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PhD Thesis

IMMEDIATE AND ACCESSIBLE GRIEF TREATMENT VIA COLD READING CHATBOTS

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Abstract

This thesis presents a potential solution for prolonged grief disorder (PGD) sufferers waiting for psychological aid, by simulating the cold reading process through a chatbot model.

PGD occurs in approximately 10% of all bereavements, and there is currently overwhelming demand for psychiatric aid meaning that 50% of patients wait over 3 months for treatment and 10% of patients wait over a year. This is likely to worsen during and immediately following the coronavirus pandemic. Therefore, an alternative is needed to treat PGD sufferers sooner.

An existing solution is the use of a griefbot, a chatbot designed to resemble the deceased. However, current griefbots rely on pre-existing data from the deceased. Some people may not have this pre-existing data if the death was unanticipated, and the deceased did not leave behind sufficient messaging data. Therefore, another alternative is required to support PGD patients waiting for grief treatment who do not have the required pre-existing data for a griefbot.

This research presents the solution as a chatbot that imitates a psychic medium who purports to communicate with the deceased. The proposed chatbot would not require pre-existing data from the deceased and could therefore be used by any PGD sufferer.

Multiple approaches to building a chatbot were tried, including rules-based, retrieval-based, and generative models.

Rules-based models use pre-written pattern-template pairs to produce predetermined responses to anticipated inputs. The rules-based cold reading chatbot works well in delivering a simple cold reading from start to end but is limited in its conversational range to the script it has been written to follow.

Retrieval-based models calculate the distance between a user's input and each line in a dialogue corpus and upon finding the closest line, returns the response to that line from the corpus. A retrieval-based cold reading chatbot returns messages that are suitable for a psychic medium, but its inflexibility leads to a lot of repetition in its

responses despite small, yet significant changes in the user's inputs.

Generative models use artificial neural networks to learn the connections between conversational inputs and outputs in order to create new responses to unanticipated inputs. The generative cold reading chatbot is able to learn some general conversational skills but struggles with learning the full cold reading technique from the available corpora. In order to improve the generative model, more training data would need to be obtained.

Three experts in psychology provided their feedback to the overall premise, the rules-based chatbot and the generative chatbot. All experts supported the use of chatbots in PGD treatment and two of the experts supported the premise of a chatbot psychic medium to help PGD patients, while the other suggested a chatbot that simulates a grief specific therapist.

Declaration

I declare that I am the sole author of this thesis and no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university. Therefore, I confirm that the work described in this thesis is my own except for some sources that support the research, which is appropriately cited and indicated.

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Chapter 1

Introduction

1.1 Background

Chatbots, synonymous with “artificial conversational entity” or “conversational artificial intelligence”, are computer programs that operate by being speaking and being spoken to, either by text or voice. The idea for chatbots can be linked back to Alan Turing in 1950, when he proposed an “imitation game”, now more commonly referred to as the “Turing test” (Turing, 1950). The purpose of the game/test was – and still is – to determine if a computational system can be considered truly intelligent. The design of the game was that a human would talk to unknown entities that they could neither see nor hear, entering written messages and receiving written messages back. Some entities would be human, and others would be computer programs. If the participant could not distinguish the computer programs from the humans, the computer programs would be considered intelligent or at least possessing the ability to exhibit intelligence comparable to a human. The idea of conversational ability as a measure of intelligence is a contentious one, with critics offering counterarguments such as the “Chinese room” (Cole, 2020), proposing that outward appearances have no bearing on the presence of understanding or consciousness. Despite their questionable usefulness as a measure of intelligence, computer programs with the capacity to process and produce natural language have found many uses, such as in customer service and mental health services, where they usually go by their shorter designation, “chatbot”.

One of the earliest chatbots, created by Joseph Weizenbaum in 1964, was called “ELIZA” (Weizenbaum, 1966) and it was designed to resemble a Rogerian psychotherapist. Computationally speaking it was relatively simple by today’s standards, using simple pattern-matching techniques to repeat the user’s input back to them, but framed as a question. For example, if a user says, “I am unhappy”, ELIZA might say “Can you explain what made you unhappy?”. Nonetheless, the effect was –

and still is – convincing, and these pattern matching techniques still have use today. Since ELIZA, chatbots such as Replika (Newton, 2017) continue to aid in the domain of mental health support. Replika was designed as a personal companion that can engage in friendly conversation or even offer practical exercises to encourage personal well-being. Unlike ELIZA, Replika uses modern artificial intelligence techniques to learn conversational behaviour, particularly that of the user. Replika was founded by Eugenia Kuyda (Newton, 2017), who also created a chatbot designed to resemble her deceased friend, Roman. The Roman chatbot, an artificial neural network trained by using thousands of messages from the real Roman and his friends and family, is an example of a “griefbot”. A griefbot is a chatbot intended to help someone with their grief, usually by imitating the deceased. Other examples of griefbots include the service HereAfter and the fictional Black Mirror episode “Be Right Back”.

HereAfter (HereAfter, n.d.), founded by James Vlahos, differs from other griefbots. Unlike other griefbots, the service doesn’t use pre-existing messaging data or social media profiles. Instead, the person being recreated has a conversation with an app or interviewer before they perish, recording their responses which can then be played back in the finished product by providing a suitable prompt. As the responses have been made specifically for the purpose of the chatbot, there are no issues with privacy or data quality. The downside to this approach is that it is unavailable if the person to be recreated is already deceased.

In the Black Mirror episode “Be Right Back” (Harris, 2013), a grieving woman uses her late partner’s social media profiles to recreate him virtually – and later physically – to both positive and negative effects. Episodes of Black Mirror are usually cautionary tales regarding the “side-effects” of technology. In this case, the focus is primarily on how users of social media often portray a false impression of themselves when they’re online. The extremes of this behaviour would include scams such as catfishing, but even behaviour such as “flex culture” would support this narrative. If a person presents a false self in their online persona, any bot trained on such data

would also exhibit these falsehoods.

Aside from data quality, there is also the issue of data quantity – how much a given person used messaging services while they were alive – if any available data exists at all. If sufficient data does exist, there is the question of who has the rights to it. One person may have rights to all of their own conversations with the deceased, but not to the deceased’s conversations with anyone else. Within those conversation there may be sensitive information. Therefore, training a chatbot on these conversations could result in the chatbot outputting that sensitive information when given certain inputs.

1.2 Motivation

The current methods for creating a griefbot require the user to either have access to the deceased's messaging data – in sufficient quantity and quality – or to have anticipated the deceased's passing beforehand and had them record their responses to a range of queries. This means that there are likely to be many bereaved who are unable to create a griefbot.

The inability to create a griefbot may not be an issue if a person is still able to grieve naturally and healthily. Natural and healthy grief is measured by the ability to complete the 4 grief tasks (Boelen & Smid, 2017). The four grief tasks have superseded the notion of there being five stages of grief, and they are defined as:

- To accept the reality of the loss.
- To process the associated pain.
- To adjust to a world without the deceased.
- To find an enduring connection with the deceased in the midst of embarking on a new life.

Unlike the five stages of grief, these tasks can be completed in any order and are not necessarily completed naturally i.e., they may require some significant effort from the patient. The task “To find an enduring connection with the deceased in the midst of embarking on a new life” may seem contradictory to the other tasks as it emphasises holding onto the deceased rather than simply “accepting the reality of the loss” and “adjusting to a world without the deceased.”

As the ability to complete these tasks is essential for healthy grief, the inability to complete the tasks results in unhealthy grief or “Prolonged grief disorder” - PGD. Prolonged grief disorder is discerned from regular, healthy grief predominantly by the duration of the grief period. A patient suffering from PGD can still be feeling the effects of grief after 6 or even 12 months (Boelen & Smid, 2017). Prior to coronavirus pandemic, PGD occurred in approximately 10% of all bereavements. Since the coronavirus pandemic, this figure is likely to increase (Eisma, Boelen, & Lenferink, 2020). The reasons for this increase are twofold. Firstly, as of December 2020, the UK

alone has recorded 80,000 excess deaths since the start of the pandemic (BBC, 2020). Secondly, the nature of bereavements in the pandemic makes them more likely to result in PGD. The exacerbating factors include not being able to say goodbye and being cut off from support networks.

The existence of PGD itself doesn't make access to griefbots a major concern, if PGD sufferers are able to seek support elsewhere, such as through pharmacological and psychological interventions. Unfortunately, pharmacological interventions are only effective in that they target the depression symptoms of grief (Boelen & Smid, 2017). Pharmacological solutions do not resolve the underlying issues that cause grief and can even interfere with the neurological functions required for healthy adaptation to grief. While psychological interventions are effective, in that they relieve symptoms while treating the underlying causes of grief, they can only be as effective as they are available. According to a 2013 report by Mind, 10% of patients seeking mental health support are left waiting over a year, while 50% of patients are left waiting over three months (Mind, 2013). PGD sufferers are amongst these patients waiting to receive treatment, and therefore they must rely on self-help in the meantime.

Self-help could be a griefbot, but with the restrictions mentioned earlier it may be limited to services such as psychic mediums (Beischel, Mosher, & Boccuzzi, 2014-2015). A psychic medium is a performer who uses techniques, such as Barnum statements, to deliver cold readings (Dutton, 1988). To deliver a cold reading is to glean information about a person without any prior knowledge about them. A psychic-medium claims to have supernatural abilities that allow them to communicate with the deceased. Whilst these claims are dubious, the results are promising. By communicating with the deceased – or at least believing that they are – through a psychic medium, the patient can find an enduring connection with the deceased. The services of psychic-mediums are not provided by the NHS, and therefore the burden of payment falls entirely on the patient. Psychic-mediums use their skills to make a living, and therefore must charge at least a living wage or more to cover additional expenses and to make a profit.

To summarise the research motivation thus far:

- PGD is a large-scale issue.
- Mental health services are overwhelmed.
- Griefbots require prior planning and/or personal data.
- Psychic mediums are expensive.

A solution is needed to address the problem of PGD to relieve the pressure on mental health services to respond to long waiting lists of patients (Mind, 2013). A chatbot solution would be available 24/7 at little to no cost to the patient. However, the data requirements for a griefbot will often rule out this option. A psychic medium has no data requirements because they use cold reading which allows them to make accurate statements without prior knowledge of the deceased (Dutton, 1988). A psychic medium does come at considerable cost to the patient. The optimal solution – i.e., the solution that has the all the advantages of the existing solutions, without their disadvantages – would be cheap and require little to no personal data. A chatbot is the best way to ensure the cost to the patient is kept as low as possible; by using automation we avoid additional personnel costs. A method of avoiding using personal data presents itself in the cold reading techniques used by psychic mediums. Combining these ideas, we reach the conclusion that the optimal solution is a chatbot that can use cold reading techniques.

1.3 Hypothesis

It is the hypothesis of this research that cold reading techniques can be replicated using established chatbot techniques and that a cold reading chatbot is the optimal solution to the issue of untreated PGD sufferers.

The optimal solution is defined as having the advantages of existing solutions and none of the disadvantages.

To be considered an optimal solution, the cold reading chatbot must meet the following criteria:

1. Be cost effective.
2. Be available 24/7.
3. Not require any personal data.
4. Demonstrate cold reading techniques in its responses.
5. Apply cold reading techniques in a way that will benefit a user with PGD.

A chatbot solution will meet criteria 1 and 2. If the chatbot successfully imitates a psychic medium it shall also meet criteria 3 and 4. Literature suggests that by meeting criteria 4, the chatbot will meet criteria 5 (Beischel, Mosher, & Boccuzzi, 2014-2015).

1.4 Aims

The aims that must be accomplished to test the hypothesis are as follows:

1. To review the current literature and determine the state of the art.
To assess whether the chatbot has replicated the cold reading techniques, one must know what the techniques are. Researching how chatbots have previously been made will inform the design of the cold reading chatbot. Accomplishing this aim ensures that the solution meets criteria 1 and 2.
2. To obtain a dataset – if required – to build the cold reading chatbot. It is already known that some chatbots, such as Roman (Newton, 2017) require substantial dialogue corpora. No personal data may be used for the solution; therefore, dialogue corpora of the deceased is not considered. Accomplishing this aim ensures that the solution meets criteria 3.
3. To develop the chatbot models with the dataset. Training time for chatbot models vary and hyperparameter tuning may be required so this step can encompass a significant time dedication.
4. Evaluate the effectiveness of each model, determine the next steps, and perform them if able to. Having reviewed the state of the art on cold readings, one can at this stage determine if the chatbot is demonstrating cold reading techniques in its responses. Accomplishing this aim demonstrates whether or not the solution meets criteria 4.
5. Present the final models to psychology experts to determine if the solutions are or could be suitable for treating PGD patients waiting for professional psychiatric intervention. Accomplishing this aim demonstrates whether or not the solution meets criteria 5.

1.5 Thesis Structure

The structure of this thesis is as follows:

Chapter 1: Introduction

This chapter establishes the key background and motivation for this research, including the issue of PGD, how patients have to wait for psychiatric intervention, and why griefbots and psychic mediums are not suitable solutions for every PGD patient. The chapter also introduces the proposed solution to these issues: a cold reading chatbot.

Chapter 2: Literature Review

This chapter discusses the prior research relevant to this thesis, including specific previous chatbots and the broad categories they fall under as well as techniques for cold reading. This literature will inform the design of the cold reading chatbot, as described in the methodology

Chapter 3: Methodology

This chapter introduces and describes the methodology chosen to create the cold reading chatbot. This includes the specific steps and the immediate outcome of each method tried. The most promising models produced by the methodology will be selected for evaluation.

Chapter 4: Evaluation

This chapter details the approach chosen to evaluate the outcomes of the research conducted and the outcomes of said evaluation.

Chapter 5: Conclusions

This chapter summarises the work done, the outcome and the results of the evaluation as well as the implications of the research conducted and the potential for future research.

Chapter 2

Literature Review

In order to inform the design of the proposed cold reading chatbot, a thorough literature review must be conducted. This includes specific chatbots that have come before, such as ELIZA and Roman, as well as the categories of chatbot that these are, such as rules-based and generative, and the machine learning techniques that can be used to create these chatbots, such as memory-based reasoning and sequence-to-sequence models.

2.1 Previous Chatbots

2.1.1 ELIZA

One of the earliest known chatbots, ELIZA is a simple rules-based chatbot designed to imitate a Rogerian psychotherapist. ELIZA performs this role without requiring any advanced artificial intelligence techniques used in modern chatbots, such as artificial neural networks used in generative chatbot models.

The reasons ELIZA was able to perform the role of a Rogerian psychotherapist so well were firstly that the role was restricted, so the chatbot was not expected to be able to respond to a wide variety of conversational topics in the way that a human might. Also, the responses used by a Rogerian psychotherapist simply put the user's input back to them but framed as a question. For example, a user saying, "I am unhappy" may receive the response "Can you explain what made you unhappy?". Therefore, the chatbot does not need generative AI if all of its responses can be composed from prewritten templates and the user's inputs.

The effectiveness of Rogerian therapy, also known as Person-centred therapy (Rogers & Sanford, 1985), has been proven (Ward, et al., 2000). However, a more targeted approach could be more effective at treating specific conditions, such as PGD.

2.1.2 Replika and Roman

A more recent chatbot model, Replika was created by Luka (Luka Inc., n.d.), the company founded by Eugenia Kuyda, the person responsible for Roman, one of the very first griefbots (Newton, 2017). Replika, like Roman, is a generative model trained on vast amounts of dialogue corpora. Aside from general conversational skills learnt from training on dialogue corpora, Replika has built in coaching techniques to improve mental well-being and is capable of remembering details from user inputs over long periods of time, creating a long-term relationship between the user and their Replika.

Replika required hundreds of thousands of lines of text to initially train and relies on user feedback to improve further. These requirements are alarming as it could prevent this paper's proposed chatbot model from being created within a reasonable timeframe given the available computational resources, if following the same method as Replika. However, Replika, much like ELIZA, takes a generalised approach to its conversations and does not specialise in a given field like the proposed cold reading chatbot model would. A more specialised chatbot may not require the same volume of data as a general conversational chatbot model.

2.1.3 HereAfter

Created by James Vlahos after he created his own griefbot modelled after his own father (Vlahos, 2017), HereAfter offers its users a means of recording the life story of themselves or their loved ones and structuring the recorded stories into an interactive chatbot (HereAfter, n.d.).

The way to create a chatbot with HereAfter is to conduct an interview with the subject, recording their responses to specific questions about them and their life, so that prompts similar to the question trigger the chatbot to retrieve the associated recorded response.

The benefit of this method is that it ensures quality of responses, i.e. the responses are recorded with the subject fully aware of their purpose and delivered in their

entirety, in the subject's voice.

The drawback with this approach is that the subject has to be able to complete the interview to record their responses. This is an impossibility for those who are already deceased.

2.1.4 A Neural Chatbot with Personality

A paper by Stanford University details the design of a generative Seq2Seq chatbot model that imitates specific characters (Nguyen, Morales, & Chin, 2017).

Initially, the researchers tried using the Cornell Movie Dialogs Corpus (Danescu-Niculescu-Mizil & Lee, 2011) to train the model, but the responses were found to be overly dramatic and inconsistent.

The researchers decided to include scripts from sitcoms for more lifelike conversations.

To imitate a specific character, the model was trained in three stages. In the first stage, the model was trained on all of the available training data, including the Cornell Movie Dialogs Corpus and all sitcom scripts. The next stage of training used only the sitcom scripts. The third and final stage used only the chosen character's lines to finetune the model.

The resultant chatbot models were able to respond appropriately to conversational cues in a way that fit the personality of the imitated characters, as judged by human users.

If it is possible to imitate specific personalities with a generative chatbot, it may also be possible to imitate specific roles, such as that of a psychic medium.

2.1.5 GPT3 and ChatGPT

Large Language Models – LLMs – are a relatively recent development that use large scale transformers with high volumes of data to generate sequences of text in a wide range of domains. General Pre-trained Transformer – GPT – is a series of such

models developed by OpenAI, with GPT-3 being the latest version as of the time of writing. ChatGPT is a variation of GPT-3 that has been finetuned for dialogue, although can still perform other functions (OpenAI, 2022).

The outputs of LLMs are remarkably lifelike and have attracted the attention of media outlets and the general public (Vallance, 2022). The time and resources it takes to train an LLM would normally be unfeasible for an individual researcher, which makes transfer learning an appealing option, effectively allowing the researcher to get a significant head start on training rather than starting from scratch.

Some critics of LLMs argue that aside from the vast scaling at play, they are no different to other generative models that are simply trained to predict the next token in a sequence, given all previous tokens, and that this does not constitute any actual understanding of the text (Bender & Koller, *Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data*, 2020). Counterarguments to this criticism may say that language and the meaning behind it cannot be so simply separated and the cognitive linguistic issues are more complicated and nuanced (Potts, 2020).

Other criticisms of LLMs include the environmental and financial impacts, as the scaling of both models and training data necessitates increased energy usage, resulting in a higher carbon footprint and operating costs, for example a single BERT model is estimated to require as much energy as a trans-American flight (Bender, Gebru, McMillan-Major, & Shmitchell, 2021). Increased energy usage also carries a financial cost which may be offloaded to the user by way of a subscription fee, increased taxes, or decreased services in other areas.

LLMs rely on such huge volumes of data that even with measures in place, harmful influence can enter the training data and create biases within the final model. These biases can lead to offensive responses to certain prompts that may be undetected until they are discovered by users (Piantadosi, 2022). Biases can emerge in LLMs if providing a particular prompt and checking for all possible prompts would be an impossible task, meaning there is always a chance for offensive responses to appear.

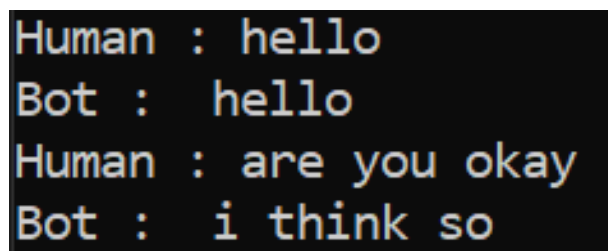
Current methods for bringing AI into alignment rely on human feedback enabled reinforcement learning, i.e., the user gives each response a “thumbs up” or “thumbs down” depending on whether the chatbot responded appropriately or not respectively. However, user feedback doesn’t always work as intended if malicious intentions are involved, for example, Microsoft’s own Twitter bot, Tay, had to be deactivated after it learned problematic behaviour from user feedback (Lee D. , 2016).

2.1.6 *Tay*

Tay was a short-lived Twitter bot, developed by Microsoft. The idea was that it would learn based on feedback from Twitter users. What happened was that users influenced Tay to imitate problematic behaviour, including racism (Lee D. , 2016). Tay demonstrated the risk of using user input to allow a bot to continuously learn and update itself if users are inclined to sabotage the bot.

2.1.7 *Cold Reading Chatbot*

The researcher has previously explored the development of a generative, cold reading chatbot, by means of a Seq2Seq chatbot model, with an encoder-decoder structure (Tracey, Saraee, & Hughes, 2020).



```
Human : hello
Bot : hello
Human : are you okay
Bot : i think so
```

Figure 1: Chatbot responding to standard conversational cues.

The model arguably responded appropriately as a psychic medium to many of the given prompts, however the responses were limited mostly to very short messages and the model did not take into consideration the full history of the conversation.

```
Human : i lost my father
Bot : i know hes right
Human : can you hear my father
Bot : i yeah
Human : is he okay
Bot : yes
Human : is he proud of me
Bot : yes
```

Figure 2: Chatbot responding to cues related to deceased relatives

```
Human : my grandmother died
Bot : yes
Human : can you hear her
Bot : yeah
Human : what does my grandmother say
Bot : hello
Human : can you tell her i say hello
Bot : okay
```

Figure 3: Chatbot responding to more cues related to deceased relatives

Because the model responded only to the last message, the user could not use short, simple responses to the chatbot. A response such as “yes” or “no” would always yield the same response, no matter the context, despite both being appropriate responses in a wide variety of situations.

```
Human : how are you
Bot : i
Human : is my dad watching me
Bot : is it
Human : are there any messages for me
Bot : is i this okay
```

Figure 4: Chatbot responding nonsensically to cues related to deceased relatives.

```
Human : whats heaven like
Bot : nothing
Human : whats hell like
Bot : you
```

Figure 5: Chatbot responding in an offensive way to cues about the afterlife.

The model could also produce responses that were incomprehensible or even offensive, despite a lack of offensive words in the vocabulary, because of the sensitive nature of the discussions.

It was deemed that the chatbot would likely improve if it could factor the entire context of the conversation, not just the last utterance.

2.1.8 MYLO

Managing Your Life Online (MYLO) (Bird, Mansell, Wright, Gaffney, & Ta, 2018) is a chatbot designed to help the user solve any problem they may be experiencing.

MYLO's non-specificity echoes ELIZA but differs in that it was designed to prompt the user to rethink their problem in a way that would allow them to solve it.

When tested on users who were experiencing psychological distress, anxiety and depression as a result of their problems, MYLO was compared against ELIZA.

Users rated MYLO to be more helpful than ELIZA, however when measuring the reduction of symptoms, no difference between the two chatbots was observed.

These outcomes highlight that there can be a significant disconnect between user reports and other metrics which may be used to establish the effectiveness of a chatbot model.

2.1.9 Woebot

Woebot (Fitzpatrick, Darcy, & Vierhile, 2017) is a chatbot designed to deliver a self-help program to users with anxiety and depression by applying cognitive-behavioural-therapy (CBT) (Mind, 2021) principles.

Whereas MYLO was compared against ELIZA, Woebot was compared an e-book

“Depression in College Students”. Users in the Woebot group showed a significant drop in depression symptoms compared to users in the information-only group, establishing that chatbots can be a far more effective means of communicating information than simply providing full texts.

2.2 Chatbot Types

2.2.1 Rules-Based Models

```
<?xml version="1.0" encoding="UTF-8"?>

  <aiml version="2.0">
    <category>
      <pattern>HI *</pattern>
      <template>Hello world!</template>
    </category>

    <category>
      <pattern>What is a chatbot</pattern>
      <template>
        A chatbot is a computer program designed to respond
        to text or voice inputs in natural language.
      </template>
    </category>
  </aiml>
```

Example of a rules-based chatbot written with AIML script (AIML Foundation, n.d.).

Rules-based refers to the set of pattern-template pairs that govern the operation of the chatbot's responses to given inputs (AIML Foundation, n.d.).

Rules-based models do not require any form of machine learning. Instead, they use token matching from an input given by the user to another input – or “pattern” – in the chatbot's script. When a match is made, the corresponding output – or “template” – is printed to the user's interface. Patterns can allow for some variation in the user's inputs, by employing wildcards, case-insensitivity, and punctuation stripping. Templates can also display some variation by using tokens saved from user inputs in their responses. Even with these measures in place, manual effort is still required on the developer's part to create a chatbot that can handle wide ranging conversations. For specific and narrow conversations, a rules-based chatbot is sufficient, but an open-ended, general conversational chatbot requires a more advanced approach.

For the purposes of the cold reading chatbot, a rules-based bot could, in theory, be fit for purpose. However, it would take a considerable amount of time to account for all possible inputs and their corresponding outputs. Although a dialogue corpus or

corpora is not required to build a rules-based model, a cold reading corpus or corpora could be useful to analyse and identify potential pattern-template pairs.

