

10.18686/wef.v2i2.4066

# Agent-based Emotional Persuasion in the Psychological Counselling System for University Students

Jinyue Zhang <sup>a\*</sup>(Corresponding author), Jiaheng Zhang <sup>a</sup>, Wenqi Liang <sup>a</sup>, Xinyue Yang <sup>a</sup>, Qingyuan Wang <sup>a</sup>

a. School of Management, China University of Mining and Technology (Beijing), Beijing, 100083

---

**Abstract:** Chinese college students have a high demand for psychological counselling, and a survey by the National Institute of Psychology shows that college students are resistant to face-to-face psychological counselling. This paper integrates the emotion model with the emotion fading factor and emotion evaluation factor based on Agent and builds the models to give Agent the complex emotional characteristics of humans. This paper applies the agent-based emotional persuasion to the psychological counselling system and uses the emotional persuasion model to give full play to the influence of the Agent's decision-making process in the psychological counselling system.

**Keywords:** Psychological Counselling; Counselling System; Agent; Emotional Persuasion

---

## 1. Survey of psychological counselling in China and other countries

In recent years, social change and intensified competition have contributed to a significant increase in the incidence of mental illness. Even if the public's attention to the psychological gradually increased, the social mental health problems shouldn't be underestimated. According to the International Congress of Psychotherapy conservative estimates, about 190 million people in China need to receive professional psychological counselling or psychotherapy, and about 20.8% of Chinese residents suffer from varying degrees of psychological disorders, resulting in a large demand for psychotherapy services. Because of China's early lack of awareness of mental health education, the development of psychological education on the Chinese mainland has lagged significantly behind that of internationally economically developed countries, which has led to the inadequacy of psychological counselling institutions in most Chinese universities. Research by the International Union of Psychological Science has shown that there are only about three psychologists per million people in China.

## 2. Survey of current deficiencies in the counselling system and implications

China has attached great importance to the physical and mental health of college students. Most Chinese colleges and universities have psychological counselling offices, and some of the colleges and universities have developed intelligent chatbots for the students to carry out psychological counselling, but there are a lot of problems such as poor relevance, and not paying attention to the user's feelings. Compared with the traditional psychological counselling system, the Agent-based emotional persuasion has many advantages.

It can mimic human behavior more, fully consider the emotional factors and pay attention to the user's feelings. The introduction of emotional persuasion AI Agent is mainly to make use of its ability to mimic human action and human thinking to make inferences and decisions, to maximize the role of emotion in psychological counselling. Emotion, as one of the ideologies of human beings, reflects human awareness and attitude towards things, regulates human behavioral activities, and plays a rather important role in the human decision-making process.

Meiling Zhang and Hong Pan proposed that compared with human psychological counselling experts, the human-machine natural interaction and flexible reasoning ability of psychological counselling expert systems are still largely insufficient; Min Ouyang proposed that further efforts are needed for the eventual realization and wide application of psychological counselling systems; Jie Lu and Xuqiang Zhang proposed that the rapid development of human-computer interaction and AI technology provides a brand-new path for relieving psychological stress, but the degree of intelligence of the system urgently needs to be enhanced and improved; Huang proposed that in terms of psychological counselling work, independent online psychological counselling systems are still the mainstream at the current stage, with passive acceptance of visits accounting for the majority of the implementation, and insufficient active monitoring functions.

These studies all improved or refined the decision-making methods of Agent, but slighted the role of persuasion and emotion in the actual decision-making process (Calderone et al., 2017; Cao et al., 2013; Sokolova et al., 2010; Wang, 2005). The studies considered and optimized the influence of debate on Agent decision-making and simulated human behavior, but similarly neglected the influence of emotion on the decision-making process of Agent-based persuasion (Kontarinis et al., 2014; Wei et al., 2017; Zhang et al., 2011a, 2011b). These authors

mentioned chatbots with psychological counselling functions, but these bots either cannot accurately identify users' needs, or do not pay much attention to users' feelings, or the persuasion is not targeted and just makes meaningless chit-chat responses, and cannot accurately identify users' needs and give emotional psychological counselling quickly (Al-Hilli et al., 2023; Kang & Kang, 2023; Park et al., 2023). Compared with the Demircan et al. (2017), the Agent-based emotional persuasion model is more reasonable to directly give emotions to the Agent, so it will be more efficient and accurate in practical applications. Sha et al. (2021) constructed an uncertain demand scenario of a case community using an Agent modelling approach and simulated the energy consumption activities of different types of households based on a probabilistic model and demographic information (p. 2021).

The studies showed a variety of counselling software and applications in practice. Although they can solve some of the problems, it is costly in terms of popularity. At present, there is no suitable psychological counselling system for university students in China, and students' psychological problems are not solved (Chatterjee et al., 2023, pp.791-815; G. et al., 2018; Shen et al., 2009, pp.76-78; Wang et al., 2009).

### 3. Model

#### 3.1 The meaning and characteristics of the Agent

The concept of Agent originates from the field of artificial intelligence, which is often directly translated as “agent” and “intelligent agent” after it was first proposed in 1986 as “individuals in a society who resolve conflicts through negotiation or competition”, based on the needs of the times for the development of artificial intelligence and communication technology, its concept has been constantly supplemented and improved, and the Agent technology has been rapidly developed in practical applications.

##### Autonomy.

The autonomy of the Agent is that the Agent can subjectively adjust its state and behavior without direct human intervention. Through its performance perception of external communication to produce perception results, and based on this perception and internal state changes to autonomously decide and control their behavior.

