

# Paper Review #14

[CSCW 2022] Modeling Motivational Interviewing Strategies  
on an Online Peer-to-Peer Counseling Platform

Dept. of Computer Science & Engineering  
**202122029 Meeyun Kim**

2023. 02. 16.

# **Contents**

**1. Introduction**

**2. Method**

**3. Analysis**

# **1. Introduction**

# About 7Cups

## Listeners

- **Volunteer counselors.**
- They receive a short training session. (Active Listening & **Motivational Interviewing**)

## Clients

- **Support seekers.**
- They can rate based on a 5-point Likert scale to express their satisfaction of conversations.  
(1: worst, 5: excellent)

# Research Questions

## ***RQ1:***

Which motivational interviewing techniques predict more satisfying conversations?

## ***RQ2:***

How does listeners' use of motivational interviewing techniques change with their counseling experience?

## **2. Method**

# **MITI**(Motivational Interviewing Treatment Integrity) **Framework**

- MITI Framework consists of thirteen MI codes aggregated from three MI manuals.

## **MI-Consistent**

- Promote the client-centered nature and goal of MI

## **MI-Inconsistent**

- Undermine the goal either through inappropriate behavior or by explicitly telling

## **Others**

- Serve primarily to establish rapport with the client during a session

| Code                          | Description   | Examples  |
|-------------------------------|---|---|
| <b>MI-Consistent</b>          |   |   |
| Affirm                        | The listener says something positive or complimentary. It may serve as reinforcement.   | <i>This is such a big step forward!<br/>I am very proud of you.</i>   |
| Emphasizing<br>Autonomy       | The listener focuses responsibility on the member.  | <i>OK, this is your call.</i>   |
| Open<br>Question              | Questions that are not closed and leave a latitude for response.  | <i>What brings you here today?</i>  |
| Closed<br>Question            | A question that implies a short answer.   | <i>Have you sought professional help<br/>with these triggers?</i>   |
| Persuade (with<br>Permission) | Listener makes overt attempt to change member's opinions, attitudes, or behavior. Listener asks for permission first or emphasizes collaboration. | <i>Unfortunately, I am not a doctor,<br/>but it is always best to get a second opinion<br/>from someone who is at least believable.</i> |
| Reflection                    | Reflections capture and return to the member something the member has said.   | <i>You feel dysphoric and<br/>it causes you suffering.</i>  |
| Seeking<br>Collaboration      | Listener explicitly attempts to share power or acknowledge the expertise of the member.   | <i>May I ask what decisions<br/>do you feel bad about?</i>  |



|                        |  |  |
|------------------------|--|--|
| <b>MI-Inconsistent</b> |  |  |
| Direct                 | Counselor gives an order or command.   | <i>You need to go somewhere else and get a second opinion.</i>         |
| Inappropriate*         | Excessive swear words, asking unnecessary personal information, abusive behavior, etc.                   | <i>What are you wearing?</i>   |
| <b>Other</b>           |  |  |
| Grounding              | Facilitate or acknowledge.   | <i>Okay or Sure or Hmm</i>   |
| Giving Information     | Educate, provide feedback, or expresses a professional opinion without persuading, advising, or warning. | <i>There are some great meditation links on here.</i>                  |
| Support*               | Sympathetic, compassionate, or understanding comments  | <i>I'm always here to help you.</i>                                    |
| Personal Disclosure    | When the listener shares something personal as part of the conversation.                                 | <i>I know exactly what you mean, I was like that a few years back.</i> |
| Introduction           | Greetings, exchanging names, etc.  | <i>Hello welcome to 7COT. My name's John</i>                           |
| Conclusion             | Statement indicating that the listener need to leave.  | <i>I'm ending our chat now.</i>  |
| Chit-Chat*             | Connecting with members by conversing about topics not related to the general session.                   | <i>I wonder if we can fly one day.</i>                                 |
| Other                  | Any utterance that does not fit into the above.  |  |

# Dataset

## Annotated Dataset

- 14,797 labeled unique listener utterances (or **734 conversations**) from 7 cups.

| Category                         | #Utterances | Annotation Agreement<br>(Krippendorff's alpha) |
|----------------------------------|-------------|--|
| Giving Information               | 304         | 1  |
| Reflection                       | 1697        | 0.585  |
| Affirm                           | 346         | 0.659  |
| Closed Question                  | 1956        | 0.868  |
| Open Question                    | 2507        | 0.950  |
| Persuade                         | 1918        | 0.424  |
| Direct                           | 250         | 0.666  |
| Emphasizing Autonomy             | 120         | 0.665  |
| Grounding                        | 1027        | 0.826  |
| Personal Disclosure              | 1605        | 0.658  |
| Introduction/Greeting            | 1260        | 0.877  |
| Conclusion                       | 340         | 0.791  |
| Seeking Collaboration/Permission | 271         | 0.662  |
| Support                          | 1493        | 0.842  |
| Inappropriate                    | 224         | 1  |
| Chit-Chat                        | 963         | 0.59   |
| Other                            | 1299        | 0.664  |