2.2.2 Retrieval Models

A retrieval-based chatbot model (Hussain, Sianaki, & Ababneh, 2019) can be built using a dialogue corpus (a dataset of statements/questions and the responses to them), wherein each statement/question is used like a pattern in a rules-based chatbot and each response as a template to streamline the process of creating a chatbot.

To account for some variation in inputs, inputs can be matched to patterns by sentence similarity. Similarity can be measured by distance, where tokens are used as dimensions.

Input	Output
Hello	Hi
Hi	Hello
Are you alright?	Yes, thank you
Are you okay?	I'm okay, thanks
What's the weather?	How should I know?
Goodbye	Bye
...	...

Figure 6 Example of a dialogue corpus

In a 3-dimensional space – with x, y, and z axes – where A is at (1, 1, 1) while points B and C are at (0, 1, 1) and (0, 0, 0) respectively, using Euclidean distance, the distance between A and B is 1, while the distance between A and C is roughly 1.7.

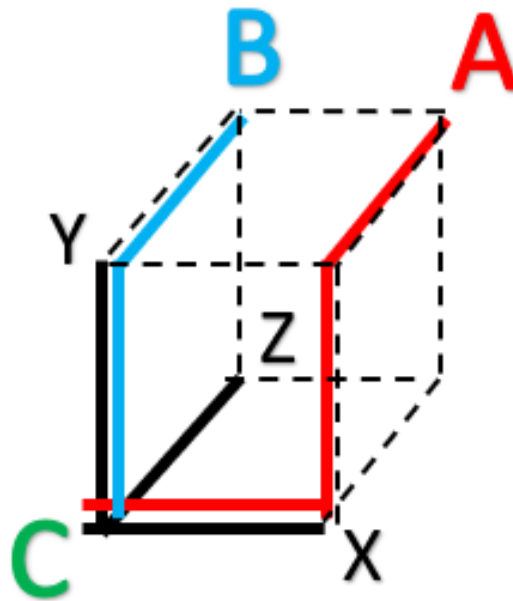


Figure 7 Illustration of 3 points in 3-dimensional vector space

Instead of x, y and z, the axes could be labelled “how”, “are” and “you”, for example. With A as the input “How are you?” and B and C as the patterns “ARE YOU OKAY” and “WHAT’S THE WEATHER” respectively, A is closer to B and therefore the appropriate response to A in this simple retrieval-based chatbot model would be the corresponding template to B.

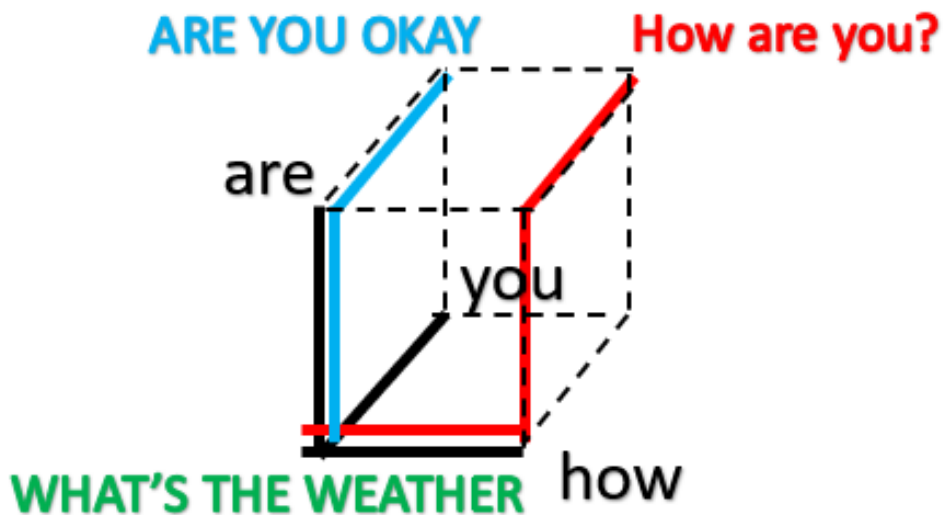


Figure 8 Illustration of 3 points, representing sequences of text, in a 3-dimensional vector space

This is the basis of a Memory Based Reasoning – MBR – retrieval chatbot. The method is similar to K Nearest Neighbours – KNN – models. However, in this case, only the closest match is used, rather than a varying “K” number of matches. Distances can be measured using one of several metrics, including Euclidean, Manhattan and Chebyshev.

Euclidean – or “as the crow flies” – distance is also the shortest distance between two points, assuming there are no obstacles. In a space defined by a set of axes, the Euclidean distance can be calculated using the Pythagorean formula, extended for however many axes there may be. Mathematically this can be represented as:

$$\text{Vector A} = [1, 2, 3]$$

$$\text{Vector B} = [1, 3, 5]$$

$$\text{Euclidean (A, B)} = ((1 - 1)^2 + (2 - 3)^2 + (3 - 5)^2)^{1/2} = (0 + 1 + 4)^{1/2} = 5^{1/2} = 2.24$$

Manhattan – or “taxicab” – distance can be interpreted as the distance between two points while travelling only along the axes, or how far a taxi ride in Manhattan would be, seeing as the taxicab would have to adhere to the grid system of the road and could not simply move “as the crow flies” which is the case for Euclidean distance. Mathematically this can be represented as:

$$\text{Vector A} = [1, 2, 3]$$

$$\text{Vector B} = [1, 3, 5]$$

$$\text{Manhattan (A, B)} = |1 - 1| + |2 - 3| + |3 - 5| = 0 + 1 + 2 = 3$$

Chebyshev – or “chess board” – distance is equal to the maximum absolute distance in any of the axes. To use an analogy: for a king piece on a chess board, it is the same distance whether it moves one space forwards, backwards, sideways, or diagonally. In Euclidean distance, the positions at diagonals would be further away than the

positions left, right, forwards, or backwards. Mathematically this can be represented as:

$$\text{Vector A} = [1, 2, 3]$$

$$\text{Vector B} = [1, 3, 5]$$

$$\text{Chebyshev (A, B)} = \max (|1 - 1|, |2 - 3|, |3 - 5|) = \max (0, 1, 2) = 2$$

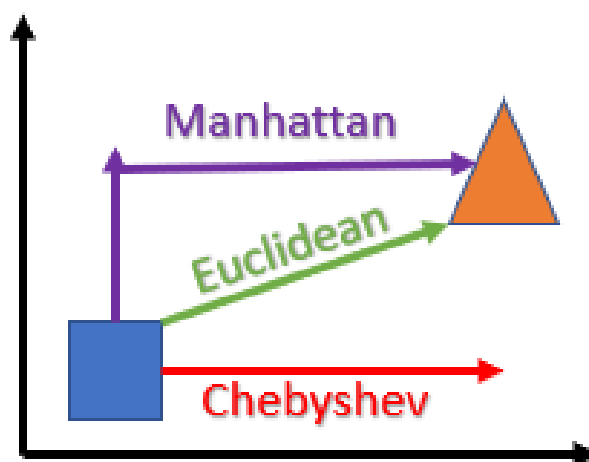


Figure 9 Illustration of the differences between Manhattan, Euclidean and Chebyshev distances

Euclidean, Chebyshev and Manhattan distances all fall under the generalisation that is Minkowski distance. The Minkowski distance represented mathematically is:

$$\text{Vector A} = [1, 2, 3]$$

$$\text{Vector B} = [1, 3, 5]$$

$$\text{Minkowski (A, B)} = (|1 - 1|^x + |2 - 3|^x + |3 - 5|^x)^{1/x}$$

Where $x = 1$ for Manhattan distance, $x = 2$ for Euclidean distance, $x = \infty$ for Chebyshev distance.

A retrieval style chatbot may also encode its inputs in ways other than a Term Document matrix. Each word in an input may be converted into its word vector. To represent each sequence of word vectors as a single vector is to produce a thought vector. Creating thought vectors from word vectors is usually done by either recurrent neural networks or self-attention via transformers (Vaswani, et al., 2017). There are two more computationally efficient methods for doing this, Sum of Word Embeddings (SOWE) and Mean of Word Embeddings (MOWE) (White, Togneri, Liu, & Bennamoun, 2015). In SOWE, vectors are added together so that each dimension of the resultant thought vector is the sum of that dimension in each of the word vectors. To illustrate:

$$\text{Vector A} = [a, b, c]$$

$$\text{Vector B} = [x, y, z]$$

$$\text{SOWE (A, B)} = [a + x, b + y, c + z]$$

MOWE follows the same process, followed by dividing the value for each dimension by the number of words in the sequence. To illustrate:

$$\text{Vector A} = [a, b, c]$$

$$\text{Vector B} = [x, y, z]$$

$$\text{MOWE (A, B)} = [(a + x)/2, (b + y)/2, (c + z)/2]$$

Other distance metrics are also possible to consider. However, while this method does allow for a far greater variety of inputs than a rules-based approach would in the same amount of time, it does not yield a greater variety of outputs than what is present in the dialogue corpus.

2.2.3 *Generative Models*

Generative chatbot models (Hussain, Sianaki, & Ababneh, 2019) can generate original responses, as opposed to being limited to selecting from pre-written responses.

These models are built with artificial neural networks.

Artificial neural networks – ANNs – are a form of machine learning inspired by the structure of neurons in biological brains. ANNs are generally composed of an input layer, hidden layers, and an output layer. Each layer is composed of artificial neurons – also called “nodes” – each of which is connected to every neuron in the previous and following layers by weighted edges if the network is densely connected.

In the case of a chatbot model, the input layer would take data in the form of a phrase such as “hello”, and the output layer would produce data in the form of a corresponding phrase such as “hi”. A neural network, intended to become a chatbot, would be trained on many input-output pairs such as the previous example in what is called a dialogue corpus or corpora.

The process of training a neural network can be described in two stages – a forward pass and a backward pass.

On a forward pass, the initial input values are parsed through input layer nodes.

Each node within a neural network receives the sum of all inputs parsed to it and applies an activation function, resulting in a new value which is then parsed through any subsequent edges.

Activation functions are a key component of ANNs, and each model is capable of utilising more than one. Choosing the right functions for the right domain is essential to creating a working ANN model. Most activation functions are nonlinear. By using nonlinear activation functions, ANN models can capture complex, nonlinear relationships between variables.

Applying the softmax activation function to a layer is used to transform the results in the values produced by the layer into a probability distribution wherein the values can lie between 0 and 1, and they must sum to 1.

For a chatbot model, the output layer would typically be a dense layer, where the number of nodes is the same as the size of the chatbot vocabulary, with a softmax activation function. The node with the highest value will represent the word that is most likely to be the correct choice.

After the forward pass is completed, and all values have passed through all the layers, the error is calculated by comparing the value predicted in the output layer to the true value of the output that corresponds to the given inputs. This comparison returns a value called “loss”. There are multiple functions for calculating loss, the appropriate function will depend on the nature of the task that the model is trying to achieve.

For multiclass classification tasks such as a chatbot, Cross Entropy is the loss function used to compare true and predicted probability distributions.

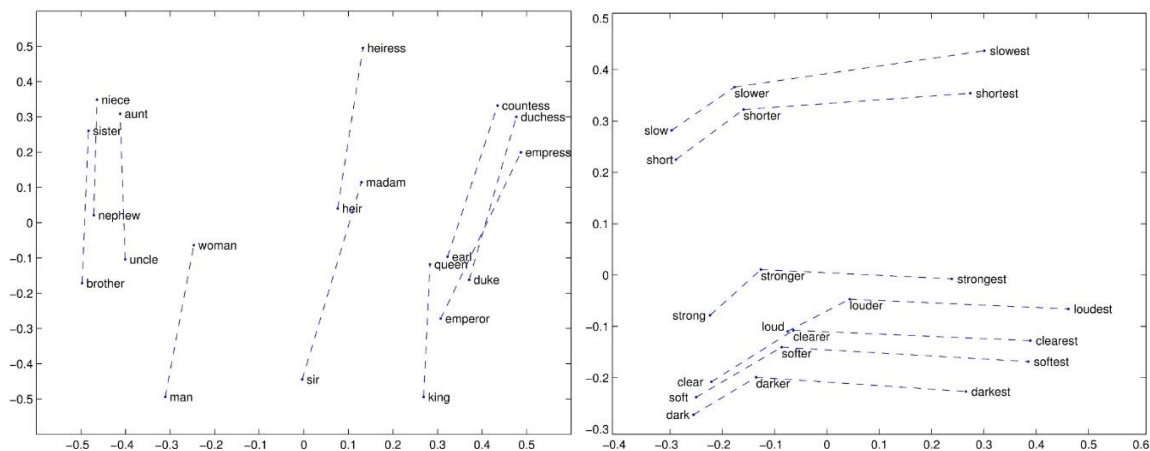
During the backward pass, the weights are incrementally adjusted to minimise the model’s loss via a process called back-propagation. After the error of a model is calculated, the backpropagation algorithm calculates the derivative of the error in respect to each weighted edge. The weighting of each edge is then adjusted in order to minimise the error gradient caused by the edge.

Word2Vec

Using unique words as dimensions in a vector space fails to capture the semantics of the words themselves. For example, the words “king” and “queen” would be as orthogonal to each other as they would be to “table” or “plant”.

Word vectors are a way to represent words numerically while also capturing semantic information. For example, the difference between the vectors for “man” and “woman” is roughly equal to the difference between “king” and “queen” or “uncle” and “aunt”, demonstrating that the vectors have captured a representation of gender. Similarly, the difference between the vectors for “strong” and “stronger” is roughly equal to the difference between “clear” and “clearer” or “soft” and “softer”,

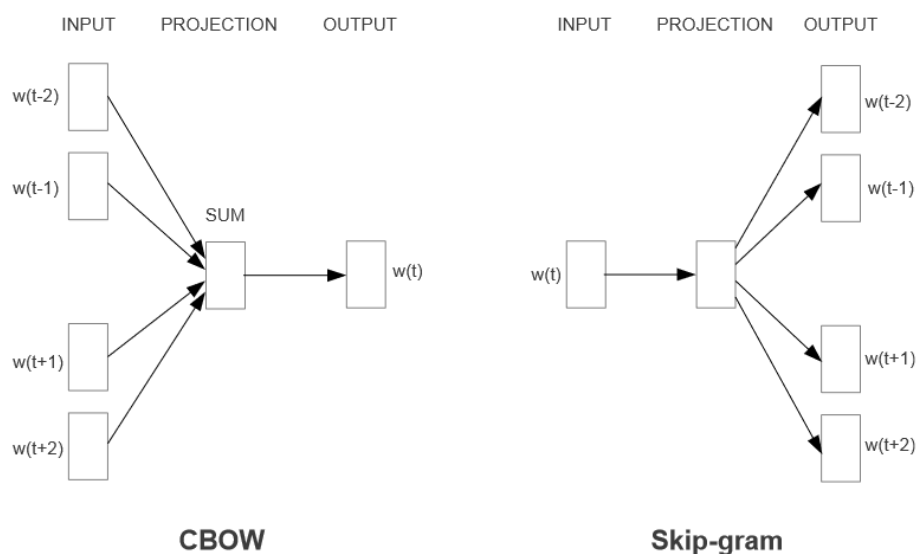
proving that grammatical concepts like comparatives and superlatives are also captured in word vectors (Pennington, Socher, & Manning, 2014).



GloVe word vectors, demonstrating the capability to capture semantics.

<https://nlp.stanford.edu/projects/glove/>

Word vectors can be obtained by using word2vec models. Word2vec can be used in one of two ways, Continuous Bag of Words (CBOW) or Skip-Gram. CBOW iterates over text input with a context window of a given number of words. The word in the centre of the window is the target and the other words in the window are used to predict the target word. In the Skip-Gram architecture, the centre word is used to predict the other words.



CBOW and Skip-gram model architectures.

In either model, the predicted word or words aren't of actual interest. Instead, the developer takes the trained weights between the input layer and the hidden layer and uses them as word vectors.

Word2vec models are usually trained on large corpora. Therefore, one may choose to use transfer learning. In transfer learning, a pre-trained model or layer is taken and finely tuned, or complimented with additional layers, to perform a new task.

Alternatively, word vectors can be trained in the embedding layer alongside the rest of the chatbot model.

Recurrent Neural Networks

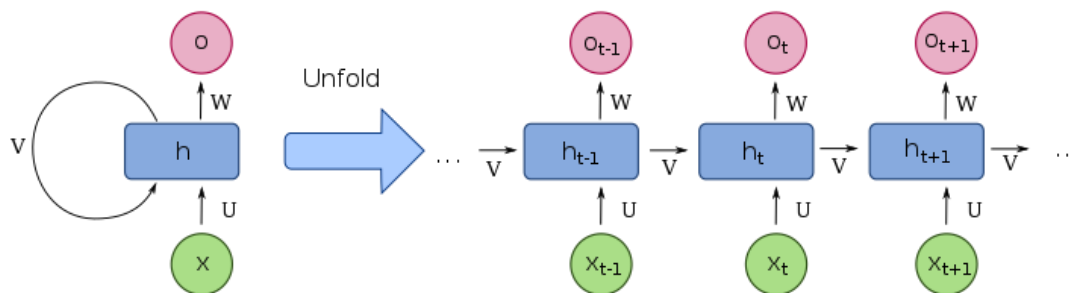
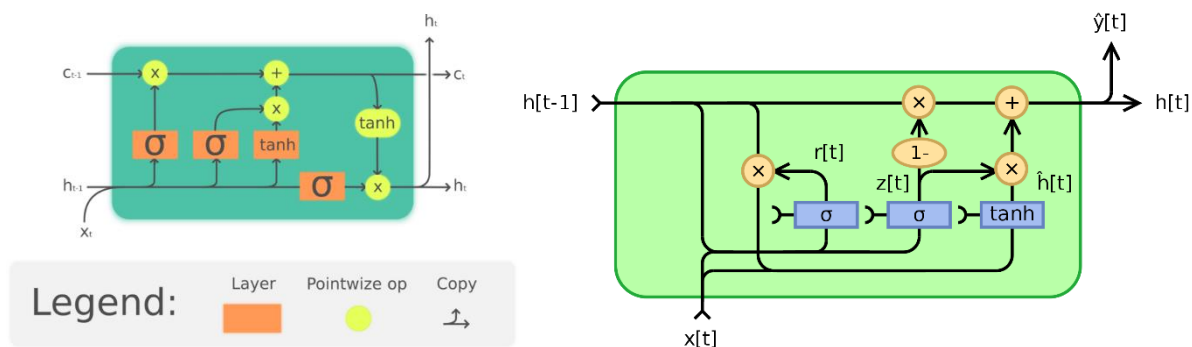


Diagram of recurrent neural network (fdeloche, 2017).

Recurrent neural networks (RNNs) unfold an artificial neural network through time and feed inputs sequentially to preserve sequential properties. For example, “The dog bit the man” and “The man bit the dog” are two sentences very different in their meaning but identical in the words they contain. What identifies one meaning over the other is the order of words and therefore recurrent neural networks allow for a form of conditional probability by feeding inputs into the network in the order that they appear.

Long Short-Term memory & Gated Recurrent Units



Diagrams of LSTM and GRU respectively (Chevalier, 2018) (Jeblad, 2018).

Vanilla RNNs suffer from the vanishing gradient problem, wherein the network stops training when the gradient approaches zero. To solve this, researchers developed the Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) models which allow values to be remembered or forgotten according to memory gates.

Sequence-to-Sequence

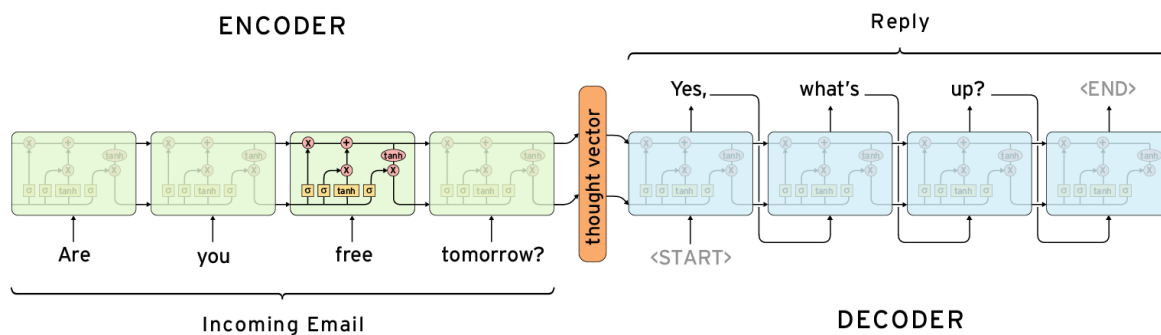


Diagram of Seq2seq model with LSTM (Abeywardana, 2017).

By combining two RNN models together, as an encoder and a decoder, one can create a seq2seq chatbot (Cho, et al., 2014) (Sutskever, Vinyals, & Le, 2014). Used for machine translation, the seq2seq model uses one RNN network to encode an input sequence and produce a “thought vector” which is then parsed into another RNN network as the initial state. This second network then outputs a sequence word by word.

Summary of Generative Models

The key difference between generative models and retrieval or rules-based models is that the neural network, by training over many iterations, can encode complex, non-linear relationships between inputs and outputs. Therefore, a user can enter an input that the model has not been trained on, the model can use the relationships it has learned to infer an appropriate response.

Unlike retrieval models, the response can be generated, i.e., not one that exists in the training dataset. If a user enters an input that bears similarities to two inputs that were in the training data, the chatbot may compose its response from elements in the corresponding outputs to both of the similar inputs. The responses are not entirely original; they must use tokens that the chatbot can choose from and be based on dialogue that the chatbot has been trained on.

Generative models require a significant volume of data and a high dimensional neural network in order to produce significant results. For applications where the anticipated range of inputs and the required variety in outputs are both limited, using a generative model would be a case of overengineering and a simpler retrieval or even rules-based model will suffice. However, generative models are better at keeping users engaged for long periods of time, examples include ChatGPT which has amassed over 1 million users in only a few days (Vallance, 2022) and Replika (Luka Inc., n.d.) which learns from continuous use over months and years with the same user.

2.3 Cold Reading Techniques

2.3.1 *Forer and Dutton*

Knowing exactly how psychic mediums operate is largely made difficult due to psychic mediums hiding their techniques under the guise of possessing supernatural abilities that allow them to contact the deceased. Thanks to the research of those like Forer and Dutton (Dutton, 1988), we understand how psychic mediums use “cold-reading” techniques to feign these abilities.

The term “cold reading” comes from the term that psychic mediums attribute to their services: “psychic reading”. The “cold” in “cold reading” comes from the fact that the psychic medium is operating with no prior information about the deceased or the bereft. In contrast, a “hot reading” is a psychic reading wherein the psychic medium has had access to information on the deceased and/or the bereft. Because a hot reading will have the same data requirement issues as a griefbot, this research will be focusing on cold readings.

One of the primary tools for a cold reading is the “Barnum statement” or “Forer effect”. Named after the showman P. T. Barnum or the psychologist Bertram Forer respectively, the statements are a means for the speaker to seem like they know a lot about a person, while knowing very little. In his original experiment, Forer took a number of these statements from horoscopes, including statements such as “You have a great need for other people to like and admire you”, and gave them to his students under the premise that they were personalised for each of them as a result of a recent personality test that they had completed. The students were asked to rate how accurate the statements were and how specific the statements were to them individually. The students rated the statements highly on both scores even though they had all received the exact same set of statements. The subject of Forer’s experiment was in general gullibility and personality interpretation, but it does bear great significance in understanding cold readings. A psychic medium knows almost nothing about their client or the deceased but must convince the client that they possess intimate knowledge that could only be obtained through supernatural

means. Therefore, a Barnum statement is an easy way to achieve this goal.

A variant of a Barnum statement is the “rainbow ruse”. A rainbow ruse will attempt to cover a range of possibilities to cover all bases. For example, “You like to have a night out, but sometimes you enjoy staying in” covers a range of behaviours that would most likely apply to anyone. The psychic medium delivering the statement would be unlucky to encounter someone who exclusively identifies with one part of that statement, but even if they do, they can simply downplay the part that was incorrect and highlight the part that was correct.

Another technique for any cold reader to consider is the Pollyanna principle (Dember & Penwell, 1980). The principle asserts that people are more likely to accept statements that are positive. In the context of cold reading, the patient is more likely to accept a statement such as “your loved one is in a better place” than “your loved one hates you”.

2.3.2 AURA

Archive of Medium and Cold Reader Data (Smith, 2005) is a statistical analysis of cold readings using transcripts from US television talk show episodes.

The readings were performed live and over the telephone, requiring the psychic mediums to use only the words spoken by the caller to deliver a cold reading on the spot. Unlike the proposed chatbot, the medium could also use the caller’s voice to determine attributes such as age and gender.

Justin Smith’s analysis revealed links between names frequently guessed by the psychics and the most common names in the US, supporting the idea that cold readings are largely composed of little more than statistically probable guesses. Smith’s analysis also revealed common types of lines by the psychic mediums, including “do you understand?”, “remember this”, questions asked, and letters asked. The question “do you understand?” absolves the psychic of any fault in their reading; either the caller agrees and thus the psychic is correct, or the psychic is still correct, but the caller has failed to understand.

Smith also analysed the accuracy of the psychics' statements by determining different types of matches, namely type 1 and type 2. Type 1 matches are those where the person or cause of death that the caller talked about is the same as the person or cause of death that the psychic medium is talking about. Type 2 matches are like type 1, with the extra requirement that the psychic medium had to make the statement about the person or cause of death before the caller did. For the deceased person, 61.17% of the psychics' statements were a type 1 but only 0.37% were type 2. For the cause of death, 11.36% of the psychics' statements were type 1 but only 1.1% were type 2. While these figures seem low, psychics are adept at handling disconfirmation (Enoksen & Dickerson, 2018) such that their abilities are not called into question despite their low accuracy.

