y. H., Wallis, M., Vouk, M., and Lester, J. (2009). Modeling dialogue structure with adjacency pair analysis and hidden markov models. In *Proc. Human Language Technologies: The 2009 Annual Conference of the North American Chapter of the Association for Computational Linguistics (HLT-NAACL)*.

Cadilhac, A., Asher, N., Benamara, F., and Lascarides, A. (2013). Grounding Strategic Conversation: Using negotiation dialogues to predict trades in a win-lose game. In *Proc. EMNLP*.

Cao, J., Tanana, M., Imel, Z. E., Poitras, E., Atkins, D. C., and Srikumar, V. (2019). Observing Dialogue in Therapy: Categorizing and Forecasting Behavioral Codes. In *Proc. ACL*.

Core, M. G. and Allen, J. F. (1997). Coding Dialogs with the DAMSL Annotation Scheme. In *Working Notes of the AAAI Fall Symposium on Communicative Action in Humans and Machines*, page 28–35.

Dhillon, R., Bhagat, S., Carvey, H., and Shriberg, E. (2004). Meeting Recorder Project: Dialog Act Labeling Guide. In *ICSI Technical Report TR-04-002*. International Computer Science Institute.

Egan, G. (2014). *The Skilled Helper: A Problem-Management and Opportunity-Development Approach to Helping*. Brooks/Cole Cengage Learning.

Hill, C. E., Helms, J. E., Tichenor, V., Spiegel, S. B., O'Grady, K. E., and Perry, E. S. (2001). Effects of therapist response modes. In Clara E. Hill, editor, *Helping Skills: The Empirical Foundation*, page 61–86. American Psychological Association.

Hough, M. (2014). *Counselling Skills and Theory*. Hodder Education, 4 edition.

Hu, J., Passonneau, R. J., and Rambow, O. (2009). Contrasting the interaction structure of an email and a telephone corpus: A machine learning approach to annotation of dialogue function units. In *Proc. 10th Annual Meeting of the Special Interest Group in Discourse and Dialogue (SIGDIAL)*.

Inoue, M., Hanada, R., Furuyama, N., Irino, T., Ichinomiya, T., and Massaki, H. (2012). Multimodal Corpus for Psychotherapeutic Situation. In *Proc. LREC Workshop on Multimodal Corpora for Machine Learning*, pages 18–21.

Ivey, A. E. and Ivey, M. B. (2003). *Intentional Interviewing and Counseling: Facilitating Client Development in a Multicultural Society*. Brooks Cole.

Kim, S. N., Cavedon, L., and Baldwin, T. (2010a). Classifying Dialogue Acts in One-on-one Live Chats. In *Proc. EMNLP*.

Kim, S. N., Wang, L., and Baldwin, T. (2010b). Tagging and Linking Web Forum Posts. In *Proc. 14th Conference on Computational Natural Language Learning*.

Landis, J. R. and Koch, G. G. (1977). The Measurement of Observer Agreement for Categorical Data. *Biometrics*, 33:159–174.

Li, Y., Su, H., Shen, X., Li, W., Cao, Z., and Niu, S. (2017). DailyDialog: A Manually Labelled Multi-turn Dialogue Dataset. In *Proc. IJCNLP*.

Matthews, S. and Yip, V. (2011). *Cantonese: A Comprehensive Grammar*. Routledge, New York.

Midgley, T. D., Harrison, S., and MacNish, C. (2007). Empirical verification of adjacency pairs using dialogue segmentation. In *Proc. 7th SIGdial Workshop on Discourse and Dialogue*, pages 104–108.

Miller, W. R., Moyers, T. B., Ernst, D., and Amrhein, P. (2003). *Manual for the Motivational Interviewing Skill Code (MISC)*. Center on Alcoholism, Substance Abuse and Addictions, University of New Mexico, Albuquerque.

Park, S., Kim, D., and Oh, A. (2019). Conversation Model Fine-Tuning for Classifying Client Utterances in Counseling Dialogues. In *Proc. NAACL-HLT*.

Pérez-Rosas, V., Mihalcea, R., Resnicow, K., Singh1, S., and An, L. (2017). Understanding and Predicting Empathic Behavior in Counseling Therapy. In *Proc. ACL*.

Roberts, G. H. (1989). Personal and Academic Stressors Affecting Developmental Education Students.

Research and Teaching in Developmental Education, 5(2):39–53.

Russell, D., Peplau, L. A., and Ferguson, M. L. (1978). Developing a measure of loneliness. *Journal of Personality Assessment*, 42(3):290–294.

Sacks, H., Schegloff, E. A., and Jefferson, G. (1974). A simplest systemics for the organization of turn-taking for conversation. *Language*, 50(4).

Schlegoff, E. A. and Sacks, H. (1973). Opening up closings. *Semiotica*, 8(4):289–327.

Stiles, W. B., Shapiro, D. A., and Firth-Cozens, J. A. (1988). Verbal response mode use in contrasting psychotherapies: A within-subjects comparison. *Journal of Consulting and Clinical Psychology*, 56(5):727–733.

Stolcke, A., Ries, K., Coccaro, N., Shriberg, E., Bates, R., Jurafsky, D., Taylor, P., Martin, R., Ess-Dykema, C. V., and Meteer, M. (2000). Dialogue act modeling for automatic tagging and recognition of conversational speech. *Computational Linguistics*, 26(3):339–373.

Wang, N., Song, Y., and Xia, F. (2018). Coding Structures and Actions with the COSTA Scheme in Medical Conversations. In *Proc. BioNLP Workshop*.

Wren, D. G. and Benson, J. (2004). Measuring Test Anxiety in Children: Scale Development and Internal Construct Validation. *Anxiety, Stress, & Coping: An international Journal*, 17(3):227–240.

Wu, T., Khan, F. M., Fisher, T. A., Shuler, L. A., and Pottenger, W. M. (2005). Posting Act Tagging Using Transformation-Based Learning. *Studies in Computational Intelligence (SCI)*, 6:321–331.

Yeung-Chan, S. T. C. (2002). 家庭暴力培訓系列（一）婦女熱線培訓教材套. Harmony House, Hong Kong.

Yeung-Chan, S. T. C. (2004). 預防家庭暴力義工訓練手冊. Harmony House, Hong Kong.

Yeung-Chan, S. T. C. (2006a). 「輔導教室」系列一. City University of Hong Kong, Hong Kong.

Yeung-Chan, S. T. C. (2006b). 「輔導教室」系列二. City University of Hong Kong, Hong Kong.

Zhang, J. and Danescu-Niculescu-Mizil, C. (2020). Balancing Objectives in Counseling Conversations: Advancing Forwards or Looking Backwards. In *Proc. ACL*.