**Highly Imbalanced!**

**New codes created by authors**

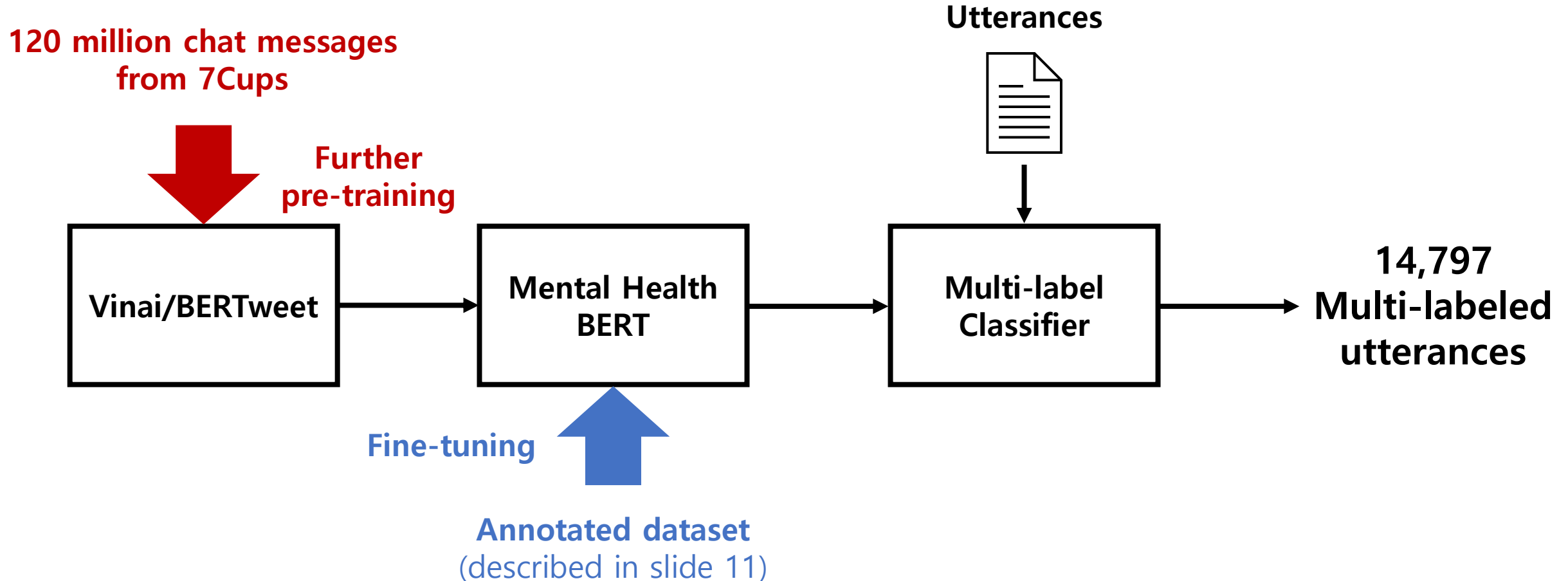
# Model

Performance (F1 score)

| Model Name                | No previous context | 1 previous utterance<br>as context | 5 previous utter-<br>ances as context |
|---------------------------|---------------------|------------------------------------|---------------------------------------|
| BERT-Base-Uncased         | 0.570               | 0.600                              | 0.539                                 |
| BERT-large                | 0.605               | 0.639                              | 0.608                                 |
| RoBERTa-Base              | 0.608               | 0.628                              | 0.606                                 |
| BERTweet                  | 0.642               | 0.693                              | 0.649                                 |
| <b>Mental Health BERT</b> | <b>0.678</b>        | <b>0.725</b>                       | <b>0.705</b>                          |