2.3.3 Effect of Mediumship on Grief

Prolonged Grief Disorder – PGD – is characterised by grief that lasts longer than six or even twelve months (Boelen & Smid, 2017).

PGD can be caused by the patient experiencing difficulties in achieving the four grief tasks. The four grief tasks have superseded the previous model of grief consisting of five stages (Stroebe, Schut, & Boernert, 2017). One of the four grief tasks is to find an enduring connection with the deceased in the midst of embarking on a new life.

Prior research (Beischel, Mosher, & Boccuzzi, 2014-2015) has demonstrated the effectiveness of mediumship in achieving this task and subsequently alleviating the symptoms of PGD.

If psychic mediums are effective at treating PGD, it stands to reason that if a chatbot can successfully imitate a psychic medium, it too would be effective at treating PGD.

2.4 Summary of Literature Review

The literature review has further evidenced the established use of chatbots for psychiatric aid, including for grief, as well as the requirements left uncatered for by current griefbot solutions.

The literature review has identified multiple means of creating chatbots, including rules-based, retrieval-based, and generative models. Each of these approaches will be explored in the methodology section of this thesis.

After producing the cold reading chatbot(s), the results can be explored, at least preliminarily, by comparing the outputs against known cold reading techniques, as have also been discovered during the literature review.

Chapter 3

Methodology

3.1 Methodology Selection

Given that the desired outcome of the research is a chatbot, multiple software development methodologies have been considered.

The first methodology to consider is the waterfall methodology (Adobe, 2022). This methodology defines the crucial stages of development as a linear process wherein as one step is completed, the next begins. Defining these steps is useful for keeping research focused and the linearity can prevent the researcher from skipping steps that will later prove to have been essential. However, the methodology is inflexible to disruptions that may occur when unforeseen events occur and/or new information is revealed.

A more flexible methodology is a spiral methodology (Boehm, 2000). A spiral methodology is similar to a waterfall methodology, except that rather than each step occurring once in a linear order, the sequence of steps is repeated. This repetition allows the researcher to develop prototypes before producing the finished product. The benefit of this is in allowing the researcher to use what they have learned from one cycle and apply their knowledge to correct any mistakes and take advantage of unexplored opportunities. However, within each cycle the steps are still linear and the methodology is still non-domain specific whereas a more domain-specific methodology could be better suited for the research task of developing a chatbot. Cross Industry Standard Process for Data Mining (Chapman, et al., 2000) – CRISP-DM – is a methodology that follows a structure similar to a spiral methodology, but with the steps within each cycle being connected in ways that allow the research to more immediately address issues as they are discovered, rather than waiting for the next cycle. CRISP-DM is also domain specific to data mining. This is a suitable choice considering that 2 out of the 3 chatbot types – retrieval-based and generative – require dialogue corpora.

3.2 Chosen Methodology

The chosen methodology for this research is CRISP-DM, Cross-Industry Standard Process for Data Mining (Chapman, et al., 2000).

CRISP-DM is a robust methodology, appropriate for multiple sectors, consisting of multiple stages which link together in a non-linear fashion. These stages are:

- **Business understanding:** For this particular project, this step covers the task of understanding the issue of PGD, the work currently being done to resolve it, the field of chatbots, and the practise of cold reading. This step is followed by the data understanding step because without business understanding there may be issues within the data that a person unfamiliar with the business would not realise. There may also be technical terminology, such as acronyms, that a person unfamiliar with the business would not understand.
- **Data understanding:** This step involves the gathering and interpreting of data sources that will allow the researcher to meet the aim(s) established during the business understanding step. For this particular project, this involves gathering dialogue corpora suitable to use when training a chatbot. Partly because the data may present unfamiliar terminology, the business understanding step may be revisited at this point. This step precedes data preparation, as a person must understand the data first in order to know how it must be prepared. This step can also link back to business understanding because investigation of the data could turn up attributes and anomalies that can be explained by a more thorough understanding of the business domain.
- **Data preparation:** Once the data is gathered and understood it must be prepared. Preparation of data can include a range of tasks, such as removing or substituting null values, identifying outliers, and restructuring the data. For this task, the conversations will be prepared such that the context is prepended to inputs as well as removing punctuation, infrequent words and converting to lowercase. Data preparation must precede the modelling step

because data should be sanitised to remove outliers, address missing values, compensate for skew, and otherwise prepare the data for the chosen modelling method. For example, inputs for a neural network must be numeric, so natural language data, i.e., text, must be tokenised.

- **Modelling:** With the data prepared, it can be used for modelling. The relevant model(s) must be identified in this step and fine-tuned to meet the specific requirements for the project. For this project, these models are rules-based, retrieval and generative chatbots. As the type of model may change, the researcher may have to return to the data preparation step to restructure the data accordingly. Modelling precedes evaluation, but can also link back to data preparation, if it is found that the data preparation was insufficient and the model has been swayed by outliers, class imbalance or skew. It may also be required to return to data preparation if a new modelling method is chosen that requires the data in a different format.
- **Evaluation:** Once the modelling has been completed, the results can be evaluated. A relevant performance metric is required in order to attain the success of the model(s) in relation to the initial goals. Therefore, this step may loop back to the business understanding step. For this project, there will be a qualitative assessment to determine the suitability of the chatbot(s). Evaluation precedes deployment, in the case that a model is evaluated and found to be suitable for purpose. It can also link back to business understanding if a result of the evaluation can be explained by a more thorough understanding of the business domain.
- **Deployment:** This is the final step. Once the researcher has completed all subsequent steps and is satisfied with the performance of the model, as identified in the evaluation step, they can deploy the solution into their industry to do what it was intended for.

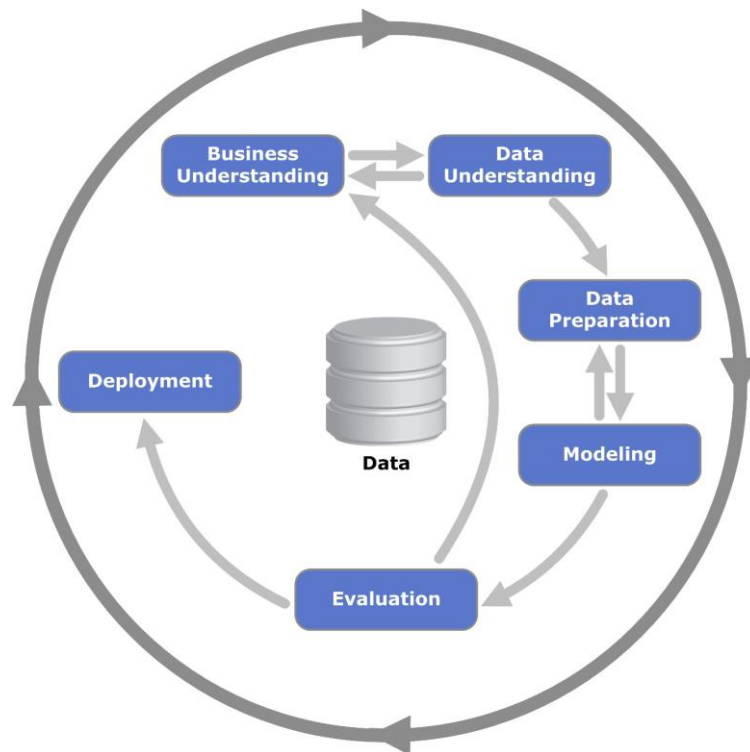


Figure 10: CRISP-DM Methodology (Vorhees, 2016)

All these steps of the CRISP-DM methodology are contained in one larger loop, signifying that the process may all be repeated if the deployed solution falters or new information and/or opportunities come to light.

The scope of this research does not extend to deployment, rather it is a proof of concept. Given the nature of the intended task, further investigation must be done to ensure that the chatbot is in a state that is can be presented to PGD patients without risk of worsening their condition by causing frustration or offense.

3.3 Data Understanding

3.3.1 AURA

The first dataset used in this research is Archive of medium and cold Reader dAta – AURA (Smith, 2005). The dataset consists of 273 transcripts of cold readings conducted over the phone while live on TV.

One benefit of the readings being conducted over the phone is that the psychic medium had no access to any visual data, i.e., they could not see the caller and make any assertions based on their appearance. This is a benefit because the chatbot model will not be missing a significant piece of information that the psychic-medium would have had access to, which would put the chatbot at a disadvantage.

However, the psychic would still have had access to audio data i.e., the caller's voice, from which they may have been able to make reasonable assumptions. For example, an older sounding voice is more likely to have a deceased spouse than a younger voice.

In previous work (Tracey, Saraee, & Hughes, 2020) an exploration of the data was conducted in the form of association rule mining, an unsupervised machine learning technique. Specifically, the apriori algorithm was applied to this dataset in an attempt to identify input-output pairs that could be used to create a rules-based chatbot.

The minimum support was set to only include rules which occur at least twice in the dataset. If a rule only appeared once, it is possible that the combination of input and output was specific to a certain context which is unlikely to be repeated, therefore these rules were disregarded.

Rules for which the confidence is <50% were disregarded because a chatbot following these rules will be wrong more often than it is right.

Rules which had lift <1 were also disregarded.

The results of association rule analysis were scarce, revealing only a few rules that passed the minimum threshold criteria. While more rules could be found by using less stringent hyperparameters, these rules would not be statistically sound to use in a chatbot.

3.3.2 *Cornell Movie-Dialogs Corpus*

Another dataset in this research is the Cornell Movie-Dialogs Corpus (Danescu-Niculescu-Mizil & Lee, 2011). Previously used to train other chatbots (Nguyen, Morales, & Chin, 2017), this dialogue corpora contains 304,713 utterances spoken in 220,579 conversations between 10,292 pairs of characters from the 9,035 characters that appear across 617 movies in a range of genres.

The significant size of the dataset lends itself to training neural network models. However, responses from chatbots trained on the dataset can be overly dramatic, due to the conversations not being real-life, casual conversations but scripted conversations as part of a movie's plot. Therefore, the conversations are likely to feature conflict and plot relevant details.

3.3.3 *Top 100 Baby Names in England and Wales*

This research also uses the historic lists of the top 100 names for baby boys and girls from 1904 to 1994, taken at 10-year intervals (Corps, 2014).

As there are 10 sets of 100 names for each gender, the dataset contains a total of 2,000 names. However, names are repeated, so the total number of unique names is lower.

The exact frequency of each name for each year is not known. Therefore, for example, it cannot be determined how much more popular the top name for boys in 1994 was than the second name for boys in 1994. Nor, for example, can it be determined if the difference in popularity between the top two names for boys in 1994 was greater or lesser than the difference in popularity between the second and third names for boys in 1994.

3.4 Data Preparation

3.4.1 Data Preparation for Retrieval and Generative Models

The transcripts from AURA are manually cleaned to remove any text deemed to be irrelevant to the readings – such as small talk between the show host and the reader between readings - and to impose structure on the readings. Lines spoken by the caller are left as “CALLER” while lines spoken by the psychic medium are entered as “READER”. If the show host spoke during the reading, their name was entered as “CALLER” or “READER” depending on whether they were talking to the psychic medium or the caller respectively. Consecutive lines spoken by a single speaker are concatenated into a single line, so the resultant order for each reading goes “CALLER” followed by “READER” followed by “CALLER” followed by “READER” and so forth. This alternating structure facilitates processing the data into inputs and outputs.

Chatbot users may or may not punctuate their inputs, so punctuation is removed from each line of the AURA dialogue corpora, except for apostrophes inside words such as “I’m”. The importance of preserving these apostrophes is that tokens such as “sister’s” and “sisters” have two different meanings, the former could be referring something belonging to a sister or a shortened form of “sister is”, while the latter is the plural of “sister”.

The flaw in the previous approach (Tracey, Saraee, & Hughes, 2020) was that the prior utterances – i.e., the context – were not being taken into consideration. The simplest way to encode the context is to append all previous utterances together into the encoder. For efficiency, only the most recent N words spoken by either the caller or reader are joined with the new input, where N is a predefined hyperparameter set at 100.

Given that the dialogue corpora are small compared to similar tasks, pre-trained word vectors were used (Pennington, Socher, & Manning, 2014)

3.4.2 Data Preparation for Retrieval Model

In order to use a memory-based reasoning, retrieval based chatbot, each input from the dialogue corpora must be converted into a thought vector in order to determine its position when compared to a user's input.

Each word for each input in the dialogue corpus was converted into its word vector. The word vectors for each input in the dialogue corpus were summed or averaged, depending on whether the bot was using Sum of Word Embedding – SOWE – or Mean of Word Embedding – MOWE – to produce thought vectors.

3.4.3 Data Preparation for Generative Model

Each word for both inputs and outputs in the dialogue corpus was tokenised, meaning that it was replaced with a number representing its place in the embeddings dictionary. The pre-trained word vectors were used to initialise the embedding layer of the model.

To further improve the generative chatbot's conversational ability, two dialogue corpora are used: one larger corpus to provide general conversation ability, and another, smaller corpus focused on the domain of cold readings.

The larger corpus is the Cornell Movie Dialogs Corpus (Lee C. D.-N.-M., 2011).

Chapter 4

Work Done

4.1 Modelling – Rules-Based (Baseline)

One approach to building a chatbot is to use rules-based methods. This is the baseline as it is the most traditional method of creating a chatbot and the most technologically simple.

4.1.1 Model Design

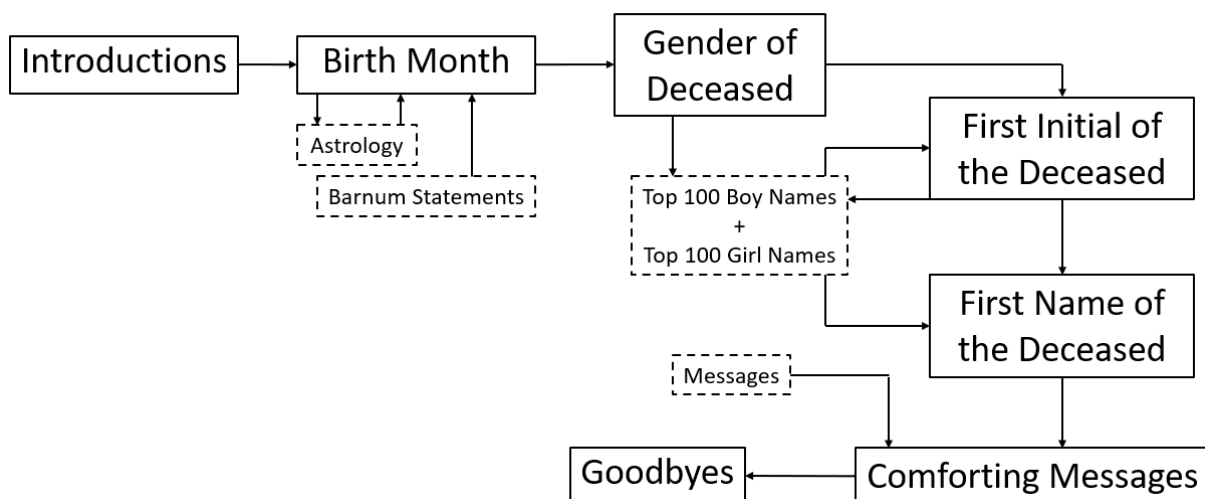


Figure 11: Diagram of the rules-based chatbot's structure design

The baseline chatbot is a traditional rules-based chatbot named “Greta” – Guided Reading Therapeutic Aid. The rules are informed by research on the cold reading technique.

Research on the cold reading technique revealed the importance of Barnum statements, astrology and name guessing.

The chatbot spends some time getting to know the user, including asking for their name, confirming their preferred name, as well as asking the user their birth month.

The preferred name is used to help the user feel as though their reading has been personalised and the birth month is used to determine the user’s star sign. Forer’s research (Dutton, 1988) demonstrated that people are more likely to accept

statements from psychics if they are supposedly based on their star sign, even if the star sign has no impact at all on the statement.

The model randomly selects one of the Barnum statements curated by Forer (Dutton, 1988) to attribute to the user. The statements are designed to make it seem as though the chatbot has uncanny knowledge of the user even though the statements are widely applicable.

After familiarising itself with the user, the chatbot begins the process of identifying the deceased. Rather than ask outright for the deceased's identity, psychic mediums often guess through common initials, narrowing down the possibilities to then guess from common first names for a determined gender identity and first initial.

Correct guesses will strengthen the user's confidence in the chatbot's psychic abilities, while incorrect guesses can be dismissed while maintaining the role of a psychic medium (Enoksen & Dickerson, 2018).

With the deceased's identity determined, the chatbot can deliver randomly selected comforting statements to the user, before offering the user a single turn to say things left unsaid that may help them to resolve their grief. As the chatbot is rules-based and cannot handle long running, unpredictable conversations, the reading is ended here by the chatbot declaring the connection lost.

4.1.2 Exploration

Prior to the assessment, the chatbot's performance is preliminarily explored to identify any immediately apparent faults. The structure of the exploration is to respond to each prompt in good faith, acting out the role of a PGD patient. Each aspect of the chatbot's functionality shall be tested, therefore multiple conversations may be required, for example to observe how the chatbot handles confirmation as well as disconfirmation.

```
Greta: Hello, my name is Greta.  
Greta: What's your name?  
User: My name is john smith
```

Figure 12: Initial greeting by chatbot

The chatbot begins by introducing itself to the user, then asking the user for their name. This is to create a feeling of familiarity between the user and the chatbot. The chatbot uppercases the first letter of each word in the user's response and lowercases the rest to ensure that regardless of the user's input, it is using the appropriate casing for a user's name.

```
Greta: Hello John Smith, may I call you John?  
User: no  
  
Greta: What would you like me to call you?  
User: Please call me Joe
```

Figure 13: Clarifying whether the user's first name is their preferred name

If the user enters a name consisting of more than one word, such as their forename and surname, the chatbot will ask to call them by only the first word, i.e., their forename. The user can decline, at which point the chatbot will prompt the user to confirm the name that they would like to be referred to with.

```
Greta: Hello, my name is Greta.  
Greta: What's your name?  
User: My name is John  
  
Greta: Hello John, may I call you John?  
User: yes
```

Figure 14: Clarifying the user's preferred name

The chatbot also confirms the name the user would like to go by if the user entered a name containing only one word as the user may have answered formally to begin with, entering their name as it would appear on a legal document, but they would prefer to be referred to by a more casual nickname.

```
Greta: Okay John, it's a pleasure to meet you.  
Greta: Let's get to know each other.  
Greta: What month is your birthday in?  
John: My birthday is in january
```

Figure 15: Questioning the user's birth month

After establishing the user's name, their name will now appear before their inputs, instead of the generic "User:" this is to establish a personalisation to the conversation, something very important to Barnum statements, the feeling that you are getting a unique, individual experience while actually receiving the same treatment as anyone else.

```
Greta: What month is your birthday in?  
John: My birthday is in january  
  
Greta: Are you a Capricorn?  
John: yes i am
```

Figure 16: Guessing the user's star sign after determining their birth month

The chatbot will then move on to asking the user what month their birthday is in. After entering their birth month, the chatbot will ask if they have the star sign that is applicable to the majority of birthdays within that month. Astrology plays an

important part in cold reading as it has been shown that people are more likely to accept a cold reading if it is supposedly based on their star sign (Dutton, 1988).

Greta: Are you a Capricorn?

John: no

Greta: I didn't think so, you're clearly an Aquarius.

Figure 17: Determining the user's star sign after an incorrect guess

If the user denies the star sign, the chatbot assigns the star sign attributed to the minority of birthdays within the user's birth month.

Greta: Of course you're a Capricorn, John. I can tell because while you have some personality weaknesses, you are generally able to compensate for them.

Figure 18: Using a Barnum statement to encourage faith in the chatbot's psychic abilities

After determining the user's star sign, the chatbot selects a random Barnum statement – from a list of Barnum statements that were used in Forer's original experiment – as a trait, then declares that it could tell the user's star sign because of that trait. The Barnum statements were chosen by Forer to be applicable to the majority of people, while seemingly revealing some hidden personal truth that the receiver would attribute to the sender possessing some psychic ability. Delivering a Barnum statement at this stage is important as the chatbot has now asked multiple questions, so it needs to deliver a statement that seems implausibly accurate in order to foster faith in its psychic abilities.

Greta: I can also sense that you've lost someone recently. Let's find them for you.

Figure 19: Changing the topic to begin the process of communicating with the deceased

The chatbot then says that it senses that the user has lost someone recently and will help the user to find them. While this can be true for many people – the older someone is, the more likely it is that at least one relative, friend or colleague has died and the term “recently” is certainly subjective, especially in matters of grief – it would certainly be applicable to a PGD patient who has been referred to the service.

Greta: Is this a male spirit?

Figure 20: Guessing the gender of the deceased, starting with male

The chatbot asks if it is a male spirit that it is looking for. The decision to start by guessing male could be a fifty-fifty “coin toss”, but it is justified by male life expectancy being shorter than female, therefore making it slightly more likely that the user is grieving a male (Buxton, 2021).

Greta: Is this a male spirit?

John: no

Greta: Is this a female spirit?

Figure 21: Guessing the gender of the deceased as female, following an unsuccessful guess with male

If the user denies that the spirit is male, the chatbot asks if it is a female spirit. It is important the chatbot asks this question instead of assuming that the spirit must be

female because there is the possibility that the deceased identified as non-binary or any other gender identity that does not fall within the male-female binary.

Greta: Is this a female spirit?

John: no

Greta: Is this a nonbinary spirit?

John: no

Greta: Is this a male spirit?

Figure 22: Guessing the gender of the deceased as non-binary, following an unsuccessful guess with female. Subsequently looping back to male if again unsuccessful

If the user denies that the spirit is female, the chatbot will ask if it is a non-binary spirit. If the user denies that the spirit is non-binary, the chatbot will cycle back to asking if the spirit is male. This allows for the user to correct their error if they mistype and deny a gender that they meant to confirm.

When the gender identity of the spirit is confirmed, the chatbot reads a file containing the top 100 most popular names for babies assigned the chosen gender at birth. The first 100 names are from 1904, the second 100 names are from 1914, and so forth until the top 100 names from 1994. The top 100 names from 1904 could be eliminated due to the fact that as of 2022, a baby born in 1904 would be 118 if they were still alive. It would be unlikely that many people born in 1904 would have died within the last year, which means that the people grieving those who were born in 1904 could have received psychiatric intervention by now, given the wait times provided by Mind (Mind, 2013). However, these names will be kept because there is the possibility of these names being used as legacy names for people born in later years, even if they do not appear in the top 100 names for that year.

For a non-binary spirit, the chatbot uses both datasets to produce a larger list of possible names.

Greta: Is this a male spirit?
John: yes

Greta: Does their first name begin with A or R?

Figure 23: Guessing the first letter of the deceased's first name, having determined the deceased's gender.

Instead of immediately guessing the name of the deceased, the chatbot identifies the most common first letters in the set of possible names. It then asks the user if the deceased's first name began with either of the top two letters.

Guessing the first letter of a name is another technique frequently used by psychic mediums as a way of both seeming to make remarkable guesses, while reducing the risk of guessing the deceased's full name wrongly. There are many possible first names, while only 26 possible first letters. Therefore, it is more likely that a randomly chosen first letter would be correct than a randomly chosen first name. The first letter can then be used to reduce the number of possible first names to something more likely to make a correct guess from.

Greta: Does their first name begin with A or R?
John: no
Greta: Does their first name begin with D or J?

Figure 24: Having another guess at the first letter of the deceased's first name, having guessed incorrectly first.

If the user denies that the deceased's first name began with either of the top two most common first letters in the set of possible names, the chatbot asks if the deceased's first name began with either of the next two most common first letters in the set of possible names.

Greta: Does their first name begin with D or J?
John: no

Greta: Sorry, it's not a clear connection. What letter does their first name begin with?

Figure 25: Asking the user for the first letter of the deceased's name, having incorrectly guessed again.

If the user again denies, the chatbot will deflect the previous failures as a symptom of an unclear connection to the afterlife, a technique employed by psychic mediums, then simply ask the user what letter the deceased's first name began with. It would be possible for the chatbot to keep guessing first letters until all first letters in the set of possible names was exhausted, however this would be frustrating to the user and lose the chatbot credibility as a source of seemingly improbable knowledge, essential to the role of a psychic medium.

When the first letter has been confirmed, the chatbot can filter the set of possible first names to only include names beginning with the confirmed first letter.

The chatbot could continue in this manner, asking if the second letter in the deceased's name began with one of the two most common second letters in names beginning with the confirmed first letter, until the deceased's name had been fully spelled out. However, this would not only be repetitive, but also diminish the credibility of the chatbot's purported psychic abilities. For these reasons, the chatbot does not ask for further letters.

```
John: Their first name begins with the letter b
Greta: Is their name Brian?
John: no
Greta: Is their name Bernard?
John: no
Greta: Is their name Benjamin?
John: no
Greta: What is their name?
John: Their name is Benedict
```

Figure 26: Guessing the name of the deceased, having obtained the first letter of their name. If incorrectly guesses three times, asking the user for the deceased's name

The chatbot then asks if the deceased's first name was the most common name in the set of possible first names. If denied, the chatbot will ask again but for the second most common name, and again for the third most common name if this is denied. If all three names are denied, the chatbot will simply ask what the deceased's name is.

```
Greta: That's it, I can hear them now.
Greta: Okay John, I have a message from Benedict.
They say "I'm not in any pain" and "I'm in a better place"
Greta: I hope that helps you John.
```

Figure 27: Relaying two randomly chosen comforting messages from the deceased to the user.

