

Designing an Empathetic Conversational Agent for Health Behaviour Change

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Motivation

- Health behaviour change is often **difficult** to put into practice and sustain
- Conversational agents could **support the change process** by inviting users to **reflect on their reasons to change** and asking them questions to help **motivate and plan** their behaviour change
- **Motivational Interviewing** can serve as a framework for this

Developing a Conversational Framework Using Generative Language Models

Testing feasibility of text generation to simulate the therapist in a Motivational Interview*

- Prompt engineering of GPT-3

Prompt:

The patient says: "I'd like to exercise more, but I'm a workaholic and have way too much stress. And then there are my eating habits."

Output:

The therapist says: "It sounds like you are sabotaging yourself when it comes to getting healthier."

The empathetic therapist says: "I hear that you wish you could exercise more and that you think stress and eating habits are obstacles to doing so. Can you tell me more about that?"

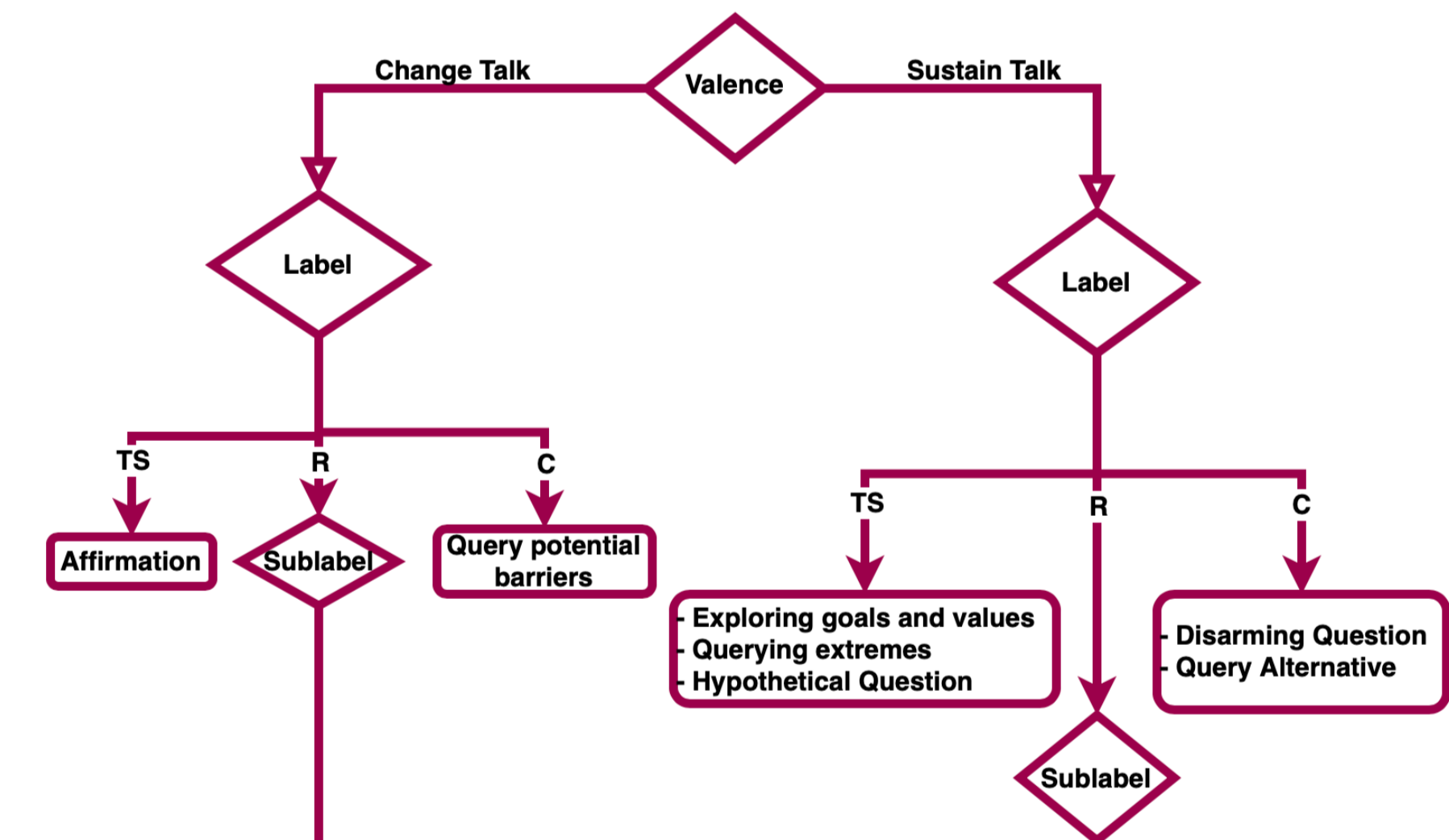
The well-meaning therapist says: "That sounds very stressful for you. Can you tell me more about what you do to relax?"

The therapist emphasizes the patient's strengths: "You are a very disciplined person and have a high work ethic. These traits can help you exercise more and eat healthier."

The therapist asks about past experiences with change: "What has prevented you from exercising more or eating healthier in the past?"

- Next: Strategic evaluation of how GPT-3 represents gender, human relationships, emotions, and actions in the context

Reacting to User Utterances



Data Collection

Annotation

- 4724 sentences collected from a German weight loss forum and annotated with **Motivational Interviewing labels**

		Change Talk +	Sustain Talk -
Label	Reason	Rationale, basis, incentive, justification, or motive	
	Sublabel	desire	Desire or will
		ability	Ability or degree of difficulty of the change
		need	Necessity or need
	Commitment	Agreement, intention, or obligation regarding future behaviour	
Taking Steps	Specific steps that have been taken in the recent past		

Keyword analysis*

TS	C	R	R _{no sublabel}	Rn	Ra	Rd	+	-
have	will	is	have	must	can	want to	do	not
eaten	try	am	was	have to	hard	would like	hope	hard
eat	tomorrow	kg	am	important	manage	hope	now	problem
was	sometime	are		need	not	I	will	unfortunately
yesterday	first	fear		take care	manage	gladly	like	find
make	today	feeling		change	difficult	like	kilos	is
started	continue	yourself		work	find	wish	kg	nothing
changed	committed	satisfied		do	it	cake	goal	believe
have	go			find	know		finally	
day	next				double			

*translated from German

Machine learning using pre-trained language models

- Finetuning German Bert in 10-Fold Cross-Validation and evaluating on test set

	Cross-Validation		Test Set		
	F1	Std	Precision	Recall	F1
Valence	73.97	2.63	70.42	73.31	70.87
Labels	74.16	3.22	79.64	74.87	76.96
Sublabels	79.49	2.69	66.20	81.89	71.53

Future Work

- Topic and domain transfer, i.e. smoking cessation, more interactional/conversational data
- Measuring **stage of behaviour change** using conversational data to be able to react accordingly
- Testing and **evaluating usability, usage and effect** of a Motivational Interviewing chatbot in practice