# Model (Cont'd)

## Architecture



# Model (Cont'd)

## Best Model Metrics (MH-BERT)

| MI Code               | No context   | 1 previous utterance | 5 previous utterances | Most Relevant Words                  |
|-----------------------|--------------|----------------------|-----------------------|--------------------------------------|
| Giving Information    | <b>0.656</b> | 0.574                | 0.387                 | mean, tell, ok, aww, oh              |
| Reflection            | 0.631        | 0.692                | <b>0.780</b>          | like, yeah, know, think, feel        |
| Support               | 0.721        | 0.750                | <b>0.778</b>          | understand, okay, hope, feel, sorry  |
| Affirm                | <b>0.677</b> | 0.624                | 0.392                 | good, great, nice, awesome, love     |
| Closed Question       | 0.905        | <b>0.915</b>         | 0.895                 | ok, talk, like, know, want           |
| Persuade              | 0.661        | 0.770                | <b>0.841</b>          | like, think, know, happen, thing     |
| Open Question         | 0.918        | <b>0.943</b>         | 0.938                 | like, happen, tell, mean, think      |
| Seeking Collaboration | <b>0.518</b> | 0.500                | NA                    | ask, tell, maybe, mind, want         |
| Inappropriate         | 0.566        | 0.667                | <b>0.783</b>          | kiss, big, eat, wet, wanna           |
| Direct                | 0.516        | <b>0.523</b>         | 0.514                 | need, dont, stop, talk, tell         |
| Emphasizing Autonomy  | 0.730        | <b>0.785</b>         | NA                    | choice, want, best, decide, right    |
| Grounding             | 0.773        | <b>0.846</b>         | 0.835                 | ok, yeah, oh, cool, hmmm             |
| Personal Disclosure   | 0.803        | 0.776                | <b>0.817</b>          | good, know, want, yeah, time         |
| Introduction          | 0.899        | <b>0.927</b>         | 0.851                 | hello, good, morning, today, welcome |
| Conclusion            | <b>0.806</b> | 0.756                | 0.500                 | sleep, bye, care, gonna, later       |
| Chit-Chat             | 0.307        | <b>0.652</b>         | 0.497                 | NA                                   |
| Other                 | 0.458        | 0.633                | <b>0.770</b>          | NA                                   |
| Averaged F1           | 0.678        | <b>0.725</b>         | 0.705                 | NA                                   |

# Model (Cont'd)

## Validating the Binary Classifiers

| Class Name (Abbreviation)               | Inter Annotator Agreement | Agreement Between the model and the Annotators |
|---|---------------------------|--|
| Giving Information (GI)                 | 1                         | 0.663  |
| Reflection (RF)                         | 0.587                     | 0.552  |
| Support (SUP)                           | 0.710                     | 0.594  |
| Affirm (AFFIRM)                         | 1                         | 0.795  |
| Closed Question (QUC)                   | 0.826                     | 0.826  |
| Open Question (QUO)                     | 0.808                     | 0.729  |
| Persuade (PR)                           | 0.581                     | 0.47   |
| Direct (DI)                             | 1                         | 0.663  |
| Emphasizing Autonomy (AUTO)             | 1                         | 1  |
| Grounding (GR)                          | 0.906                     | 0.796  |
| Personal Disclosure (PD)                | 0.594                     | 0.499  |
| Introduction/Greeting (INT)             | 1                         | 0.795  |
| Outro/Conclusion (OUT)                  | 0.795                     | 0.795  |
| Seeking Collaboration/Permission (SEEK) | 1                         | 0.663  |
| Inappropriate (IP)                      | NAN                       | NAN  |
| Chit-Chat (CC)                          | 0.71                      | 0.426  |
| Cumulative Agreement                    | 0.734                     | 0.614  |

# 3. Analysis

# Answer RQ1

## Logistic Regression Results

- Analyze 63,012 conversations (5,632,402 utterances / January 2020 to August 2020)
- 1: satisfactory conversation (1~3 point), 0: unsatisfactory conversation (4~5 point)

| Conversation Category | Count  | Percent of Total Count |
|-----------------------|--------|------------------------|
| Satisfactory          | 49,892 | 79%                    |
| Unsatisfactory        | 13,120 | 21%                    |

- Weighted using the inverse of the respective class frequencies.



# Answer RQ1 (Cont'd)

## Coefficients and Odds Ratio

- **Reflection**, **Persuade**, and **Affirm** are significant predictors for satisfaction.
- **Inappropriate** is significant negative predictor for satisfaction.

| MI Code                    | Coefficient      | Odds Ratio   |
|----------------------------|------------------|--------------|
| <b>MI-Consistent</b>       |                  |              |
| Affirm                     | 0.036*           | 1.037        |
| Emphasizing Autonomy       | 0.078 ⊖          | 1.081        |
| Open Question              | 0                | 1            |
| Closed Question            | 0.011 ⊖          | 1.012        |
| Persuade (with permission) | 0.018**          | 1.019        |
| Reflection                 | <b>0.035***</b>  | <b>1.035</b> |
| Seeking Collaboration      | 0                | 0.999        |
| <b>MI-Inconsistent</b>     |                  |              |
| Direct                     | 0.019            | 1.019        |
| Inappropriate              | <b>-0.086***</b> | <b>0.917</b> |
| <b>Other</b>               |                  |              |
| Grounding                  | 0.008 ⊖          | 1.008        |
| Giving Information         | -0.025           | 0.975        |
| Support                    | 0.013            | 1.013        |
| Personal Disclosure        | 0.001            | 1.001        |
| Introduction               | 0                | 1            |
| Conclusion                 | 0.014            | 1.015        |
| Chit-Chat                  | -0.004           | 0.996        |
| <b>Control Variables</b>   |                  |              |
| Member Age                 | -0.007***        | 0.993        |
| Listener Age               | -0.003***        | 0.997        |
| Member Past Average Rating | 0.522***         | 1.685        |
| AIC of Model               | 97,800           |              |

# Answer RQ2

## Changes in listener usage of MI strategies