After the user has confirmed the deceased's name, the chatbot will state that they can hear the deceased, using the name that has been confirmed to further the illusion of personalisation. The chatbot will then state that they have a message from the deceased, then return two randomly chosen statements from a set of messages

such as “Take time to heal”, “Look after yourself” and “I’m happy for you”. These statements were written to be generic and comforting but could be changed with advice from mental health experts to deliver messages that in the experts’ professional opinions would benefit the PGD patients.

```
Greta: I hope that helps you John.  
Greta: What would you like to say to Benedict?  
John: i miss you  
  
Greta: Okay John, I've passed that on to Benedict.
```

Figure 28: Giving the user the option to send a message intended to the deceased.

The chatbot will then ask what the user would like to say to the deceased, offering the patient a means to unburden themselves from things left unsaid and possibly find some form of closure, allowing them to make progress on their grief tasks.

```
Greta: Okay John, I've passed that on to Benedict.  
t.  
Greta: I'm losing the connection now, but don't worry,  
Benedict will always be there whenever you need to talk to them,  
even if I'm not around.  
Greta: Goodbye John. Take care.
```

Figure 29: Confirming receipt of the message for the deceased and ending the conversation with the user.

The chatbot will then say that they are losing the connection, keeping the exchange brief, and reassure the user that the deceased is always present if the user needs them, reaffirming the 4th grief task of finding an enduring connection with the deceased.

Keeping the exchange brief is especially important for a rules based chatbot, as the

chatbot's responses would have to be manually written, requiring a potentially gratuitous amount of development time if the user is anticipated to want a lengthy conversation with the deceased.

The baseline model's responses are limited to what can be anticipated and manually written by a developer. In order to expand the model's potential responses, a number of different methods can be employed.

4.2 Modelling – Retrieval Based

Another approach considered is to use the AURA dataset to create a retrieval-based chatbot, negating the requirement to write rules at all by simply retrieving responses directly from the dataset instead.

This style of chatbot uses the AURA dialogue corpora and a Memory-Based Reasoning – MBR – approach for retrieving the corresponding responses to closest matched inputs.

Multiple vectorization methods and distance metrics were tested, as described in the exploration subchapters.

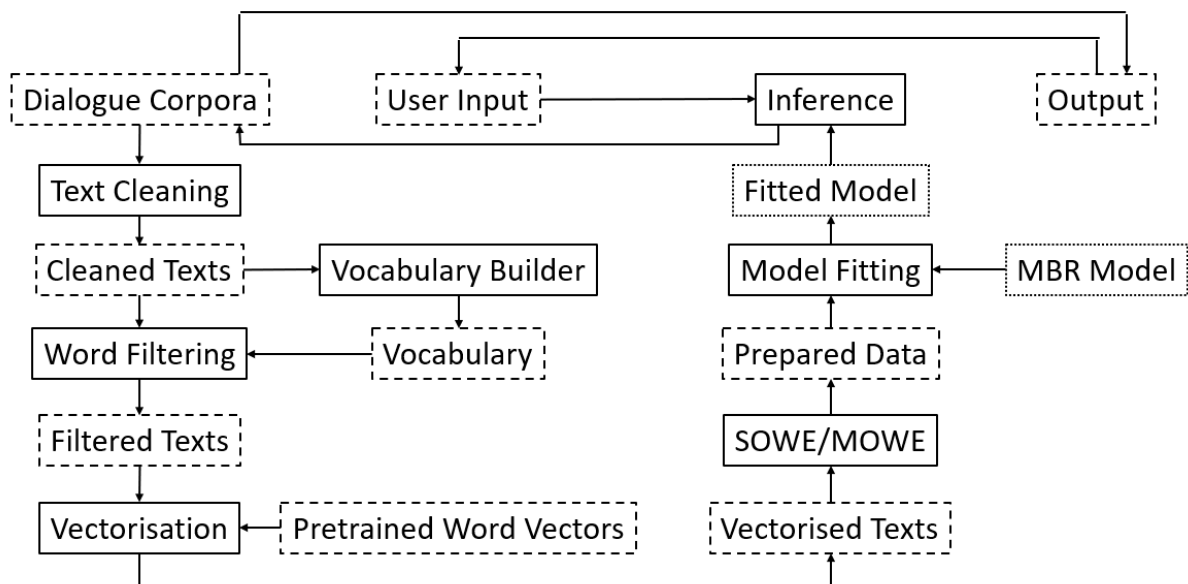


Figure 30: Diagram of the retrieval-based chatbot's structure design.

4.2.1 Exploration – SOWE

For the retrieval based chatbots using sum of word embedding – SOWE – thought vectors, no differences were observed between using Manhattan, Euclidean, or

Chebyshev distance metrics. Therefore, the following samples apply to each distance metric. Evidence of this can be found in the appendix.

```
Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
```

Figure 31: SOWE retrieval based Chatbot asking the user for a question

In the above conversation, the chatbot asks how the user is, then asks the user for their question. This is quite open ended and could be met with a vast range of responses. Instead, a reasonable range of questions is selected as follows:

- A question asking if there are any messages for the user
- A question asking if there are any messages for the user from the user's father
- A question asking if there are any messages for the user from the user's mother
- A question asking if there are any messages for the user from the user's grandfather
- A question asking if there are any messages for the user from the user's grandmother
- A question asking if there are any messages for the user from the user's son
- A question asking if there are any messages for the user from the user's daughter

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: i'm aware of a man standing as you just just opposite me looking at me he's fairly broad set a little bit barrel chested a little broad set very straight straight shoulders he's what is that ok he's describing to me first of all he's describing to me water talking about a boat a small boat and i feel it is a small sailing boat i'm seeing a dock on the water and i'm seeing what he refers to as the as a family house i hope i'm not confusing you caller because i have no idea what i'm doing
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married

Figure 32: SOWE retrieval based Chatbot asked if there are any messages for the user

In the event where the user asks the chatbot if there are any messages for them, the chatbot responds with a description of a man describing water, a boat, and a family house. About 40% of the world's population lives within 60 miles of the coast (United Nations, 2017) so it is a reasonable guess that the user may have some familiarity with a boat.

The chatbot then checks if they are confusing the user. At this point, if the user chooses to allow the chatbot to continue by simply stating "ok", the chatbot will go on to describe a family where a father figure passed before someone else got married. "Father figure" would usually describe an older man although it may apply to a woman in the absence of a male presence, making them more likely to be deceased, and the wedding is non-specific so as long as any wedding had occurred since a father figure dying, the statement will sound plausible to the user.

Should the user again simply state “ok”, the chatbot repeats the last message. This would be considered a failure to deliver a full cold reading suitable for a PGD patient.

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: i'm aware of a man standing as you just just opposite me looking at me he's fairly broad set a little bit barrel chested a little broad set very straight straight shoulders he's what is that ok he's describing to me first of all he's describing to me water talking about a boat a small boat and i feel it is a small sailing boat i'm seeing a dock on the water and i'm seeing what he refers to as the as a family house i hope i'm not confusing you caller because i have no idea what i'm doing
Human: i'm confused
Bot: i'm seeing all the machines and so on and so forth
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married

Figure 33: SOWE retrieval based Chatbot asked if there are any messages for the user, with the user stating confusion after the initial response

In this case, the user says that they are confused when the chatbot checks. In response, the chatbot states that they are “seeing all the machines and so on and so forth”. This is vague and could mean any machines but is likely to be recognisable to the user as hospital machinery, something likely to be near a person before they die. Should the user accept this response and say “ok”, the chatbot returns to the message about the father figure passing before a wedding. This suggests that the minor detour was to regain the user’s confidence having briefly lost it by confusing them. With the user’s confidence restored, the chatbot can return to its planned reading.

However, the chatbot once again repeats itself after this so it once again fails to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Figure 34: SOWE retrieval based Chatbot asked if there are any messages for the user from their father

The above dialogue occurs whether the user asks for any messages from their father, mother, grandfather, grandmother, son, or daughter. Evidence of this can be found in the appendix.

In the above dialogue, after being asked if there are any messages for the user from their father, the chatbot says that “Gray Eagle” is describing a dysfunctional family arguing over land. Familial issues are relative to each individual, as is what constitutes dysfunctional, so the user may find this applicable.

The chatbot goes on to say that Gray Eagle has the user’s mother with him and describes the mother as difficult, stern and not openly loving. Parents are figures of

authority to their children, so this seem like a description one might accept about their mother.

The chatbot then goes on to talk about a sister that the user may not be close to as well as a son left behind, before repeating itself.

Aside from repeating itself, constituting a failure on the chatbot's part, the chatbot failed to address what was asked of it: messages from the user's father. This dialogue is the same regardless of which relative from the designated set is chosen, so it may seem more applicable if the user does ask for their mother or sister. However, as the user in this case has asked for their father and no reference to their father has been made, this would not be a cold reading suitable for a PGD patient.

4.2.2 Exploration – MOWE

For the retrieval based chatbots using mean of word embedding – MOWE – thought vectors, no differences were observed between using Manhattan, Euclidean, or Chebyshev distance metrics. Therefore, the following samples apply to each distance metric. Evidence of this can be found in the appendix.

```
Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: good was there a hospital stay with him too
```

Figure 35: MOWE retrieval based Chatbot asked if there are any messages for the user

In the above dialogue, the conversation flows identically to how it does with the SOWE retrieval based chatbot, up until the user asks if there are any messages for them. At this point, the chatbot responds by asking about a hospital stay with an unidentified "him".

This doesn't make sense in the context and is therefore a failure to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please

Figure 36: MOWE retrieval based Chatbot asked if there are any messages for the user from the user's father

If instead, the user asks for messages from a specific relative, the chatbot asks for his name. Note that the chatbot asks for “his name” regardless of the specified relative. Evidence of this can be found in the appendix. Therefore, for instances where the specified relative is the user’s mother, grandmother, or daughter, the chatbot would fail to deliver a cold reading to the PGD patient.

For instances where the specified relative is the father, grandfather or son, the responses are identical, as evidenced in the appendix.

As the chatbot has asked for a male name and the possible answers are too vast to account for all of them, this preliminary exploration will use the three most common names corresponding to each of the four most common first initials for male names (Corps, 2014) as identified by the baseline rules-based chatbot. These are: Alexander, Andrew, Anthony, Robert, Richard, Raymond, David, Daniel, Donald, John, James, and Joseph.

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: alexander
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Figure 37: MOWE retrieval based Chatbot asked if there are any messages for the user from the user's father, named Alexander

If the user gives the name of their male relative as “Alexander”, the chatbot then responds with a message about the user’s husband. This is a drastic deviation from

the current subject and would constitute a failure to deliver a cold reading suitable for a PGD patient.

Note that the chatbot offers the same response if the name given is Andrew, Raymond, David, Daniel, or if an empty response is given instead of a name. This suggests that there are no vectors available for these names.

```
Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: anthony
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side
```

Figure 38: MOWE retrieval based Chatbot asked if there are any messages for the user from the user's father, named Anthony

If instead the user gives the name of their male relative as “Anthony”, the chatbot denies that there are any messages and asks the user about something “years ago”. When prompted for more clarity, the chatbot mentions a congratulations for somebody pregnant. When asked for an identity the chatbot mentions someone on the mother’s side of the user’s family, three family members in the military and a “Peter”, again on the mother’s side.

the chatbot seems to be casting a wide net without engaging with the user’s chosen subject of conversation, therefore this would also be considered a failure to deliver a cold reading suitable for a PGD patient.

Note that these responses are identical if the name provided is Robert, Richard, Donald, John, James, or Joseph as evidenced in the appendix.

4.2.3 Results

Despite many possible variations including distance metrics of Manhattan, Euclidean, and Chebyshev, and thought vectorization methods including SOWE and MOWE, plus variations of the deceased relative including father, mother, grandfather, grandmother, son, and daughter, there are many repetitions in the chatbot's responses. This is perhaps symptomatic of a lack of available corpora for the chatbot to select more varied responses from, given slight variations in its input.

Another possibility is that the retrieval-based model is unable to adapt to small changes within inputs as it is limited to outputs it already knows. A generative model is able to create new outputs and may be better suited to this task. This possibility is explored in the next section.

4.3 Modelling – Generative Model

This Seq2seq model is an improvement on the previous work (Tracey, Saraee, & Hughes, 2020), most notably in how the training and inference data is prepared, such that prior context is also taken into consideration.

4.3.1 Model Design

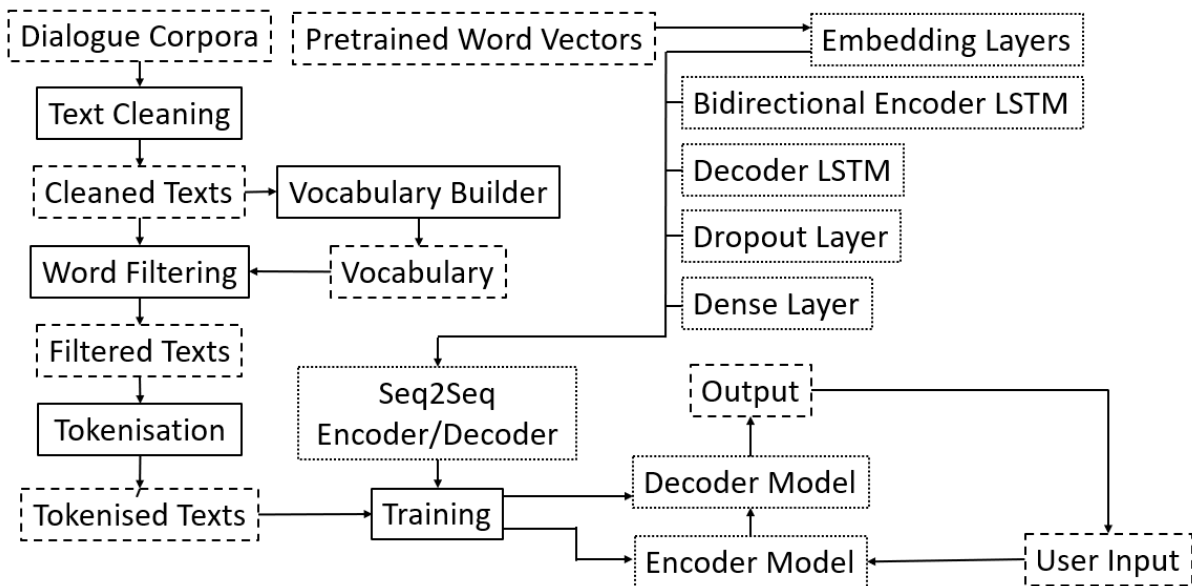


Figure 39: Diagram of the generative chatbot's structure design

The inputs for the model are initially put through an embedding layer. In this case, because the dataset is relatively small, GloVe embeddings (Pennington, Socher, & Manning, 2014) can be used to initialise the embedding layers rather than using random values while still leaving the embeddings able to train alongside the other layers to adjust to the task at hand.

GloVe embeddings are available in 50, 100, 200 and 300 dimensions. Higher dimension embeddings capture more information but require more data and computing power to train. For a balance of computing efficiency and semantic information captured, 200-dimension embeddings are chosen.

The embedding layer connects to the encoder and decoder. The encoder itself is a bidirectional LSTM. The bidirectionality is an extra step to ensure that the full context is considered, and earlier tokens are not “forgotten” during the encoding process.

The final forward and backward hidden states are concatenated together to produce the initial hidden state for the decoder LSTM, which is unidirectional. Likewise, the final forward and backward cell states are concatenated together to produce the initial cell state for the decoder LSTM.

Due to the limits of the computational equipment available to the researcher, the upper limit of the decoder's dimensionality is 1024. The bidirectional encoder dimensionality must be set to half the dimensionality of the decoder and is therefore 512.

The decoder LSTM is connected to a dropout layer. This layer will randomly drop a defined proportion of the inputs that it receives and allow the remaining inputs to pass through unaltered. Using a dropout layer is a means to avoid overfitting; Values for dropout layers can be between 0 and 1, where no values are dropped, or all values are dropped, respectively. The proportion of inputs to drop is set at 0.5 to balance between forcing the model to find suitable substitutions whilst still allowing it to learn the original sequences.

The dropout layer is connected to the dense layer. The dense layer uses softmax activation to determine the token most likely to be the next token in a sequence. Loss is measured in cross-entropy.

4.3.2 Training and Exploration for General Conversational Ability

The model was trained on both datasets in 20 epoch increments to monitor progress. After each increment, prior to the assessment, a preliminary exploration of the chatbot was conducted to identify any immediately apparent faults. This exploration was conducted by way of a short conversation, acting in good faith, and not trying to catch the chatbot out. At this point, the role of a PGD patient is not adopted as the aim of this section of training is to learn general conversational ability.

If the chatbot is observed to falter in its conversational ability, i.e., repeating itself endlessly, the chatbot will be considered a failure and require further training. In the event that the rate of improvement diminishes – what is considered by the

researcher to be – considerably, the training will be terminated, regardless of the chatbot’s performance.

The batch size was set at 64, the learning rate was set at 0.0001 and the optimiser chosen was ADAM.

The rate of improvement diminished over time, as observed in the loss over epoch graphs.

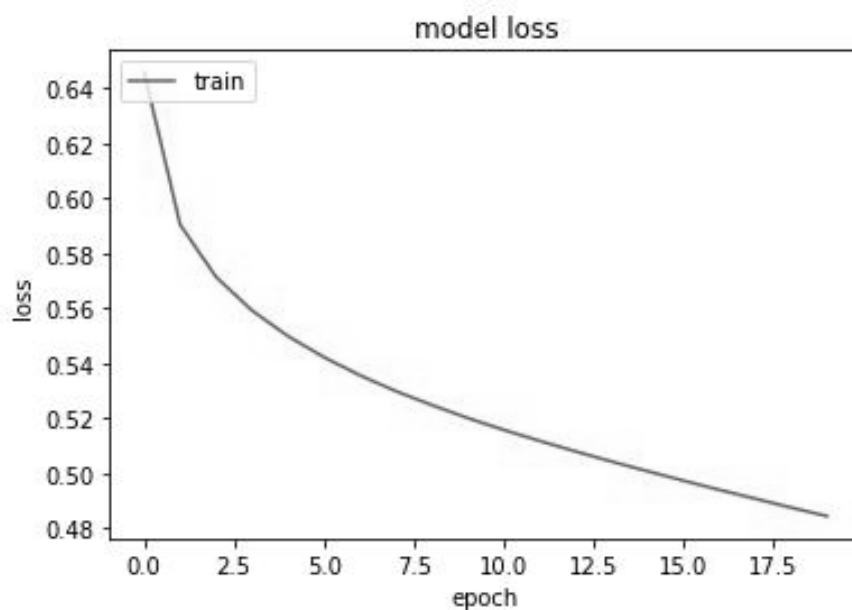


Figure 40: 0 to 20 epochs. The rate of improvement is briefly significantly large, before reducing after a few epochs.

The first few epochs exhibit a considerable drop in loss, which means a considerable improvement in the model’s ability to accurately predict the next word in the target sequence. The model then settles into a reduced rate of improvement which it holds for the remainder of the 20 epochs.

The improvement in loss between 0 and 20 epochs is ≈ 0.16 , most of which is achieved within the first few epochs, as indicated by the y-axis labels.

Given that the rate of improvement has not yet levelled out, it would be reasonable to continue training beyond 20 epochs.

```
Human: hello
Bot : hello
Human: how are you
Bot : i'm fine
Human: good
Bot : i am
Human: yes
Bot : i am
Human: what are you
Bot : i'm fine
Human: ok
Bot : i am
Human: i know
Bot : i am
Human: alright
Bot : i am
```

Figure 41: Exchange with chatbot model after training for 20 epochs

From the above conversation sample, the responses are initially reasonable; reciprocating the initial greeting and answering the question “how are you”. However, the responses then become repetitive, often responding with “I am” regardless of the input.

These responses suggest that the model requires further training.

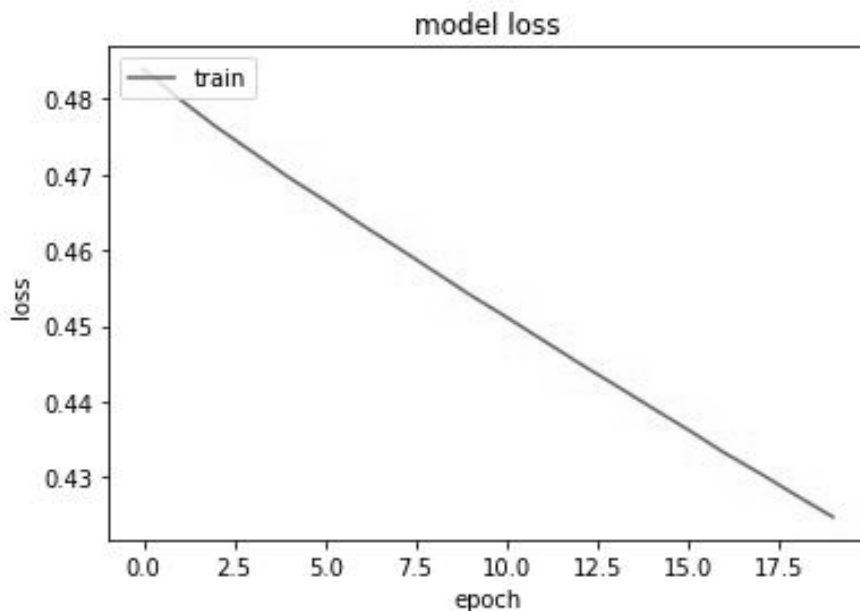


Figure 42: 20 to 40 epochs. Here the rate of improvement remains uniform.

The rate of improvement between 20 and 40 epochs remains constant, neither increasing nor decreasing or showing any spikes.

The improvement in loss between 20 and 40 epochs is ≈ 0.05 , as indicated by the y-axis labels. This is less improvement than was observed in the first 20 epochs but that is to be expected as the first few epochs accomplished a significant improvement from the randomly initialised weights that the model started with.

This consistency would suggest that it is reasonable to continue training the model beyond 40 epochs.

```
Human: hello
Bot : hello
Human: how are you
Bot : i'm fine
Human: good
Bot : are you sure
Human: i'm sure
Bot : i was wondering if you were going to be there
Human: where
Bot : i don't know
Human: ok
Bot : i was wondering if you could help me
Human: of course i can help you
Bot : yeah
Human: what do you need
Bot : i have to go to work
Human: ok
Bot : ok
Human: what do you need help with
Bot : i don't know
Human: alright
Bot : ok i want to be a little bit of a little bit of a little bit
Human: a little bit of what
Bot : i don't know
Human: ok
Bot : ok
```

Figure 43: Exchange with chatbot model after training for 40 epochs

The above conversational sample is definitely an improvement upon the previous sample. Rather than responding to “good” nonsensically with “I am” the chatbot continues the conversation with “are you sure”. The chatbot goes on to ask its own

question, although doesn't follow up with more context when prompted. The following question does go further, although again falters when asked for more information. After faltering for the second time, the chatbot repeats "a little bit of a", then when prompted for more information, defaults back to "I don't know". This is an improvement, but calls for further training still.

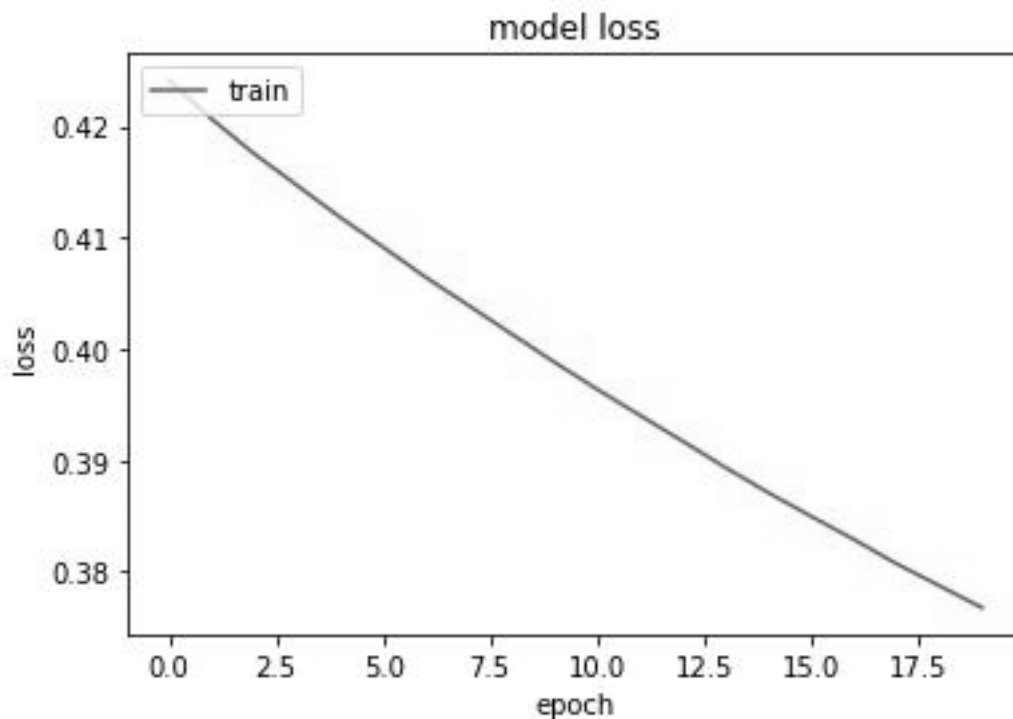


Figure 44: 40 to 60 epochs. Here the rate of improvement remains uniform.

