

# A Cold Reading Chatbot for Accessible PGD Relief



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## Prolonged **G**rief **D**isorder

- Difficulty processing grief, exceeding 6 or even 12 months.
- Occurring in 10% of bereavements

# Motivation

~~Seven stages of grief~~

Four grief tasks

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.**

## Pharmacological treatment

- Effective at reducing symptoms.
- Does not target underlying cause.
- Risk of dependence.
- Interferes with functions necessary to adapt to loss.

## Psychological interventions

- Effective form of treatment.
- 10% of patients waiting over a year for treatment.
- Over 50% of patients waiting over 3 months

## Mediums

- Performers who use cold reading to infer communication with the deceased.
- Purported line of communication allows patients to resolve their grief.
- Mediums must charge a living wage for their services, rendering them inaccessible to many.
- As humans, mediums are unable to deliver readings to multiple clients at once, or at all hours of the day.

# What about chatbots?

## What are chatbots?

# Chatbots: 1966 to 2020.

From simple rules-based chatbots (e.g. ELIZA) to complex neural network architectures (e.g. GPT-3).

While the world of science fiction still often paints AI as a malevolent force, chatbots are proving to be an increasingly useful tool.

For example, it's been predicted that in 2020, 30% of web searches will have been conducted without a screen (i.e. via voice interfaces e.g. Alexa/Siri).



# Are chatbots accessible?



Accessible to the deaf by default:  
Text-based input/output.  
e.g. Facebook messenger bots



Adaptations for blindness.  
Speech-to-text software for input  
+ Screen readers for output (not always  
compatible with bot output formats).



Accessible to the blind by default.  
Voice-based input/output.  
e.g. Alexa, Siri.



Adaptations for deafness.  
Text-based companion apps (fiddlier  
than conventional usage).

# Are chatbots accessible?



Translation (e.g. Google translate).

Chatbot models are able to utilise machine translation techniques to support a wide array of languages.

# Ongoing accessibility issues in chatbots:

- Accents:

Users with strong regional accents can struggle with voice interface chatbots, particularly if the training dataset didn't include their accent.

- Spelling:

Users with dyslexia can struggle with text interface chatbots.

## Griefbots

- A chatbot specifically designed to help with grief.
- Recreating the deceased in order to resolve grief through conversation, much like with mediums.
- Two methods of creation.
  - Training on personal messaging data.
  - Recording query-response pairs prior to the deceased's passing.
- Messaging data may be non-existent, sparse, or private.
- The deceased's passing may not have been pre-empted.

## A new griefbot method

- Automating the cold reading process.
- Does not require personal messaging data.
- Does not require the deceased's death to be pre-empted.
- Does not need to charge a living wage to each patient.
- Can deliver readings simultaneously and 24/7.

## Data

- **Archive of Medium and Cold Reader Data**
  - Transcripts of readings conducted live over the phone.
  - 3908 lines of text.
  - 273 readings.
- **Cornell Movie-Dialogs Corpus**
  - Conversations extracted from movie scripts.
  - 220,579 conversational exchanges.
  - 617 movies.

- Association rule analysis
  - **AURA** dataset
  - Rules-based chatbot.
  - Document-Term matrix with binary frequency.
  - Left hand side = caller n-grams
  - Right hand side = full-length reader responses.
  - Minimum count = 2
  - Minimum confidence = 50%
  - Minimum lift = 1

# Methods

{C\_saw\_him} => {R\_i saw him }

{C\_you\_saw\_him} => {R\_i saw him }

{C\_you\_saw} => {R\_i saw him }

{C\_greatgrandmother} => {R\_yes}

{C\_seeing} => {R\_yes }

{C\_good\_evening\_sylvia} => {R\_yes }

{C\_evening\_sylvia} => {R\_yes }

- Only 7 rules (that meet minimum parameters)
- Insufficient for mediumship or even conversational ability.

- Deep learning
  - **Artificial neural networks**
    - Bio-inspired machine learning model.
    - Densely connected layers of nodes
  - **Recurrent neural networks**
    - Inputs fed into **ANN** sequentially.
    - Preserves sequential properties.
  - **Sequence-to-sequence**
    - Two **RNNs**: encoder and decoder.
    - Final state of encoder fed to initial state of decoder.
  - **Long short-term memory**
    - Memory gates preserve information, avoiding the vanishing gradient problem.

- Training
  - **Seq2seq LSTM**
  - **AURA** + Cornell: removed exchanges with utterances longer than 25 characters long.
  - Cornell: removed unique exchanges.
  - 200 epochs
  - Batch size 4

# Results

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

The chatbot exhibits conversational ability

```
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
```

The chatbot adopts the role of a medium

```
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
```

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

The chatbot can  
produce insensitive  
responses

```
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
```

The chatbot is  
sometimes  
incomprehensible

# Further work:

- Multi-turn contexts:

So far our chatbot only accounts for context included in the user's most recent utterance.

- Data scarcity:

For a deep learning model, the chatbot uses a relatively small volume of data.

# Thank you for your time.

Any questions?

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