##### Purposefulness.

Agent is goal-oriented, it serves the purpose and requirements of the designer or customer and shows the orientation to the goal in the process of autonomous operation. It is driven by the task to analyze and dismantle it and can eliminate interfering items to solve the target step by step to complete the intended task.

#### 3.2 Segmentation of decision processes for agent-based emotional persuasion

According to the above characteristics of Agent, to facilitate the application of the decision-making process of Agent-based emotional persuasion to the psychological counselling system for analysis and modelling, the decision-making process of Agent-based emotional persuasion can be split into four stages as shown in Figure 1.

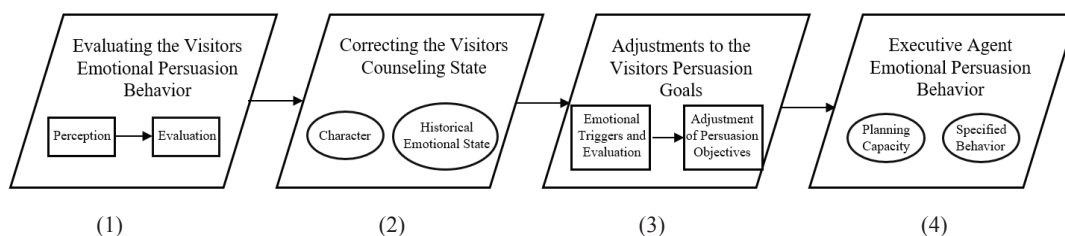


Figure 1: Counselling state correction model

After evaluating the emotional persuasion session, the Agent analyses the evaluation data and updates its own knowledge and internal state of emotional persuasion. The Agent will autonomously update the knowledge of emotional persuasion according to the existing knowledge base, such as the relevant experience of psychological counselling, the analysis of the character of different people and other knowledge, to better serve psychological counselling.

#### 3.3 The model for evaluating the emotional persuasion behavior of visitors

The model uses the multi-attribute expected utility theory and quantifies the visitor's emotional evaluation according to the Agent's actual persuasion situation as follows:  $E_x = \sum_{i=1}^n \phi_i \rho_i$ , and  $\sum_{i=1}^n \phi_i = 1$ .

where  $\phi_i$  represents the weight attributed to a certain affective state attribute  $i$ . This variable is used to capture the quantitative criticality of that affective state attribute and  $\rho_i$  is expressed as the assessed value of the benefit of the attribute  $i$ . The calculation of  $\rho_i$  can be represented as (1):

$$\rho_i = \begin{cases} \frac{U_i - \text{MIN}_i}{\text{MAX}_i - \text{MIN}_i} & \text{Benefit-type attributes} \\ \frac{\text{MIN}_i - U_i}{\text{MAX}_i - \text{MIN}_i} & \text{Cost-type attributes} \end{cases} \quad .\text{MIN}_i \leq U_i \leq \text{MAX}_i \quad (1)$$

$U_i(\Omega)$  denotes the value of attribute  $i$  (in  $\Omega$ ) perceived by the Agent,  $\text{MIN}_i$  denotes the minimum value of attribute  $i$ , and  $\text{MAX}_i$  denotes the maximum value of attribute  $i$ . There are two types of attributes perceived by the Agent, namely, cost-type and benefit-type:  $i$  is a cost-type attribute when the value of  $\rho_i$  is in a negative correlation with the value of  $U_i$ , and  $i$  is a benefit-type attribute when the value of  $\rho_i$  is in a positive correlation with the value of  $U_i$ .

## 4. The application of modelling in a counselling system for university students

### 4.1 Overview of the psychological system

Agent-based emotional persuasion is to add and apply emotional blocks to existing persuasion models. By learning social emotion, the Agent is more inclined to human thinking mode and emotional expression in the process of analyzing human problems and making decisions, and it reflects the unity of sensibility and rationality in the process of communication and decision-making, and makes the result of persuasion more resonant and easier to understand. Agent-based psychological counselling system for college students is a more intelligent computer system built on the background of traditional psychological counselling systems by using the emotional persuasion function of the Agent.

### 4.2 Working of agent-based emotional persuasion models

From above, we have added four models to the Psychological Counselling Scheme Management Agent: The evaluation model of emotional persuasion behavior, the correction model of psychological counselling status, the adjustment model of emotional persuasion goal and the executive model of emotional persuasion behavior. The Psychological Counselling Scheme Management Agent records, stores and displays the psychological problems and psychological intervention methods through pictures or words, to enable visitors to log into the system in a non-consulting state to browse the psychological information.

## 5. Conclusion

This study incorporates the emotional model with emotional fade factor and emotional evaluation factor based on Agent, and the emotional persuasion decision-making model of Agent achieved according to the mapping relationship between emotion and persuasion goal, which endows Agent with complex emotional characteristics of human beings so that the decision-making process of Agent joins the perceptual decision-making. By evaluating the visitor's emotional persuasion behavior, the psychological counselling state is corrected in time. According to the actual situation of the visitor persuasion goal adjustment and the implementation of emotional persuasion behavior.

## References

- [1] Huang, J., Zhu, M., Chen, Y., & Jing, M., A comparative study of the current situation of mental health education for college students at home and abroad. *China Forestry Education*, 1999, 30-32.
- [2] Wang, M., & Jia, X., Application and development of artificial intelligence in counseling and therapy. *Psychology Monthly*, 2023, 18, 227-230.
- [3] Min, P.Y. and Seog, C., Developing an university adjustment test and profile for online system: Focusing on 's' university. *The Journal of Humanities and Social science*, 2021, 12, 1767-1782.

**Acknowledgements:** We thank China University of Mining and Technology (Beijing) for supporting the project.