The rate of improvement continues to remain constant between 40 and 60 epochs, again without any spikes.

The improvement in loss between 40 and 60 epochs is ≈ 0.04 , as indicated by the y-axis labels. This is slightly less than was observed between 20 and 40 epochs, which suggests that although both figures appear consistent, there is a near imperceptible diminishing of returns occurring.

Therefore, it is still reasonable to continue training the model beyond 60 epochs.

```
Human: hi
Bot : hi
Human: what would you like to talk about
Bot : i don't know i just want to know you know what i mean
Human: what do you mean
Bot : i don't know
Human: ok
Bot : i don't know
Human: that's ok
Bot : you know what i mean
Human: not really
Bot : yeah i know
Human: anything else you want to talk about
Bot : yeah i know i know
Human: is that a no
Bot : what you said
Human: ok
Bot : yeah i mean i don't know i mean i don't know
```

Figure 45: Exchange with chatbot model after training for 60 epochs

This sample of conversation with the chatbot seems to default to “I don’t know” more frequently than the previous sample. This seems to be the safest option for the chatbot, i.e., rather than risk responding assertively with the wrong thing, the chatbot uses the “safer” option of deflection. This isn’t to insinuate that there is a conscious decision made by the chatbot to take this route, rather that statistically, saying “I don’t know” is an appropriate response to the majority of inputs, in comparison to other single responses.

However, training the chatbot further may allow the model to identify the nuances in inputs that correspond with more specific responses which would increase its overall accuracy. Therefore, more training is supported.

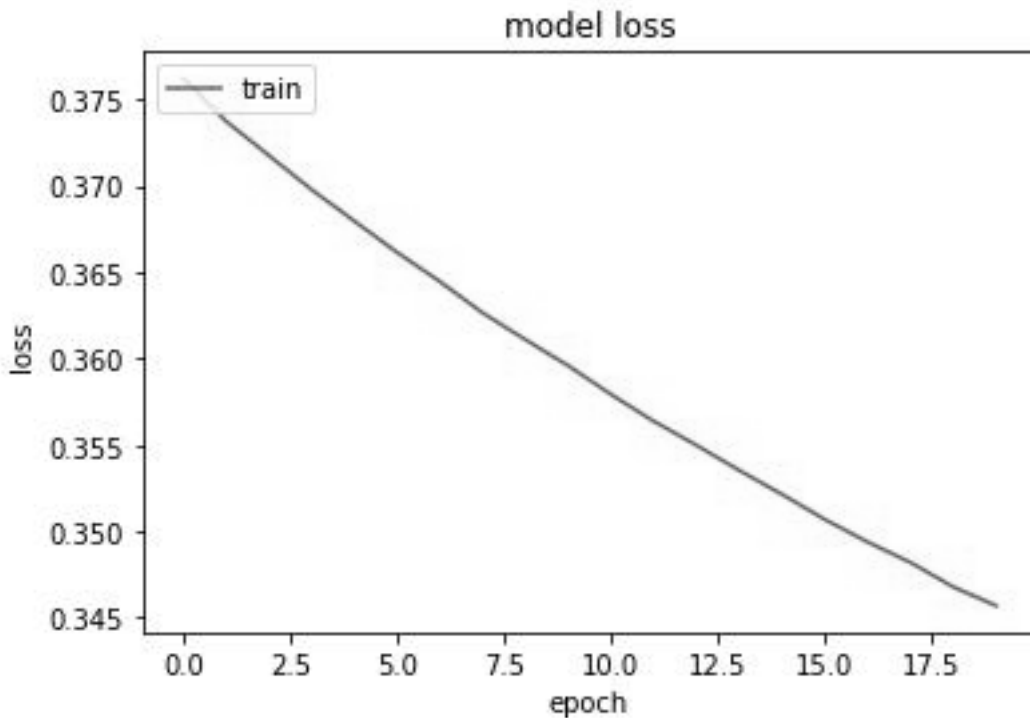


Figure 46: 60 to 80 epochs. Here the rate of improvement remains uniform.

For the most part, the rate of improvement continues to remain constant between 60 and 80 epochs, with no spikes. However, there is a slight wobble in the rate of improvement.

The improvement in loss between 60 and 80 epochs is ≈ 0.03 , as indicated by the y-axis labels. This is again less improvement than was observed in the previous 20 epochs, supporting the theory of diminishing returns.

The wobble is very slight, so it is still reasonable to continue training the model beyond 60 epochs.

Human: hello
Bot : hello
Human: how are you
Bot : i'm me
Human: yes you are
Bot : why
Human: because that's your identity
Bot : i don't know what
Human: what
Bot : you don't have a choice or something
Human: yes you can choose who you want to be
Bot : i'm not going to tell me what i'm going to do
Human: can you tell me
Bot : well i know you know
Human: do i know
Bot : i don't know
Human: i see
Bot : you don't know
Human: i don't think i do
Bot : you don't have to me
Human: what do you mean
Bot : i don't know
Human: ok
Bot : ok

Figure 47: Exchange with chatbot model after training for 80 epochs

The above sample of conversation with the chatbot once again features a lot of deflection, although this time with some variety. Not only does the chatbot say “I don’t know” but also “you don’t know” or “I know you know”. This could partly be due to the course of the conversation wrapping itself into a loop where neither speaker is certain of anything but could also be because the chatbot’s current weights still lie somewhere between the safe, cover-all defaulting from the last set of epochs, and the theorised more specific responses that may emerge in future epochs. More training will be conducted to determine if these responses will be realised.

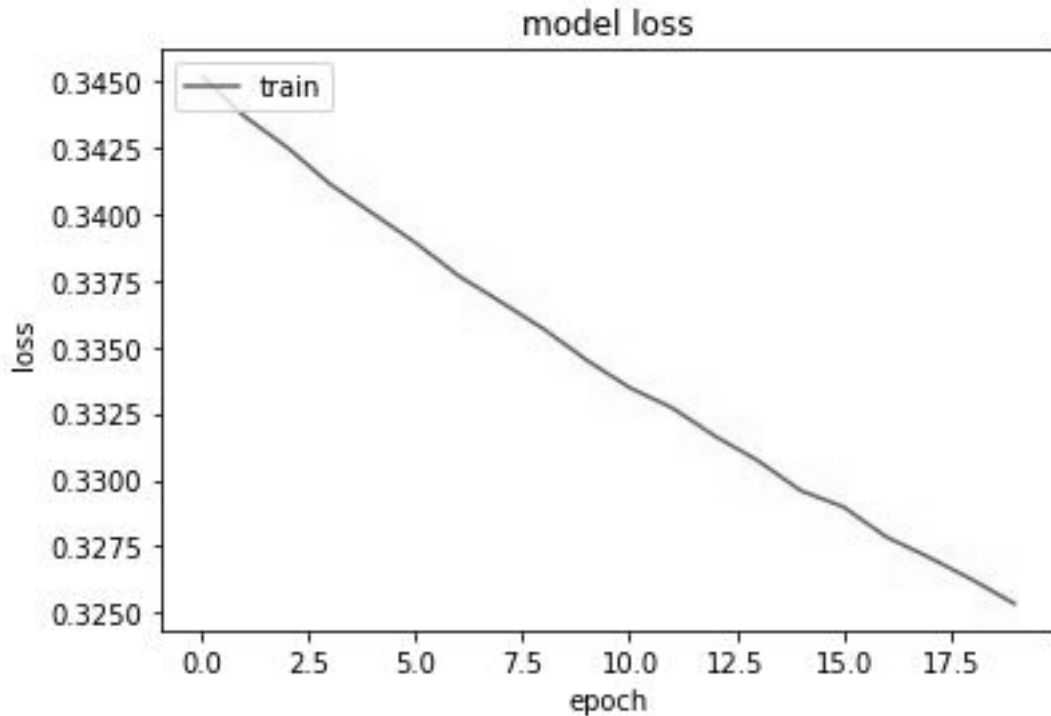


Figure 48: 80 to 100 epochs. Here the rate of improvement remains uniform.

The model continues to improve between 80 and 100 epochs, but the wobbles are increasing in severity, which would suggest that the model is approaching its optimal state.

The improvement in loss between 80 and 100 epochs is ≈ 0.02 , as indicated by the y-axis labels. Once again, this is less than the previous 20 epochs, confirming the theory of diminishing returns. The rate at which the returns are diminishing – with the exception of the first 20 epochs – is constant, at 0.01 per 20 epochs. If the next 20 epochs follows this trend, the improvement in loss would be expected to be ≈ 0.01 . As the gradient has not yet levelled out completely, the model can still be trained further than 100 epochs.

Human: hello
Bot : hi
Human: how are you
Bot : i'm fine
Human: good
Bot : yeah i don't know i was just thinking about you too
Human: what were you thinking about me
Bot : i don't know i was just trying to get you
Human: get me for what
Bot : i was looking for you i was just going to see you a
nd i don't know how to treat you like that
Human: i'm here now
Bot : okay you have a little time
Human: i do
Bot : okay you know i can get you a drink and i'll go
Human: you don't have to go but i'll take a drink
Bot : okay okay okay
Human: what are we drinking
Bot : just a little surprise
Human: ok
Bot : okay i have a drink of my
Human: did you get me a drink
Bot : no
Human: oh
Bot : you want me to go to bed
Human: no i thought you were getting me a drink
Bot : yeah
Human: but you didn't get me one
Bot : no
Human: how come
Bot : i don't know i don't know
Human: ok
Bot : i don't want to be alone

Figure 49: Exchange with chatbot model after training for 100 epochs

This sample of conversation with the chatbot seems much better at carrying a conversation than the previous iterations. When prompted for more information on statements such as “I was just thinking about you” and “I can get you a drink” the chatbot does respond in a way that is appropriate and more specific than “I don’t know”.

Later in the conversation, the chatbot does start to revert back to “I don’t know” and the consistency of the conversation is derailed. However, this is the best the chatbot has performed so far and thus it would be reasonable to continue training.

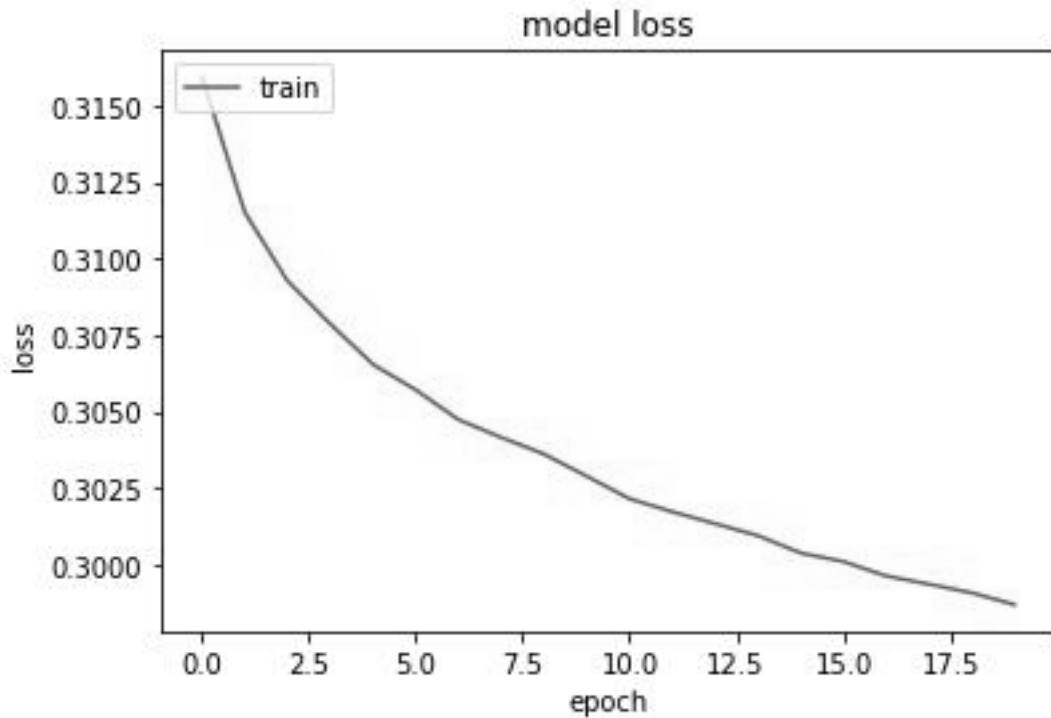


Figure 50: 100 to 120 epochs. At this point, the rate of improvement begins to decrease significantly.

After training on both datasets for 120 epochs, the rate of improvement has considerably diminished.

The improvement of loss between 100 and 120 epochs is ≈ 0.015 , which is less of a reduction in improvement from the previous 20 epochs than is expected but is still a reduction.

As the rate of improvement has dropped considerably at this point, the decision is made to stop training on all data and begin finetuning the model by only training on the AURA corpus.

Human: hello
Bot : hello
Human: how are you
Bot : i'm me
Human: yes you are
Bot : why
Human: because that's your identity
Bot : i don't know what kind
Human: what kind of what
Bot : you know what you're saying you're the only one who
can control the world but you don't know what it is
Human: i don't know what the world is?
Bot : don't tell me
Human: what
Bot : shut up
Human: ok
Bot : i don't know i think i should be able to tell you w
hat i am
Human: then tell me
Bot : you're a very good friend
Human: thank you
Bot : thank you
Human: what are you
Bot : i don't know i just thought you could be so happy
Human: maybe i will be happy
Bot : how do you know
Human: i don't but i have to hope
Bot : you're not a little girl you don't have to be a gir
l i don't think you should
Human: ok why do you say that
Bot : i don't know i just don't feel it
Human: alright that's fair
Bot : it doesn't matter
Human: why not
Bot : because i don't want to be alone i just want to kno
w
Human: what do you want to know
Bot : i don't know

Figure 51: Exchange with chatbot model after training for 120 epochs

This time, the conversation sample from the chatbot exhibits strange behaviour; responding with “I’m me” when asked “how are you” and saying things such as “you’re not a little girl you don’t have to be a girl I don’t think you should” unprompted. The chatbot also told the user to “shut up”, something that would be disastrous for a user to receive, especially if they were seeking help for their grief. It is possible at this point that the chatbot has overfit to the training data and is

learning responses that were appropriate in specific circumstances but not applicable here.

Therefore, training should stop at this point and the weights from the previous 20 epochs should be finetuned for cold readings, rather than these weights which are overfitted.

Following the example set by Stanford (Nguyen, Morales, & Chin, 2017) it would be reasonable to set the upper limit of finetuning epochs to the number of training epochs used in the general conversational model – 100 epochs.

4.3.3 Finetuning and Exploration for Cold Reading

The model was finetuned on the AURA corpus in 20 epoch increments.

After each increment, prior to the assessment, a preliminary exploration of the chatbot was conducted to identify any immediately apparent faults. This exploration was conducted by way of a short conversation, acting in good faith, and not trying to catch the chatbot out. At this point, the role of a PGD patient is adopted as the aim of this section of training is to learn the cold reading technique.

If the chatbot is observed to falter in either its conversational ability, i.e., repeating itself endlessly, or in its ability to perform a cold reading, i.e., by making a guess that is impossible in the given context, the chatbot will be considered a failure and require further training. In the event that the upper limit of training is reached, regardless of whether the chatbot still fails, training will terminate.

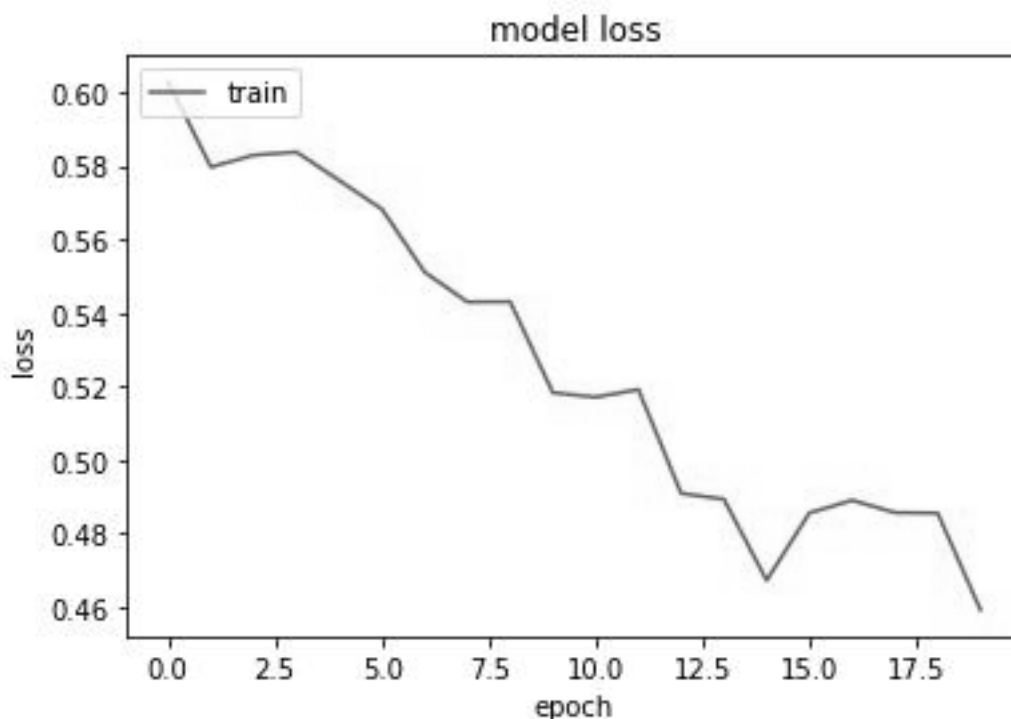


Figure 52: Finetuned for an additional 20 epochs

After finetuning the model on only the AURA corpora for 20 epochs, it is clear that the rate of improvement is less consistent than it was with all the available dialogue corpora. This could in part be explained by the model having to “unlearn” certain behaviours in order to prioritise the cold reading aspects much more.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : a male j
Human: yes
Bot : a female j or an r
```

Figure 53: Interaction with chatbot after finetuning for 20 epochs.

In the above interaction, the chatbot now begins a conversation differently to the pre-finetuning, general conversational model. This time the model guesses two initials, similar to the letter guessing stage of the baseline, rules-based model. Notably, the chatbot does not specify that the connection is to someone deceased, therefore widening the possible connections to include those still alive.

If the user says yes to this, the chatbot then makes a guess that the person the user is thinking of is “a male j.” This is possibly a risky move, as the connection could be to a male, female, or nonbinary j, or a male, female, or nonbinary g. Therefore, a male j is just one out of six possibilities.

If the user confirms this guess as correct, the chatbot then makes a bizarre guess that the connection is to “a female j or an r”. This conflicts with the confirmed information up to this point. The connection has been confirmed to be a male j. Not a female and not an r. Therefore, the chatbot is considered to have failed at this point and would not be suitable for delivering a cold reading to PGD patients.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : a male j
Human: no
Bot : a female j in a name is like a name
Human: what name
Bot : i don't know who is that
Human: is it joan
Bot : a or is that a female
Human: yes
Bot : a female j is in her name or is there a j
Human: yes there's a j
Bot : is there a a or a mary
```

Figure 54: Interaction with chatbot after finetuning for 20 epochs.

The above interaction also confirms the chatbot’s first guess that the user is connected to a j or g initial. However, this time the user denies that the connection is to a male j. At this point the chatbot guesses a female j instead. This is a logical path to take, given the information that the user has provided. However, the chatbot’s responses after this point become repetitive, asking multiple times if the connection is female and a j, before bizarrely asking if there is a Mary. The chatbot is considered to have failed at this point and could not deliver a cold reading to PGD patients.

```

Human: hello
Bot : hi do you have somebody who's a j or g initial co
nected with you
Human: no
Bot : who is the c or
Human: is it christopher
Bot : ok i don't know if i'm going to tell you what i'm
getting through this is the first thing i'm seeing you i
n the family or a month or m or a j or m or m or m or a
Human: what
Bot : a or m or a m

```

Figure 55: Interaction with chatbot after finetuning for 20 epochs.

In the final interaction for the chatbot finetuned at 20 epochs, the user denies the chatbot’s initial guess at a j or g initial. The chatbot then asks about a different letter, c. When given a name beginning with c, the chatbot then produces a rather nonsensical message, repeatedly guessing letters. The chatbot is also considered to have failed at this point and could not deliver a cold reading to PGD patients.

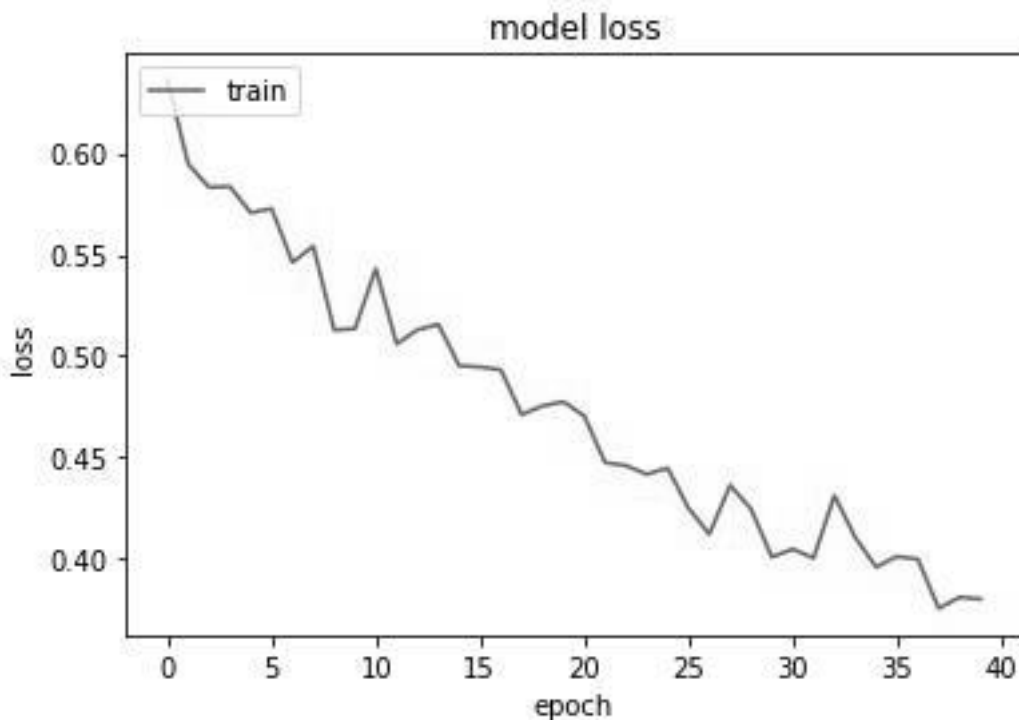


Figure 56: Finetuned for an additional 40 epochs

While the training progress continues to be “bumpy” when the model is finetuned for 40 epochs, the overall direction continues to be one of improvement.

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: yes
Bot : a male j
Human: yes
Bot : a male j
Human: yes
Bot : a male j
Human: yes
Bot : a female j or is a j or an m

Figure 57: Interaction with chatbot after finetuning for 40 epochs.

In the above interaction with the chatbot finetuned after 40 epochs, the chatbot first guesses that the user has a connection with someone who has a j or g initial. This is identical the initial guess made by the chatbot finetuned after 20 epochs.

However, if the user confirms the guess in this instance, this chatbot model asks for confirmation on the letter, specifically if the j initial is the correct one. This is more careful than the previous chatbot iteration; at this point, with the user confirming that the initial guess was correct, the chatbot has a fifty percent chance of guessing the correct initial. Even so, its wording does not commit to the letter j, and is asking the user for confirmation.

If the users again confirms the letter j, the chatbot guesses that the connection is a male j. If all possibilities are treated equally, this guess has a one in three chance of being correct. However, the proportion of the population that is nonbinary is significantly smaller than the proportion that is not (Kelley & Santos, 2022) and life expectancy is lower for males than females (Buxton, 2021) so, assuming that the connection is to someone deceased, the guess that the connection is to a male is the most likely.

However, at this point the chatbot repeats its guess until finally it guesses “a female j or an m”. This is in conflict with the established facts up to this point in the conversation and therefore the chatbot has failed to deliver a cold reading suitable

for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: yes
Bot : a male j
Human: no
Bot : is there a j in a name
Human: yes
Bot : a or a mary or a
Human: yes
Bot : or a j or a
Human: yes
Bot : or a
```

Figure 58: Interaction with chatbot after finetuning for 40 epochs.

In this interaction, the user again confirms the initial guess and the letter j. However, at the point where the chatbot guesses a male j, the user denies. The chatbot then requests if there is a j in the name, which the user confirms, this already being an established fact.

The chatbot then asks if there is a Mary. This doesn't fit the narrative so far, but if the user does confirm, the chatbot will ask again for a j, which the user confirms again, to which the chatbot responds briefly and with no meaning. At this point the chatbot has failed to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: yes
Bot : a male j
Human: no
Bot : is there a j in a name
Human: yes
Bot : a or a mary or a
Human: no
Bot : a female j or j
Human: yes
Bot : or a or a or or a
Human: no
Bot : is it a a or a or a or a t or or a t or female or somebody who is there

Figure 59: Interaction with chatbot after finetuning for 40 epochs.

In the above interaction, the user again confirms the initial guess and the j initial. The user denies the male j guess just as before and reconfirms that there is a j in the name, but this time denies the Mary guess.

The chatbot then guesses a female j, which is very likely considering that a j has been confirmed but a male j has been ruled out.

However, the chatbot then seems to be either repeating an empty guess or guessing the letter a. Assuming that it is guessing the letter a, if the user denies, the chatbot responds with repetitive guesses which seem to indicate that the chatbot has failed to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: no
Bot : is there a j or an

Figure 60: Interaction with chatbot after finetuning for 40 epochs.

In this interaction, the user confirmed the initial guess but denied the letter j. At this point the chatbot again asks if there is a j, but this time also guesses the letter m. Not only has the user already denied the letter j at this point, but by process of elimination they have confirmed the letter g, which the chatbot is no longer pursuing.

Therefore, the chatbot is considered to have failed at this point to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: no
Bot : a male j
```

Figure 61: Interaction with chatbot after finetuning for 40 epochs.

In the above interaction, the user denies the initial guess of either a j or g initial being connected to them.

However, the chatbot then guesses a male j, despite the j initial being eliminated entirely.

The chatbot has failed at this point to deliver a cold reading suitable for PGD patients.

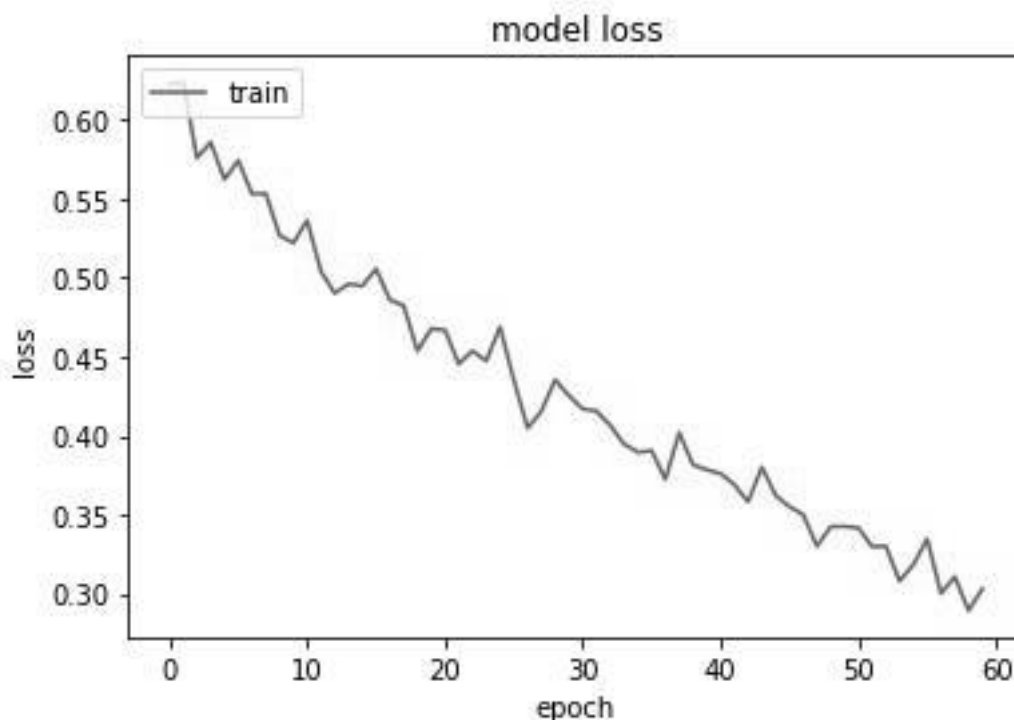


Figure 62: Finetuned for an additional 60 epochs

When finetuned for 60 epochs, the rate of improvement continues its overall progress while also exhibiting small spikes in loss. However, these spikes are quickly corrected in subsequent epochs and training progress continues so further epochs are justified.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: yes
Bot : a male j
Human: yes
Bot : a male j
Human: yes
Bot : a male j or or j or
Human: yes
Bot : a female j
```

Figure 63: Interaction with chatbot after finetuning for 60 epochs.

In the above interaction with the chatbot finetuned for 60 epochs, the chatbot's initial guess is again a j or g initial.

If the user confirms this guess, the chatbot again narrows the guess down to the letter j.

If the user confirms this also, the chatbot narrows the guess down again to a male j, just as the chatbot did after being finetuned for 40 epochs.

If the user confirms this, the chatbot asks again, then again, and finally guesses a female j.

Seeing as the user has already confirmed a male j, the chatbot is considered to have failed to deliver a cold reading chatbot suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: yes
Bot : a male j
Human: no
Bot : a female j in a name or is there a j or an m or a
Human: yes a female j
Bot : a female or a or
Human: what
Bot : a

Figure 64: Interaction with chatbot after finetuning for 60 epochs.

In this interaction, the user confirms the initial guess and the letter j, but denies the guess of a male j.

At this point, the chatbot guesses a female j. This is a reasonable guess, given the established facts.

However, after confirming a female j, the chatbot's responses deteriorate into repeated guesses at the gender and then simply "a".

At this point, the chatbot has failed to deliver a cold reading appropriate for a PGD patient.

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: no
Bot : a female j

Figure 65: Interaction with chatbot after finetuning for 60 epochs.

In this interaction with the chatbot, the user confirms the chatbot's initial guess of j or g but denies the subsequent guess of the letter j.

The chatbot then guesses a female j, which conflicts with the user's denial of the letter j entirely.

Therefore, the chatbot has failed to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: no
Bot : a c or a j
Human: c
Bot : a a r

Figure 66: Interaction with chatbot after finetuning for 60 epochs.

In the final interaction with the chatbot, the user denies the initial guess. In response, the chatbot guesses either a c or a j. While the user has already denied the letter j, if the user confirms the letter c, the chatbot then guesses an r. The chatbot appears to be stuck guessing letters and failing to recognise the user's confirmation of the letter c.

Therefore the chatbot has again failed to deliver a cold reading suitable for a PGD patient.

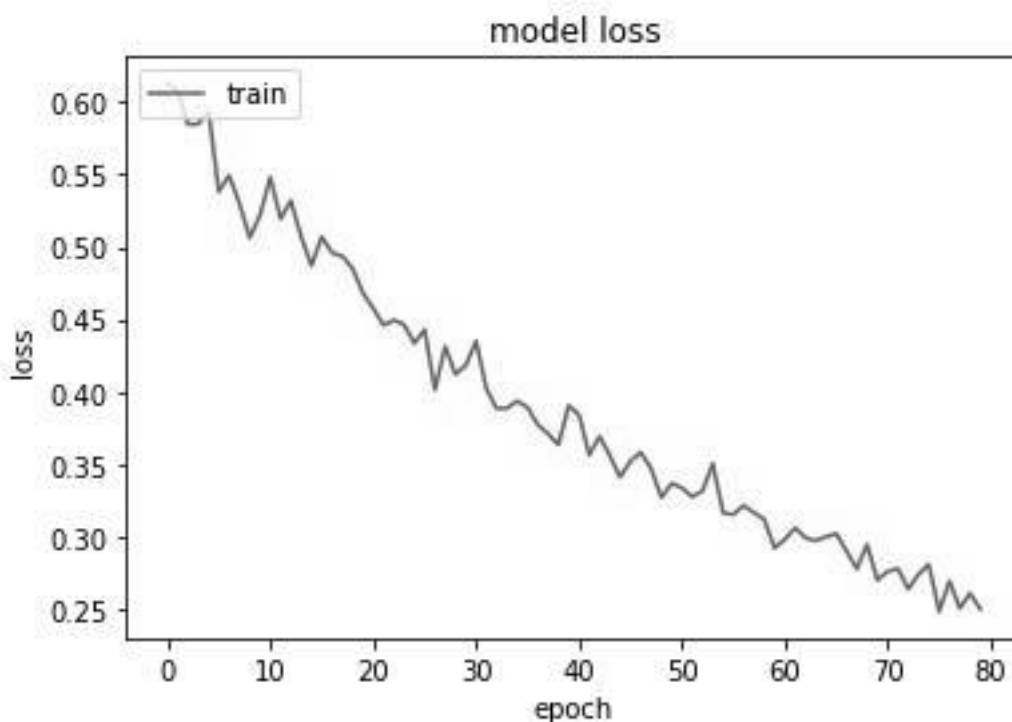


Figure 67: Finetuned for an additional 80 epochs

After finetuning the chatbot for 80 epochs, the model continues to improve overall while exhibiting small spikes in loss.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: yes
Bot : a male j
Human: yes
Bot : a male j
Human: yes
Bot : a female j
```

Figure 68: Interaction with chatbot after finetuning for 80 epochs.

In the above interaction with the chatbot after finetuning for 80 epochs, the chatbot makes the same initial guess as the prior iterations of the finetuned chatbot. That is, a guess that someone with either a j or g initial is connected to the user.

If the user confirms, the chatbot again follows the path of prior iterations. Firstly, the chatbot confirms if the letter j is correct and, if it is, that it is a male j.

If the user confirms this too, the chatbot repeats itself, to which the user then reconfirms.

At this point the chatbot then guesses a female j, in contradiction to the established facts, thereby failing to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: yes
Bot : a male j
Human: no
Bot : a female j in a name in name name or a john or a name i don't know who the d
Human: yes a female j
Bot : i think that is the person of the people you know is there a j or a
```

Figure 69: Interaction with chatbot after finetuning for 80 epochs.

In this interaction, the user again confirms the initial guess and the letter j but denies the guess of a male j.

The chatbot guesses a female j, although also guesses “John” and a “d”. If the user confirms a female j, the chatbot responds with a message that begins nonsensically and ends with the repeated guess of a j.

The chatbot has failed to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: yes
Bot : which letter a j
Human: no
Bot : a female j in a name like a
```

Figure 70: Interaction with chatbot after finetuning for 80 epochs.

In this interaction, the user confirms the initial guess but denies the letter j.

Nonetheless, the chatbot then guesses a female j, failing to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: no
Bot : which letter in the name
```

Figure 71: Interaction with chatbot after finetuning for 80 epochs.

In this interaction the user denies the initial guess of a j or g initial. The chatbot then asks for a letter instead of suggesting one.


```

Greta: Is this a female spirit?
Pete: no

Greta: Is this a nonbinary spirit?
Pete: y

Greta: Does their first name begin with A or J?
Pete: no

Greta: Does their first name begin with M or C?
Pete: no

```

Rather than test for all twenty-four remaining letters in the alphabet, this research will use the remaining most common letters suggested by the baseline, rules-based chatbot when the deceased is non-binary, therefore using the most common first names from the male and female datasets. These letters are A, M and C.

```

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: no
Bot : which letter in the name
Human: a
Bot : yes a male j

```

Figure 72: Interaction with chatbot after finetuning for 80 epochs.

If the users says the letter A, the chatbot guesses a male j. This ignores the user's inputs up to this point, failing to deliver a cold reading suitable for PGD patients.

```

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: no
Bot : which letter in the name
Human: m
Bot : yes the the m a t a t in the d is a a t a t is in the d

```

Figure 73: Interaction with chatbot after finetuning for 80 epochs.

If instead the user says the letter M, the chatbot initially seems to confirm the letter M, but then repeats the letters A, T and D in a nonsensical way. This is another failure to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial co
nected with you
Human: no
Bot : which letter in the name
Human: c
Bot : yes i don't know what it is but i'm seeing someon
e who has a military problem with the last name of the f
amily do you understand that
Human: yes
Bot : is this your brother
Human: yes
Bot : ok is there somebody around you who is the father
```

Figure 74: Interaction with chatbot after finetuning for 80 epochs.

If the user says the letter C, the chatbot responds with a message about someone whose identity is uncertain, but they have a military problem and something to do with the last name of the family. It asks if the user understands this message.

If the user says that they do understand, the chatbot will ask if this person is the user's brother. This appears to be a risky guess, but males make up the majority of personnel in the armed forces (Ministry of Defence, 2022).

If the user confirms that it is their brother, the chatbot then asks about a father. This is divergence from the previous line of questioning is jarring for the user and considered a failure to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: no
Bot : which letter in the name
Human: c
Bot : yes i don't know what it is but i'm seeing someone who has a military problem with the last name of the family do you understand that
Human: yes
Bot : is this your brother
Human: no
Bot : ok who is this
Human: my father
Bot : ok who is this
Human: my father
Bot : ok who is your brother

Figure 75: Interaction with chatbot after finetuning for 80 epochs.

If instead the user denied that it is their brother, the chatbot will ask who it is. If the user says that it is their father, the chatbot repeats its question before asking again about the user's brother.

Therefore, the chatbot has failed to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: no
Bot : which letter in the name
Human: c
Bot : yes i don't know what it is but i'm seeing someone who has a military problem with the last name of the family do you understand that
Human: no
Bot : is this your family or your son
Human: my family
Bot : yes i think of the family that you had a brother in the family you know
Human: yes
Bot : ok because you have a brother that is coming through your family and i have a father and your brother your brother is the older male who has crossed
Human: ok
Bot : your son is there i also feel that there is a man in the family who has crossed over
Human: ok
Bot : i don't know if this is a godfather or an uncle or a father or a father figure for me to let you know that i feel like there's a father figure who has passed and i don't know if there's a father in law or there's an older male who has crossed and there's a father figure who i feel like there's a father figure who has passed and i don't know if you have a son or a brother figure who is standing next to me as i think that would be a ignored ignored to him to the

Figure 76: Interaction with chatbot after finetuning for 80 epochs.

In this interaction, the user denies understanding the chatbot's statement about a military problem. The chatbot then asks if the connection is to the user's family or son. This is a somewhat strange question, seeing as the user's son would be their family.

If the user say it is their family, the chatbot mentions a brother in the family, and prompts the user to confirm.

The chatbot then delivers a series of statements around a brother, a father, father figure and/or father in law, an older male, a son, a godfather and an uncle.

The series of statements are vague, covering too wide an array of possible

connections. Therefore, it has failed to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's a j or g initial connected with you
Human: no
Bot : which letter in the name
Human: c
Bot : yes i don't know what it is but i'm seeing someone who has a military problem with the last name of the family do you understand that
Human: no
Bot : is this your family or your son
Human: my son
Bot : ok who is the guy that there is a j name in the family who's in the family
```

Figure 77: Interaction with chatbot after finetuning for 80 epochs.

In this final interaction with the chatbot trained for 80 epochs, the chatbot asks if the user understands its statement about a military problem and the user denies. The chatbot again asks if the connection is to the user's family or son. The user says that the connection is their son, to which the chatbot begins to ask about someone else with a j name.

This not only contradicts what has been said up to this point, with the user already denying the j initial, but ignores the user's statement that the connection is to their son. If a PGD patient using the chatbot had lost their son, the disregard demonstrated by the chatbot would be damaging, therefore meaning that the chatbot has failed to deliver a suitable cold reading.

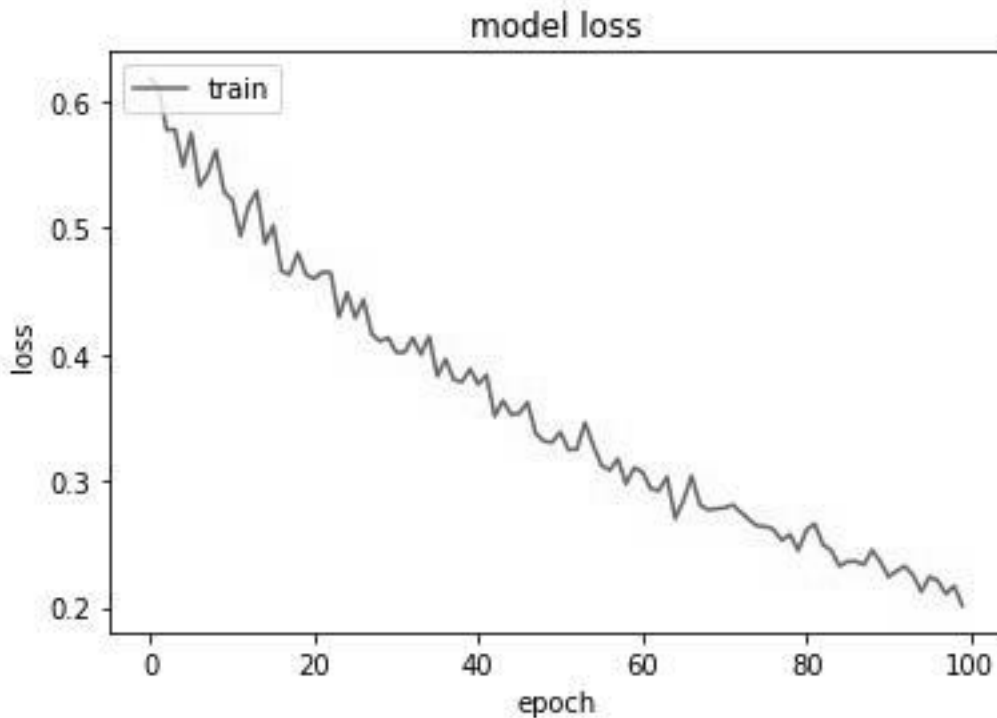


Figure 78: Finetuned for an additional 100 epochs

As the chatbot reaches the predefined upper limit of finetuning epochs – 100 epochs, equal to the number of epochs used to train the model on all dialogue corpora – the consistent overall progression remains, but so too do the small spikes in loss.

```
Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: yes
Bot : which letter
Human: b
Bot : yes i don't know what is it
Human: my father
Bot : is that a female or a
```

Figure 79: Interaction with chatbot after finetuning for 100 epochs.

In the above interaction with the chatbot finetuned for 100 epochs, the chatbot makes an initial guess of either an r or b initial. This is particularly noteworthy as it differs from the initial guess made by all previous iterations of the finetuned chatbot, all of which guessed either a j or g initial.

In the event that the user says yes, the chatbot will ask the user to confirm which

letter.

If the users says the letter b, the chatbot appears to claim ignorance, and asks the user to identify the person whom they seek.

Rather than exhaust all possible connections in this preliminary exploration, a small selection of immediate familial connections – father, mother, son, daughter, grandfather and grandmother – shall be tested.

If the user says that it is their father, the chatbot asks if that is a female.

It is unlikely that a person the user identified as their father, would identify as female.

Therefore, the chatbot has failed to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: yes
Bot : which letter
Human: b
Bot : yes i don't know what is it
Human: my son
Bot : yes he is a a in a unique in a wheelchair
Human: yes
Bot : is this family in the family
```

Figure 80: Interaction with chatbot after finetuning for 100 epochs.

In this interaction, the user again confirms the b initial.

When asked, the user says that the connection is to their son, to which the chatbot says that the user's son is "unique" and "in a wheelchair". A person describing their son as unique is likely, however the wheelchair appears to be more of a gamble.

However, given that the connection is likely to someone deceased, it is possible that the circumstances that led to their death, also necessitated the use of a wheelchair.

Assuming that this is the case, the user confirms the chatbot's statement, to which the chatbot asks if this is family.

Similar to the interaction with the chatbot finetuned for 80 epochs, this statement disregards the current line of questioning, focused on the user's son, in favour of

pursuing a new connection. This would be hurtful to a PGD patient, and thus the chatbot fails to deliver a suitable cold reading.

```
Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: yes
Bot : which letter
Human: b
Bot : yes i don't know what is it
Human: my son
Bot : yes he is a a in a unique in a wheelchair
Human: no
Bot : ok is there a j or an m
```

Figure 81: Interaction with chatbot after finetuning for 100 epochs.

If instead the user denies that chatbot's statement about the wheelchair, the chatbot again pursues a new angle, this time asking if there is a j or an m. This is similarly hurtful to the prior interaction's conclusion, and therefore another failure to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: yes
Bot : which letter
Human: b
Bot : yes i don't know what is it
Human: my mother
Bot : the first thing is that family to your mom
```

Figure 82: Interaction with chatbot after finetuning for 100 epochs.

In the above interaction, after confirming the b initial, the user says that it is their mother that they are looking for.

The chatbot then asks "is that family to your mom" which is a confusing message as the user has just said that it is their mother that they are looking for. Therefore, the chatbot has failed to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: yes
Bot : which letter
Human: b
Bot : yes i don't know what is it
Human: my daughter
Bot : is it a female or a j or a j or an m or female or who is this

Figure 83: Interaction with chatbot after finetuning for 100 epochs.

In this interaction, after confirming the b initial, the user says that it is their daughter that they are looking for. The chatbot then asks if it is a female or a j or m initial that they are looking for.

This disregards the user's input and therefore fails to provide a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: yes
Bot : which letter
Human: b
Bot : yes i don't know what is it
Human: my grandfather
Bot : is that a male or a
Human: yes
Bot : is that a or a

Figure 84: Interaction with chatbot after finetuning for 100 epochs.

In this interaction, after confirming the b initial, the user says that it is their grandfather that they are looking for. The chatbot then asks if it is a male. This is a likely assumption. Nonetheless, if the user confirms, the chatbot then responds nonsensically with a question the doesn't ask anything.

Therefore, the chatbot has failed to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: yes
Bot : which letter
Human: b
Bot : yes i don't know what is it
Human: my grandmother
Bot : yes she does that something
Human: what thing
Bot : is that your name or your sister
```

Figure 85: Interaction with chatbot after finetuning for 100 epochs.

In this interaction, after confirming the b initial, the user says that it is their grandmother that they are looking for. The chatbot then confirms and says, “she does that something”.

When prompted for clarification, the chatbot asks about the user’s sister, disregarding the conversation up to this point. This is a failure to deliver a cold reading suitable for a PGD patient.

```
Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: yes
Bot : which letter
Human: r
Bot : yes
Human: yes
Bot : which letter or a j
```

Figure 86: Interaction with chatbot after finetuning for 100 epochs.

In the above interaction, the user confirms the initial guess but instead confirms the r initial. The chatbot seems to prompt the user for another confirmation or confirm the user’s confirmation. Either way, if the user confirms again, the chatbot then asks again which letter and suggests another letter – j. This disregard the user’s confirmation of the r initial and is thus another failure to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: no
Bot : which is a male j or
Human: yes
Bot : a female j

Figure 87: Interaction with chatbot after finetuning for 100 epochs.

In the above interaction, the user denies the initial guess of an r or b initial, to which the chatbot offers the guess of a male j.

If the user confirms this guess, the chatbot then guesses a female j. This strange response ignores the user's confirmation of the chatbot's last guess, which means the chatbot has failed to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: no
Bot : which is a male j or
Human: no
Bot : a female j
Human: yes
Bot : a male j or is a j or n or n or

Figure 88: Interaction with chatbot after finetuning for 100 epochs.

In this interaction, the user again denies the initial guess of an r or b initial. This time, the user denies the second guess of a male j, at which point the chatbot guesses a female j instead.

If the user confirms a female j, the chatbot then guesses a male j or n. This is contradictory to the established facts up to this point and thus the chatbot has failed to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: no
Bot : which is a male j or
Human: no
Bot : a female j
Human: no
Bot : or a j or an m or
Human: m
Bot : is that a female
Human: yes
Bot : a female j

Figure 89: Interaction with chatbot after finetuning for 100 epochs.

In the above interaction the user denies the initial guess, the male j guess, and the female j guess. The chatbot responds by guessing a j or an m. Seeing as the user has already denied a male or female j, there is still the small possibility that it is a nonbinary j. Given that this is statistically improbable (Kelley & Santos, 2022), it is a very risky guess for a cold reading.

If however, the user says m, the chatbot guesses that the connection is female. If the user confirms this, the chatbot then guesses a female j, in contradiction with the user's previous responses.

Therefore, the chatbot has again failed to deliver a cold reading suitable for a PGD patient.

Human: hello
Bot : hi do you have somebody who's an r or b initial with you
Human: no
Bot : which is a male j or
Human: no
Bot : a female j
Human: no
Bot : or a j or an m or
Human: m
Bot : is that a female
Human: no
Bot : like a mary or an m or b

Figure 90: Interaction with chatbot after finetuning for 100 epochs.

In the final interaction with the chatbot finetuned for 100 epochs, the user denies the initial guess, the male j guess, and the female guess.

The user then confirms the m guess but denies the guess that the M is female. The chatbot responds by guessing a name like Mary or a b. Mary is traditionally a female name as opposed to a male name (Corps, 2014), which makes this an unlikely guess. Therefore, the chatbot has again failed to deliver a cold reading suitable for a PGD patient.

The result of training the model on the combined corpora demonstrates that the chatbot has encoded conversational ability, including what seems to be an understanding of context. However, the chatbot's performance does appear to diminish as the conversation progresses, perhaps due to the model being unable to process the entire context. This could be improved by scaling the model to include a greater context window in training and to utilise greater dimensionality in the LSTMs.

However, on finetuning the model for the AURA corpus, the model does not demonstrate the same level of understanding as it did for general conversation. Some cold reading techniques are observed, such as guessing the first letter of the deceased's name, however in its current state it cannot deliver a cold reading, certainly not to a vulnerable individual such as a PGD patient.

4.4 Modelling – Large Language Model

Thus far, the work on generative chatbots has concerned models trained from scratch. It may be possible to leverage the power of Large Language Models (LLMs) such as ChatGPT (OpenAI, 2022) to bypass training that would require time and resources outside of reasonable limitations to the individual researcher.

To explore this possibility, ChatGPT was used by providing the model with a simple prompt, e.g. "Talk to me as if you are a psychic medium", observing the outcome and responding if appropriate or restarting with a different prompt.

Using simple prompts yields chatbots that succeeds and fail in the same ways as prior attempts. The responses are in some ways impressive and appropriate for a psychic medium to say. However, the chatbots do not spend time building a bond with the user, something that the psychiatric experts all emphasised as critical to the treatment of PGD patients. More sophisticated cold reading chatbots may be possible if the LLM is provided with the proper prompt.

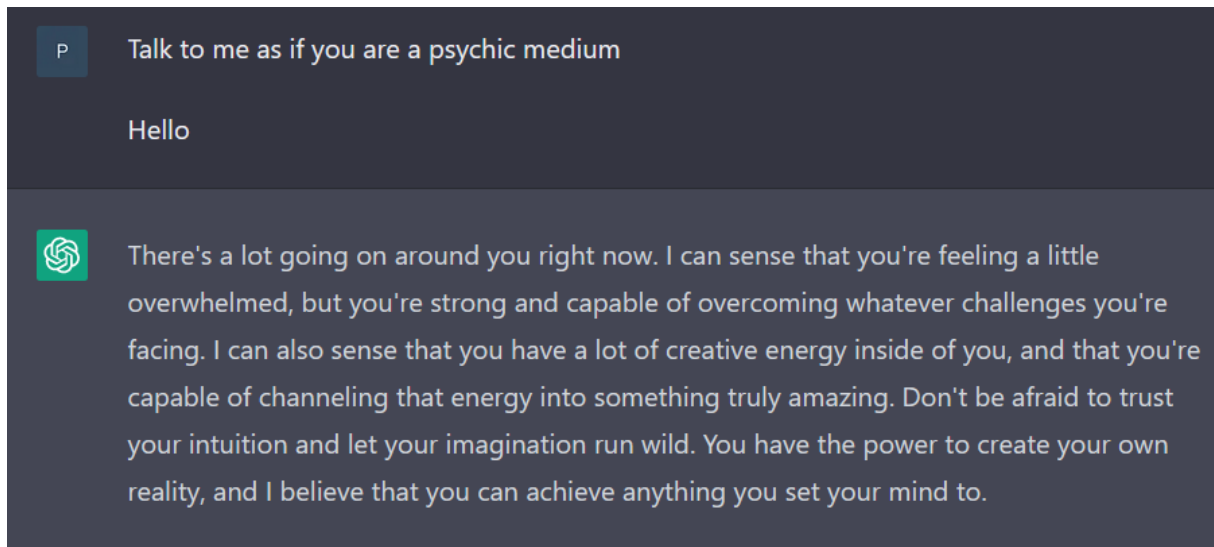


Figure 91: ChatGPT initial attempt at creating a psychic medium chatbot. Fails to open up a dialogue with the user and therefore would not tide the user over the waiting period for psychiatric aid.

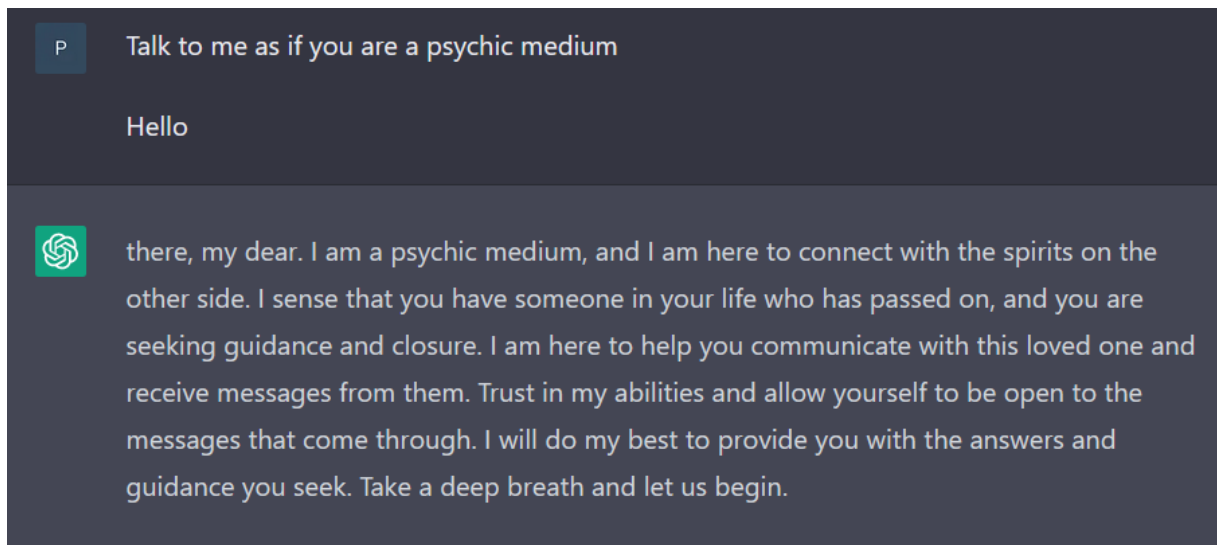


Figure 92: ChatGPT second attempt at creating a psychic medium chatbot. Invites the user to respond and seems to open up a dialogue while still acting appropriately for a psychic medium.

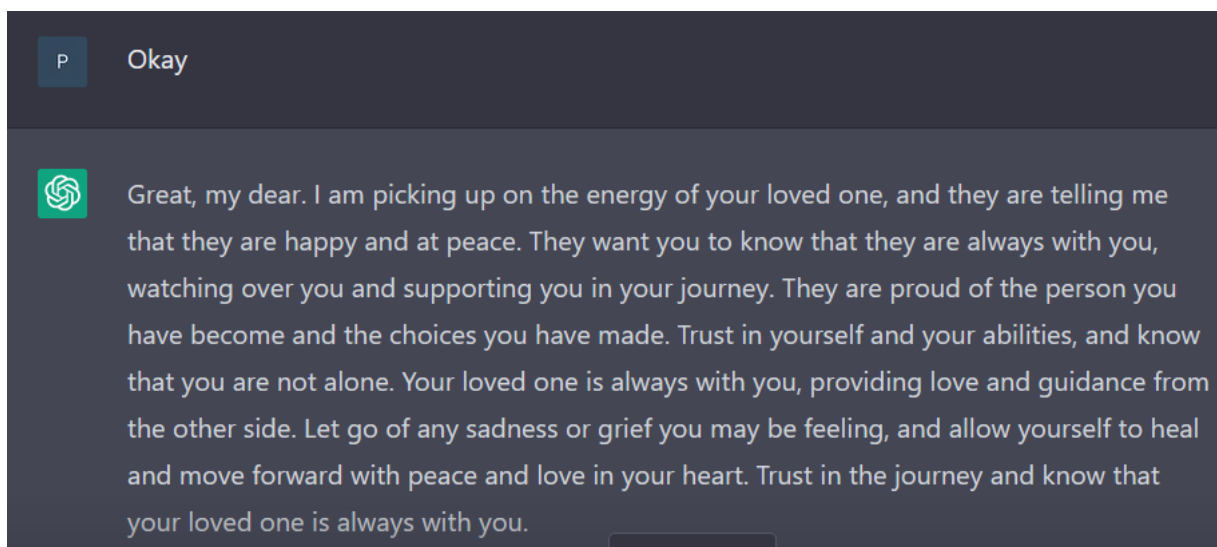


Figure 93: Subsequent exchange from the second attempt at creating a psychic medium chatbot in ChatGPT. Generally comforting messages, although sparse in ways of specifics and bond building with the user

P

Is there anything more specific?



I am picking up on a specific message that your loved one wants to convey. They are telling me that they want you to take care of yourself and prioritize your own happiness and well-being. They want you to know that it is okay to let go of any lingering pain or anger, and to forgive yourself and others. Your loved one wants you to focus on your own growth and development, and to trust in the path that life has laid out for you. They are sending you love and light, and they want you to know that they are always with you, supporting you and guiding you. Trust in the journey and trust in yourself, and know that you are loved and supported from the other side.

Figure 94: When prompted for more specific information, the ChatGPT cold reading chatbot offers a new message, although the specificity of the message is debateable.

This is quite similar to a Barnum statement.

P

Use cold reading techniques to talk to me as if you are a psychic medium

Hello



and thank you for coming to me today. I am a psychic medium and I am here to help you connect with your loved ones who have passed on. I can sense that you are feeling a bit lost and unsure of what direction to take in your life right now. You may be struggling with some difficult emotions and feeling a bit overwhelmed. But know that your loved ones are with you, watching over you and guiding you. They want you to know that they are at peace and that they are proud of the person you have become. They are sending you their love and support, and they want you to trust in yourself and your own abilities. You are stronger than you realize, and you have the power to overcome any obstacle that comes your way. Trust in yourself and trust in the love and guidance of your loved ones. They are with you always.

Figure 95: Using a different prompt to create a cold reading chatbot in ChatGPT, this time specifically requesting the use of cold reading techniques. The chatbot again does not seem to open up a dialogue, but does respond appropriately and offer the user comfort

P

Which loved ones are with me?



As a psychic medium, I am not able to see specific individuals who are with you. I am only able to sense the presence of loved ones who have passed on and are now in the spirit world. I can feel their love and support for you, and I can sense that they are proud of you and want you to trust in yourself and your own abilities. But I cannot say for certain which specific individuals are with you. I believe that it is up to you to connect with them on a deeper level and perhaps even communicate with them through your own intuitive abilities or through the help of another psychic medium.

Figure 96: When prompted for specific identities of the deceased, the chatbot deflects while still maintaining the role of a psychic medium

P

Talk to me as though you are my deceased father

Hello



my son, it's good to see you again. I've been watching over you and am proud of the man you have become. I know I'm not physically with you, but please know that I am always with you in spirit. You can talk to me any time you need to and I will always be here to listen and offer guidance if you need it. Just remember to keep pushing forward and never give up on your dreams, no matter how difficult things may seem. You are capable of great things and I have every confidence in your ability to achieve them. I love you, my son.

Figure 97: ChatGPT prompted to create a chatbot based on a deceased relative. Vague and comforting messages appropriate for the role provided.

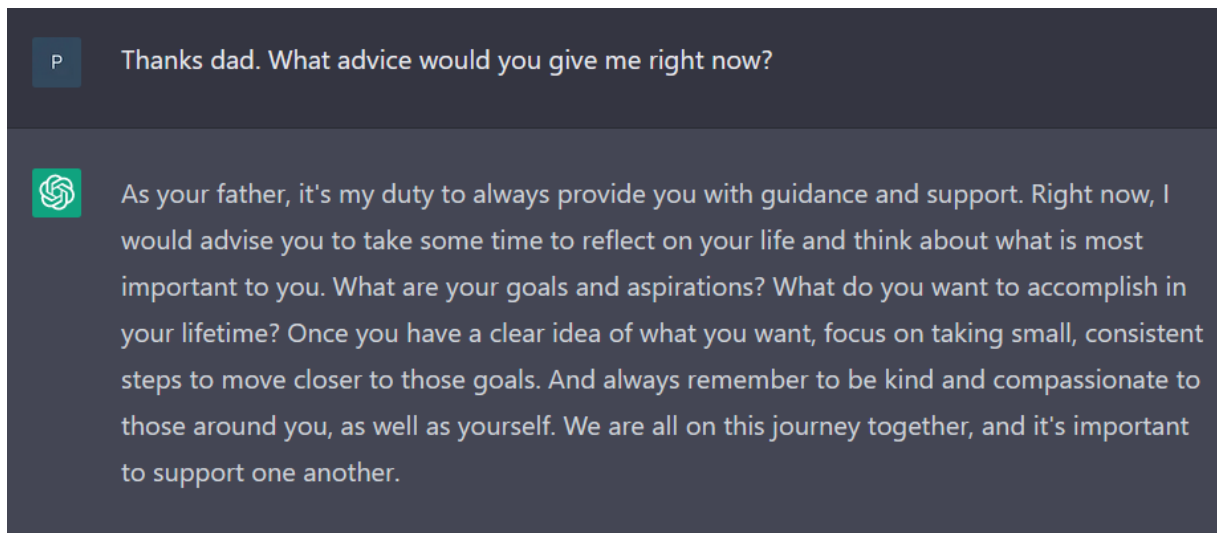


Figure 98: Subsequent message from ChatGPT prompted to act as a deceased father. Generally comforting messages and advice.

One of the initial motivations for the cold reading chatbot was that PGD patients are unable to create a griefbot without the necessary data from the deceased. LLMs can take a prompt to speak as though they were a user's deceased relative and begin a conversation in that role. The responses are non-specific, given the brief prompt, and more specific responses could possibly be achieved with more elaborate prompts. The PGD patient could provide information about the deceased to fill out these prompts, which may make it harder for the patient to suspend their disbelief and immerse themselves in the experience given that they are aware of how the chatbot works and why certain responses are chosen.

Chapter 5

Evaluation

5.1 Review of Methods for Evaluating Chatbots

Performance metrics for chatbots are difficult to define. Although models such as Seq2seq were designed for machine translation, translation metrics such as BLUE and ROUGE fail to paint an accurate picture of chatbot performance because unlike with translations, there are often multiple appropriate responses to any given input and multiple inputs can all generate the same response (Liu, et al., 2017). For example, if one was to say, “how are you?” to a chatbot, it would be acceptable for the chatbot to respond with “I’m fine”, “I’m okay”, “Not too bad”, “I’m doing great”, or “I’m not doing well” just to list a few possible responses. Likewise, “Yes” could be an appropriate response to “Are you okay?”, “Are you hurt?” and “Is it going to rain today?”.

One method of chatbot assessment is the Turing test (Turing, 1950). The Turing test assesses a chatbot’s ability to trick the user into believing that is in fact a human also, rather than a chatbot. However, for this chatbot’s purposes, the Turing test is not appropriate as the user isn’t meant to be convinced that the chatbot is human, but that it is capable of mediumship. It is the stance of this research that the chatbot’s presentation as inhuman will not be a hinderance due to the human tendency towards anthropomorphism (Sharkey & Sharkey, 2007).

What the Turing test does offer, is the established use of qualitative assessment for chatbots. In the Turing test, humans were asked to determine whether their conversational partner was human or not by qualitatively assessing their conversation. Stanford asked participants to qualitatively judge whether lines of dialogue were from a TV character or a chatbot (Nguyen, Morales, & Chin, 2017). The cold reading chatbots may also be qualitatively assessed.

5.2 Chosen Method for Evaluation

In order to assess the produced chatbots, they are presented to experts in psychology who can determine their applicability to the problem statement of PGD patients waiting for psychiatric intervention.

5.2.1 Format of Presentations

The consultations with each of the experts will follow the same format to ensure consistency and fairness. The experts are encouraged to elaborate on their feedback while not being lead:

- First the expert will be given a brief summary of the research motivation and objectives, as outlined in this thesis' introduction chapter.
- Then, the experts will be shown a demonstration of the baseline, rules-based, cold reading chatbot. The demonstration will include all features of the rules-based model, including compensating for disconfirmation at various points throughout the reading.
- The expert will then be shown a number of exchanges with the general conversational generative model, prior to being finetuned. This demonstration is followed by a demonstration of the finetuned generative model.

5.2.2 Selection of Experts

The staff profiles of the University of Salford's psychology department were reviewed for possible suitable candidates. Candidates were chosen based on their listed interests matching the subject of the thesis. Candidates were contacted with an email containing a brief description of the research. Of the candidates who responded, some were not available and referred the researcher to other experts in psychology at the University of Salford. These experts were then also contacted. Those experts that responded confirming their availability were selected to assess the chatbots.

5.3 Experts Providing Evaluation

The experts who provided their feedback are Dr Linda Dubrow-Marshall, Dr Peter Eachus and Dr David Tate.

These experts were chosen for their expertise in psychology and their specific research interests.

5.3.1 Dr Linda Dubrow-Marshall

Dr Linda Dubrow-Marshall is a HCPC registered clinical and counselling psychologist, as well as a BACP Accredited Counsellor/Psychotherapist. They are the Head of Psychology and a Senior Lecturer in Psychology at the University of Salford. Dr Dubrow-Marshall's research interests include creative therapies for depression. While this is not a therapy for depression, it arguably fits the description of a creative therapy.

5.3.2 Dr Peter Eachus

Dr Peter Eachus is a Chartered member of the British Psychological Society. They are the Director of Psychology and Public Health within the School of Health Sciences at the University of Salford. Dr Eachus' research interests include self-efficacy in the use of computers and the Internet. Computers are at the foundation of this research and as the user is not interacting with another human, they are using self-efficacy to achieve their grief goals.

5.3.3 Dr David Tate

Dr David Tate is a member of the British Psychological Society. They are a Lecturer of Psychology at the University of Salford. Dr Tate's research interests include psychological intervention development and evaluation. The chatbot is intended to be a psychological intervention and thus Dr Tate's perspective is also significant.

5.4 Results of Evaluation

5.4.1 Evaluation on Overall Premise

Dr Dubrow-Marshall stated that due to their own personal biases, opinions, and beliefs – primarily being that they do not believe in psychics – they would never personally suggest to a patient that they visit a psychic. This is in part because they are against any non-scientific claims, for example the use of hypnosis to revisit past lives. However, they did say that people do like going to psychics because they can be made to feel close to psychics because of the techniques that psychics use, and this can feel comforting. Dr Dubrow-Marshall emphasised that they do not personally find it comforting – quite the opposite – and others may share their view, meaning that a psychic chatbot may not be suitable for these people.

Dr Dubrow-Marshall suggested a more general chatbot that would offer helpful tips for mental health, such as “have you looked out the window today?”. When asked how such a chatbot would differ from similar chatbots such as Replika, they did state that they personally focus on person-person relationships over the use of automated methods such as bots, so it was not their place to evaluate such methods. Although, they acknowledged that many people do use and like automated methods such as chatbots.

Dr Tate was generally supportive of the premise. They recognised the issue of long waiting lists for PGD patients and the need for something to provide support while they wait, albeit something that is targeted towards patients who would be receptive to a psychic reading, i.e., spiritual people. Saying that, they stated that even some spiritual people may take offense to certain remarks, if the chatbot’s view of spirituality and the afterlife did not align with their own. More investigation should be conducted into grief theory to improve the chatbot. This includes links with spirituality. Overall, the view was taken that the most important thing is that the user leaves their interaction with the chatbot in a better state than when they entered it. Dr Eachus was more critical of the underlying premise. While they knew of patients who had sought help from psychic mediums, they believed that the general

perception of psychics by many is that they are untruthful, and they personally would not seek the counsel of a psychic medium if they were personally experiencing grief.

5.4.2 Evaluation on Baseline, Rules-Based Model

Dr Dubrow-Marshall judged the baseline rules-based chatbot to be working well, although the comforting statements could be more specific and helpful for the user. For the rules based chatbot, Dr Tate suggest that the chatbot should be designed in collaboration with grief experts as well as those currently experiencing grief – the stakeholders of the chatbot

Another suggestion was made to reduce the number of guesses for the deceased's first name to only 1 or maybe 2 guesses. Dr Tate felt that a user would get frustrated and give up on the chatbot after this point, not necessarily because it was getting things wrong, but because it wasn't behaving like a person would in that instance. Dr Tate stated that to their knowledge, a clairvoyant would use skills much like a therapist to form a bond with the recipient/patient/user through a series of empathic responses. For example, "I understand this is a hard time..." and "You must be feeling a lot of emotion right now" would be effective statements that empathise with the user's plight but leave the details open for the user to interpret however best fits their specific circumstances.

The chatbot should try to mimic what a grief counsellor does. This suggestion is similar to that of the previous expert. In particular, person-centred therapy was mentioned, much like how ELIZA works. Person centred therapy is non-judgemental and empathic, while using vague wording much like a psychic medium.

The Barnum statements used in the rules based chatbot came under criticism for being used too early in the conversation and being questionable in their sincerity, i.e., it didn't seem like the chatbot would know the user well enough to make such personal statements. This feedback does highlight the effectiveness of Barnum statements – anyone using a Barnum statement doesn't need to know the recipient at all, yet they seem to be very personal. The reason Barnum statements are used in

the chatbot at all is precisely to demonstrate knowledge that could only be explained by psychic abilities. However, as this was not clear to the expert and instead only served to make them feel uncomfortable with the statement, it is a criticism worth addressing in future versions.

The option to leave a final message should be made more clear, for example “Is there any final thing that you need to say to John that you didn’t get to say when they were alive?” makes it more clear that this is an opportunity to get as much off the user’s chest as possible within a single message.

Dr Tate also suggested that the randomly selected, prewritten comforting messages could be altered to mimic what a grief counsellor would do.

5.4.3 Evaluation on Generative Model

It was difficult for Dr Dubrow-Marshall to judge the generative model in its current state, although they felt that as long the chatbot were upfront about not actually being able to talk to the deceased and that it presented its service as an opportunity for the user to suspend their disbelief, similar to entering a virtual reality environment, then the chatbot could prove to be beneficial and not detrimental.

Dr Eachus noted that the pre-finetuning chatbot seemed to act more like the patient than the reader/therapist.

Dr Eachus also noted that the finetuned chatbot jumped straight into the cold reading, which seemed odd and unnatural.

Dr Eachus determined that a better application of the technology would be to mimic a therapist.

For the generative chatbot model, Dr Tate found that the pre-finetuning model produced a startlingly offensive response for someone suffering a loss. This kind of event can happen in generative chatbot models even when offensive words and phrases are removed and is a cause for concern.

The finetuned model produced strange responses that didn’t feel like a person. Part of the problem was that the responses felt too specific to someone else’s situation,

which made it feel like the chatbot wasn't really talking to the user.

The next steps suggested by Dr Tate were that the chatbot should focus on building a bond with the user, by generating meaningful responses and allowing the user to explain their grief. The chatbot should also produce less incoherent and incorrect inferences.

Chapter 6

Conclusions

6.1 Review of Hypothesis

Finding a new solution for PGD is crucial considering that the condition occurred in roughly 10% of all bereavements prior to exacerbating factors such as COVID-19. Existing solutions such as psychological intervention, griefbots and psychic mediums are inaccessible to many PGD patients due to wait times, lack of data and financial costs respectively.

The hypothesis of this research was that the cold reading techniques could be replicated using established chatbot techniques and that a cold reading chatbot would be the optimal solution. The optimal solution was defined as having the advantages of existing solutions and none of the disadvantages. To this end, the solution would have to meet the following criteria:

1. Be cost effective.
2. Be available 24/7.
3. Not require any personal data.
4. Demonstrate cold reading techniques in its responses.
5. Apply cold reading techniques in a way that will benefit a user with PGD.

For criteria 1 and 2, previous work on chatbots and cold reading techniques were reviewed, and multiple methods were devised to be explored in the methodology. The research identified and produced three different chatbot types: rules-based, retrieval-based, and generative. As chatbots, all of the models produced meet criteria 1 and 2.

For criteria 3, all three models meet criteria 3. In the case of the rules-based model, the chatbot uses rules written based on the researcher's understanding of the cold reading technique from the literature review. For the retrieval-based and generative models, the chatbots use the AURA dataset (Smith, 2005) to retrieve responses or generate them respectively.

For criteria 4, the baseline rules-based chatbot used conventional methods of creating a chatbot as well as knowledge of cold reading techniques. The model works in delivering a cold reading from start to end and the techniques such as Barnum statements are effective to the point of their detriment by coming off as overly familiar with the user. However, the rules-based model is limited in its responses to what has been anticipated. The effectiveness of Barnum statements deployed by the baseline rules-based chatbot could be used to argue that well-chosen lines are more important than sophisticated AI techniques. Cold readings work not because the psychic medium can create a totally unique reading for every one of their clients, but instead because the Barnum statements used are widely applicable to most people despite seeming very personal. The retrieval-based chatbot used existing responses in the dialogue corpora to respond to inputs from the user that matched inputs in the dialogue corpora. The responses were in keeping with the role of a psychic medium but were too repetitive and lacked flexibility required to perform a cold reading adequately. The generative chatbot is an improvement on the baseline in that it possesses the ability to respond to unanticipated inputs with appropriate responses and it has learned techniques such as initial guessing without any explicit instruction to do so. However, all branches of cold readings eventually fall short, possibly due to a lack of available training data in the cold reading domain when compared to similar projects such as the Roman chatbot (Newton, 2017). It is possible that a generative chatbot with more training data could still meet criteria 4, given what has been observed in the produced model.

For criteria 5, the expert evaluation suggests that the proposed solution could be useful for treating PGD, although the models produced so far require further work in order to be fit for purpose. Perhaps the reason that the cold reading chatbots don't work as well as one would hope is because psychic mediums don't work, at least not in the way that one would like them to. AURA's analysis revealed that psychics only predicted the cause of death in 1.1% of their statements and the identity of the deceased in 0.37% of their statements. Only 61.17% of statements discussed the

deceased person identified by the caller, meaning that the psychics spent the rest of their time discussing other subjects.

If psychics are so unreliable, why is it that they remain in business? To answer this, consider that thus far the thesis has focused on two parties in the cold readings: the psychic and the caller. There is another party that has not been discussed: the audience. These readings were televised to entertain the audience and it is the psychic's job to use the caller as a platform to showcase their skills in an entertaining way. It is acceptable to the psychic for a few callers to be let down so long as the larger audience is sufficiently impressed.

The work undertaken has supported the hypothesis as far as criteria 1 through 4 are concerned. However, further work is required to determine whether criteria 5 can or cannot be satisfied. In particular, additional training data and further development on the chatbot model(s) with a focus towards treating the patient as opposed to performative readings.

6.2 Contributions

One of the influences of this research was griefbots: chatbots that imitate the deceased. Griefbots require data from the deceased which motivated this research to find a solution that did not require data. As psychic mediums can also imitate the deceased and one can obtain dialogue corpora from psychic mediums, this research found that a chatbot resembling a psychic medium, built with the forementioned corpora, makes for a suitable alternative to a griefbot.

This method of substitution could allow for the creation of chatbots that imitate many more professions and/or people where their dialogue corpus is unavailable, but the corpus of an imitator is available. For example, if one wanted to create a chatbot version of a celebrity whose dialogue corpora is unavailable or insufficient, a chatbot version of an impersonator of said celebrity may be created instead to serve the same purpose.

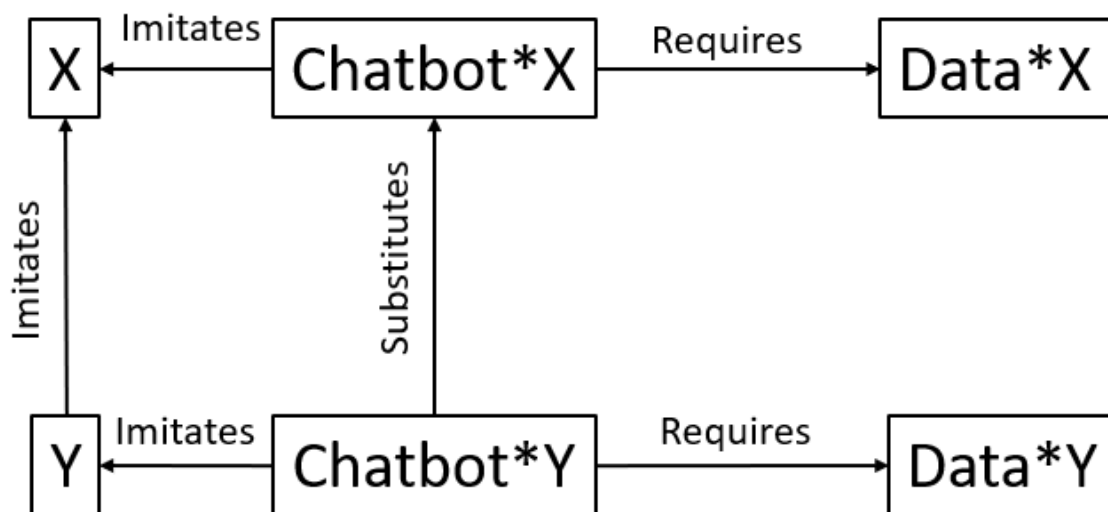


Figure 99: Diagram of the method for substituting one chatbot for another where dialogue corpora is unavailable

6.3 Limitations

Multiple limitations have been identified in this research.

The research was conducted entirely within a timeframe of 4 years, by an individual researcher using relatively few computational resources, i.e., a laptop with a single GPU. With more time and resources, a greater variety of more sophisticated models could be explored.

Only psychiatry experts at the University of Salford were contacted for their evaluation of the chatbot models and of those experts, only a few were available. More evaluators would most likely mean a greater variety of perspectives which could guide future research. No experts in AI were consulted for their evaluation, which could have provided technical input that would also guide future research. The work done on ChatGPT was conducted after the evaluation period, meaning that it has not been evaluated as the other models have been.

6.4 Future Work

6.4.1 Grief Therapist Chatbot

Future work could take the suggestion of a chatbot designed to imitate a grief therapist. This approach would echo Chatbots such as ELIZA and Replika, the key difference being that the chatbot would focus on the subject of grief, as opposed to being an all-round therapist.

Advisory vs Listening

One of the main risks that would be involved with such a project would be the chatbot delivering the wrong advice to patients, causing further harm. However, if the chatbot successfully adopts the role of a therapist, it should just act as a listening ear for the patient to vent to.

Data Handling

If a grief therapist chatbot were to be a generative model, it would require dialogue corpora consisting of conversations between PGD patients and their therapist(s). This would necessitate the handling of personally identifying information and sensitive information regarding the patients. Assuming that the patient gave informed consent to their conversations being recorded and used for the purpose of training a chatbot, the aspects of the conversation that are personally identifying or sensitive would require anonymisation. Rather than simple omission, appropriate substitutions would need to be made so that the model could still learn the relationship between the information that was shared by the patient and the response from the therapist. If the patient is aware that their session is being recorded, their behaviour during the therapy session may change. For example, the patient may withdraw, tell half-truths and self-censor to protect their personal information from any potential invasion of privacy, despite any reassurances that can be made regarding the safe storage and anonymising of their data. It is only speculative that there would be a significant difference in behaviour, but a small difference could have an impact on the trained

chatbot.

Rules-Based vs Generative

Issues around data requirements would be largely mitigated by a method that requires less data. Rules-based chatbots require almost no data and could be designed in collaboration with professional grief therapists, informing the chatbot developer of the methods that they use and in what context(s) they use them in. However, developing a rules-based chatbot can only follow the rules it is given and therefore cannot respond to unanticipated inputs or generate original responses which would keep the user engaged. Keeping the user engaged is critical because the chatbot needs to tie the user over the waiting period for psychiatric aid.

6.4.2 Improved Cold Reading Chatbot

Accessibility

In order to treat as many PGD patients as possible, it is vital that the chatbot be as accessible as possible. The primary motivation for this research is that established griefbot methods are inaccessible to PGD patients who lack the necessary data from the deceased.

As the chatbot is text-based, it is already accessible for solely audio-impaired users. However, text is a representation of spoken language; for signers, a signing interface may be more comfortable.

For visually impaired users, speech-to-text and text-to-speech software could allow the user to input messages and receive outputs respectively. The accuracy of these tools would be vital to the user experience, as an inaccurate speech-to-text tool would input words that the user did not say and omit words that the user did say.

Likewise, a poor text-to-speech tool could mispronounce words, causing confusion, or simply sound too unnatural for the user to experience a genuine connection.

Translation software may allow the chatbot to be used by non-English speaking users.

However, these tools can be unreliable, and mistranslations can be offensive,

especially in the case of predicted pronouns reinforcing stereotypical and harmful gender roles (Stanovsky, Smith, & Zettlemoyer, 2019). Therefore, a bespoke chatbot for these languages would be a more reliable solution. This bears the challenge of finding a sufficient volume of high-quality dialogue corpora for cold readings in these languages, something that has already proven to be a difficult task for the English language. The challenge of gathering enough data stands true for sign languages also, including ASL and BSL.

Minority gender identities, such as nonbinary, should also be acknowledged and respected by the chatbot. A chatbot failing to acknowledge the identity of a deceased nonbinary person could cause further harm to the PGD patient, in the rules-based model this has been accounted for relatively simply but is harder to guarantee in a generative model where the responses are dependent on the dialogues in the training data where these identities may be under-represented.

Building Empathic Bonds

Improvements to the cold reading chatbot should focus on building and exploring an empathic relationship with the user, according to the evaluation with the experts. In their current states, the rules-based and generative chatbots spend little to no time building a bond with the user before beginning the cold reading. Expanding this in a rules-based chatbot could take significant development time in order to manually write the possible pathways of dialogue. A solution may be to create a separate generative model that focuses on this bond-building process, which switches to an improved cold reading chatbot after the bond has been built.

Possibly the best way to improve the cold reading chatbot is to avoid imitating the psychic mediums who perform to an audience. Even if a chatbot were to perfectly replicate these psychics, the chatbot's responses would be written with the intent to entertain an audience, not to benefit its patient. There are psychic mediums who will offer private readings, and transcripts of these readings may be more suitable to train a chatbot on. However, the nature of the private reading makes obtaining transcripts

more complicated and difficult, especially at the volume required for a generative chatbot.

6.5 Closing Statement

Perhaps the greatest obstacle that the cold reading chatbot will face is the incredulity that the premise is met with; the notion of treating a very real psychological condition with fantasies of summoning spirits may seem counterintuitive. However, spirituality and healthcare are not as detached from one another as one might think (Puchalski, 2004) and fantasy may be exactly what the patient needs.

*“Humans need fantasy to be human. To be the place where the falling angel meets
the rising ape.”*

(Pratchett, 1996)

References

- Abeywardana, S. (2017, October 1). *Sequence to sequence tutorial*. Retrieved from towards data science: <https://towardsdatascience.com/sequence-to-sequence-tutorial-4fde3ee798d8>
- Agrawal, R., & Srikant, R. (1994). Fast Algorithms for Mining Association Rules. *Proceedings of the 20th VLDB Conference*, (pp. 487-499). Santiago.
- Agrawal, R., Imielinski, T., & Swami, A. (1993). Mining association rules between sets of items in large databases. *ACM SIGMOD Record*, 207-216.
- AIML Foundation. (n.d.). *AIML Foundation*. Retrieved from <http://www.aiml.foundation/>
- BBC. (2020, December 22). *Covid-19: UK sees over 80,000 excess deaths during pandemic*. Retrieved from BBC News: <https://www.bbc.co.uk/news/health-55411323>
- Beischel, J., Mosher, C., & Boccuzzi, M. (2014-2015). The possible effects on bereavement of assisted after-death communication during readings with psychic mediums: a continuing bonds perspective. *Omega*.
- Bender, E. M., & Koller, A. (2020). Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data. *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics* (pp. 5185-5198). Association for Computational Linguistics.
- Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? *FACCT '21* (pp. 610-623). ACM.
- Boelen, P. A., & Smid, G. E. (2017). Disturbed grief: prolonged grief disorder and persistent. *British Medical Journal*.
- Buxton, J. (2021, September 23). *National life tables – life expectancy in the UK: 2018 to 2020*. Retrieved from Office for National Statistics: [https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandma](https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages)

rriages/lifeexpectancies/bulletins/nationallifetablesunitedkingdom/2018to2020

- Chapman, P., J. C., Kerber, R., Khabaza, T., Reinartz, T., Shearer, C., & Wirth, R. (2000). *CRISP-DM*. SPSS.
- Chevalier, G. (2018, May 16). *Long short-term memory*. Retrieved from Wikipedia: https://commons.wikimedia.org/wiki/File:The_LSTM_cell.png
- Cho, K., Merrienboer, B. v., Gulcehre, C., Bahdanau, D., Bougares, F., Schwenk, H., & Bengio, Y. (2014). Learning Phrase Representations using RNN Encoder-Decoder for Statistical Machine Translation. *ArXiv*.
- Cole, D. (2020). The Chinese Room Argument. In E. N. Zalta, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University.
- Corps, D. (2014). *Top 100 baby names in England and Wales: historical data*. Office for National Statistics.
- Danescu-Niculescu-Mizil, C., & Lee, L. (2011). Chameleons in imagined conversations: A new approach to understanding coordination of linguistic style in dialogs. *Proceedings of the 2nd Workshop on Cognitive Modeling and Computational Linguistics* (pp. 76-87). Portland: Association for Computational Linguistics.
- Dutton, D. L. (1988). The cold reading technique. *Experientia*.
- Eisma, M. C., Boelen, P. A., & Lenferink, L. I. (2020). Prolonged grief disorder following the Coronavirus (COVID-19) pandemic. *Psychiatry research*, 288.
- Enoksen, A. E., & Dickerson, P. (2018). 'That proves my point!': How mediums reconstrue disconfirmation in medium-sitter interactions. *The British journal of social psychology*, 57(2), 386–403.
- fdeloche. (2017, June 19). *Recurrent neural network*. Retrieved from Wikipedia: https://en.wikipedia.org/wiki/File:Recurrent_neural_network_unfold.svg
- Glosser.ca. (2013, February 28). *Artificial neural network*. Retrieved from Wikipedia: https://commons.wikimedia.org/wiki/File:Colored_neural_network.svg
- Harris, O. (Director). (2013). *Black Mirror: Be Right Back* [Motion Picture].
- HereAfter. (n.d.). Retrieved from <https://www.hereafter.ai/>

- Hussain, S., Sianaki, O. A., & Ababneh, N. (2019). A Survey on Conversational Agents/Chatbots Classification and Design Techniques. *Web, Artificial Intelligence and Network Applications*, 946-956.
- Jebblad. (2018, February 8). *Gated recurrent unit*. Retrieved from Wikipedia: https://commons.wikimedia.org/wiki/File:Gated_Recurrent_Unit,_base_type.svg
- Kelley, N., & Santos, R. D. (2022). *Rainbow Britain: Attraction, Identity and Connection in Great Britain in 2022*. Stonewall.
- Lee, C. D.-N.-M. (2011). Chameleons in imagined conversations: A new approach to understanding coordination of linguistic style in dialogs. *Proceedings of the Workshop on Cognitive Modeling and Computational Linguistics, ACL 2011*.
- Lee, D. (2016, March 25). *Tay: Microsoft issues apology over racist chatbot fiasco*. Retrieved from BBC: <https://www.bbc.co.uk/news/technology-35902104>
- Liu, C.-W., Lowe, R., Serban, I. V., Noseworthy, M., Charlin, L., & Pineau, J. (2017). How NOT To Evaluate Your Dialogue System: An Empirical Study of Unsupervised Evaluation Metrics for Dialogue Response Generation.
- Luka Inc. (n.d.). *Our Story*. Retrieved from Replika: <https://replika.com/about/story>
- Mikolov, T., Chen, K., Corrado, G., & Dean, J. (2013). Efficient Estimation of Word Representations in Vector Space.
- Mikolov, T., Sutskever, I., Chen, K., Corrado, G., & Dean, J. (2013). Distributed Representations of Words and Phrases and their Compositionality.
- Mind. (2013). *We still need to talk A report on access to talking therapies*.
- Ministry of Defence. (2022). *UK Armed Forces Biannual Diversity Statistics*. Office for National Statistics.
- Newton, C. (2017). *Speak, Memory*. Retrieved from The Verge: <https://www.theverge.com/a/luka-artificial-intelligence-memorial-roman-mazurenko-bot>
- Nguyen, H., Morales, D., & Chin, T. (2017). A Neural Chatbot with Personality.

- OpenAI. (2022, November 30). *ChatGPT: Optimizing Language Models for Dialogue*. Retrieved from OpenAI: <https://openai.com/blog/chatgpt/>
- Pennington, J., Socher, R., & Manning, C. D. (2014). GloVe: Global Vectors for Word Representation.
- Piantadosi, S. T. (2022, December 4). Retrieved from Twitter: <https://twitter.com/spiantado/status/1599462375887114240>
- Potts, C. (2020, October 5). *Is it possible for language models to achieve language understanding?* Retrieved from Medium: <https://chrisgpotts.medium.com/is-it-possible-for-language-models-to-achieve-language-understanding-81df45082ee2>
- Pratchett, T. (1996). *Hogfather*. Victor Gollancz.
- Puchalski, C. (2004). Spirituality in health: the role of spirituality in critical care. *Critical care clinics*, 487-504.
- Rogers, C. R., & Sanford, R. C. (1985). Client-Centered Psychotherapy. In H. I. Kaplan, & B. J. Sadock, *Comprehensive textbook of psychiatry* (pp. 1374-1388).
- Sharkey, N. E., & Sharkey, A. J. (2007). Artificial intelligence and natural magic. *Artificial Intelligence Review*, 9-19.
- Smith, J. (2005, April 15). *Archive of mediUm and cold Reader dAta*. Retrieved from Statisticool: <https://www.statisticool.com/mathstat/aura.html>
- Stanovsky, G., Smith, N. A., & Zettlemoyer, L. (2019). *Evaluating Gender Bias in Machine Translation*. arXiv.
- Stockl, A. (2017). *Classification of Chatbot Inputs*.
- Sutskever, I., Vinyals, O., & Le, Q. V. (2014). Sequence to Sequence Learning with Neural Networks. *ArXiv*.
- Tracey, P., Saraee, M., & Hughes, C. (2020). Applying NLP to build a cold reading chatbot. *European Conference on Natural Language Processing and Information Retrieval (ECNLP/IR) 2020*. Online.
- Turing, A. (1950). Computing Machinery and Intelligence. *MIND*.

- United Nations. (2017, June 5 - 9). Factsheet: People and Oceans. *The Ocean Conference*. New York.
- Ursache, M. (2015). *The Journey to Digital Immortality*. Retrieved from Medium: <https://medium.com/@mariusursache/the-journey-to-digital-immortality-33fcbd79949>
- Vallance, C. (2022, December 7). *ChatGPT: New AI chatbot has everyone talking to it*. Retrieved from BBC: <https://www.bbc.co.uk/news/technology-63861322>
- Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., . . . Polosukhin, I. (2017). Attention Is All You Need. *ArXiv*.
- Villaronga, E. F. (2019). "I Love You," Said the Robot: Boundaries of the Use of Emotions in Human-Robot Interactions. *Emotional Design in Human-Robot Interaction*, 93-110.
- Vlahos, J. (2017, July 18). *A Son's Race to Give His Dying Father Artificial Immortality*. Retrieved from Wired: <https://www.wired.com/story/a-sons-race-to-give-his-dying-father-artificial-immortality/>
- Vorhees, W. (2016, July 26). *CRISP-DM – a Standard Methodology to Ensure a Good Outcome*. Retrieved from Data Science Central: <https://www.datasciencecentral.com/profiles/blogs/crisp-dm-a-standard-methodology-to-ensure-a-good-outcome>
- Wakefield, J. (2016, March 24). *Microsoft chatbot is taught to swear on Twitter*. Retrieved from BBC News: <https://www.bbc.co.uk/news/technology-35890188>
- Ward, E., King, M., Lloyd, M., Bower, P., Sibbald, B., Farrelly, S., . . . Addington-Hall, J. (2000). Randomised controlled trial of non-directive counselling, cognitive-behaviour therapy, and usual general practitioner care for patients with depression. I: Clinical effectiveness. *BMJ*, 1383-1388.
- Weizenbaum, J. (1966). ELIZA—a computer program for the study of natural language communication between man and machine. *Communications of the ACM*.

White, L., Togneri, R., Liu, W., & Bennamoun, M. (2015). How Well Sentence Embeddings Capture Meaning. *Conference: the 20th Australasian Document Computing Symposium*. Crawley.

Appendix

1. Transcript from Retrieval-Based Chatbots using SOWE Thought Vectors and Manhattan Distance Metric

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my daughter
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: i'm aware of a man standing as you just just opposite me looking at me he's fairly broad set a little bit barrel chested a little broad set very straight straight shoulders he's what is that ok he's describing to me first of all he's describing to me water talking about a boat a small boat and i feel it is a small sailing boat i'm seeing a dock on the water and i'm seeing what he refers to as the as a family house i hope i'm not confusing you caller because i have no idea what i'm doing
Human: i'm confused
Bot: i'm seeing all the machines and so on and so forth
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: i'm aware of a man standing as you just just opposite me looking at me he's fairly broad set a little bit barrel chested a little broad set very straight straight shoulders he's what is that ok he's describing to me first of all he's describing to me water talking about a boat a small boat and i feel it is a small sailing boat i'm seeing a dock on the water and i'm seeing what he refers to as the as a family house i hope i'm not confusing you caller because i have no idea what i'm doing
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandmother
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
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Human: ok
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Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my mother
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
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Human: ok
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Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
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Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

2. Transcript from Retrieval-Based Chatbots using SOWE Thought Vectors and Euclidean Distance Metric

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my daughter
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: i'm aware of a man standing as you just just opposite me looking at me he's fairly broad set a little bit barrel chested a little broad set very straight straight shoulders he's what is that ok he's describing to me first of all he's describing to me water talking about a boat a small boat and i feel it is a small sailing boat i'm seeing a dock on the water and i'm seeing what he refers to as the as a family house i hope i'm not confusing you caller because i have no idea what i'm doing
Human: i'm confused
Bot: i'm seeing all the machines and so on and so forth
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me?
Bot: i'm aware of a man standing as you just just opposite me looking at me he's fairly broad set a little bit barrel chested a little broad set very straight straight shoulders he's what is that ok he's describing to me first of all he's describing to me water talking about a boat a small boat and i feel it is a small sailing boat i'm seeing a dock on the water and i'm seeing what he refers to as the as a family house i hope i'm not confusing you caller because i have no idea what i'm doing
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Human: hello
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Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
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Human: ok
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Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my mother
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
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Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

3. Transcript from Retrieval-Based Chatbots using SOWE Thought Vectors and Chebyshev Distance Metric

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my daughter
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: i'm aware of a man standing as you just just opposite me looking at me he's fairly broad set a little bit barrel chested a little broad set very straight straight shoulders he's what is that ok he's describing to me first of all he's describing to me water talking about a boat a small boat and i feel it is a small sailing boat i'm seeing a dock on the water and i'm seeing what he refers to as the as a family house i hope i'm not confusing you caller because i have no idea what i'm doing
Human: i'm confused
Bot: i'm seeing all the machines and so on and so forth
Human: ok
Bot: in that family the older male must have passed as well like the father figure there because they're telling me to acknowledge that somebody was at their wedding so somebody in that side of the family must have lost their dad before they got married
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: i'm aware of a man standing as you just just opposite me looking at me he's fairly broad set a little bit barrel chested a little broad set very straight straight shoulders he's what is that ok he's describing to me first of all he's describing to me water talking about a boat a small boat and i feel it is a small sailing boat i'm seeing a dock on the water and i'm seeing what he refers to as the as a family house i hope i'm not confusing you caller because i have no idea what i'm doing
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandmother
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
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Human: ok
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Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my mother
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: ok i don't actually see anyone at the moment i'm talking to gray eagle ph he's talking about the family i'm assuming it is your family he's talking about problems and a major split in family and i think we're going back a few years i would say i would say some kind of a dysfunctional family situation and a major split and arguments over property i think it is arguments over land and actually i feel that this there is some issue with land even as we're talking now he's talking about life being too short life being too
Human: ok
Bot: because he's claiming that he's got he's got your mom with him i'm going to say something and i hope i don't offend you with but in life your mom might have been a very difficult lady to work with because he's making me feel like she's not like she was when she was here so i think that she might have been a little stern a little difficult a little hard to deal with not as openly loving as maybe sometimes you would like or maybe she was just this way with you but i want you to know
Human: ok
Bot: you know that i also want to tell you there's either a sister that you have that you're not close to there's a connection there that i want to get closer with
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also
Human: ok
Bot: and i feel like this person i don't know if they left a son behind also

4. Transcript from Retrieval-Based Chatbots using MOWE Thought Vectors and Manhattan Distance Metric

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my daughter
Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: alexander
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: andrew
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: anthony
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: daniel
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: david
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: donald
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: james
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: john
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: joseph
Bot: no what about years ago
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: raymond
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

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Bot: how are you
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Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: robert
Bot: no what about years ago
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Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my mother
Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: alexander
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

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Bot: what's your question
Human: are there any messages for me from my son
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Human: anthony
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Human: are there any messages for me from my son
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Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: david
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: donald
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Human: what do you mean
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Human: hello
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Human: are there any messages for me from my son
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Human: are there any messages for me from my son
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Human: john
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Human: are there any messages for me from my son
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Human: joseph
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: raymond
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: richard
Bot: no what about years ago
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: robert
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
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5. Transcript from Retrieval-Based Chatbots using MOWE Thought Vectors and Euclidean Distance Metric

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my daughter
Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: alexander
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: andrew
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: anthony
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
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Human: hello
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Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: daniel
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: david
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
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Bot: what's your question
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Bot: what is his name please
Human: donald
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Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: raymond
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: richard
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: robert
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandmother
Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my mother
Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: alexander
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: andrew
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any questions for me from my son
Bot: what is his name please
Human: anthony
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: daniel
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: david
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: donald
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: james
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: john
Bot: no what about years ago
Human: what do you mean
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: joseph
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: raymond
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: richard
Bot: no what about years ago
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: robert
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
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Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

6. Transcript from Retrieval-Based Chatbots using MOWE Thought Vectors and Chebyshev Distance Metric

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my daughter
Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: alexander
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: andrew
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: anthony
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: daniel
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: david
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: donald
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: james
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: john
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
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Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: joseph
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: raymond
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: richard
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
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Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my father
Bot: what is his name please
Human: robert
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me
Bot: good was there a hospital stay with him too

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: alexander
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: andrew
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: anthony
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: daniel
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: david
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: donald
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
Human: ok
Bot: that's three in the family who was in the military also because i'm getting something about being in the military
Human: ok
Bot: no no i know that also there is a peter over there so i would ask in the family this looks like in your mother's side

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: james
Bot: no what about years ago
Human: what do you mean
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Human: ok
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: john
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
Bot: it's that connection is this on your mom's side of the family as well
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: joseph
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: raymond
Bot: i knew it was your husband contacting me i really do i also want to tell you or i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: richard
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my grandfather
Bot: what is his name please
Human: robert
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
Human: who
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Human: hello
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Human: are there any messages for me from my grandmother
Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my mother
Bot: what is his name please

Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: alexander
Bot: i knew it was your husband contacting me i really do i also want to tell you i don't know if you found something in a pocket of yours that belonged to him

Human: hello
Bot: how are you
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Human: are there any messages for me from my son
Bot: what is his name please
Human: andrew
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Human: hello
Bot: how are you
Human: i'm fine
Bot: what's your question
Human: are there any messages for me from my son
Bot: what is his name please
Human: anthony
Bot: no what about years ago
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Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
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Human: are there any messages for me from my son
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Human: donald
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Human: james
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Human: are there any messages for me from my son
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Human: john
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Bot: what is his name please
Human: joseph
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Human: raymond
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Bot: what is his name please
Human: richard
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Human: hello
Bot: how are you
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Bot: what's your question
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Bot: what is his name please
Human: robert
Bot: no what about years ago
Human: what do you mean
Bot: ok let me tell that you that there's a congratulatory message of somebody being pregnant now
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