Consideration on Mental Therapy Using Computers

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Abstract: This paper focuses on methods of mental therapy using computers, in particular, those by software counseling systems with artificial intelligence. We discuss validity of these methods by reconsidering the basis of psychotherapy.

. Introduction

In recent years, interactive systems of computers have a high capacity and they encourage psychotherapy using computers. On the other hand, our daily communication is based on our bodies. Thus, it should sufficiently been discussed whether computational systems lacking bodies can straightforwardly be applied to mental therapy.

This paper focuses on software counseling systems with artificial intelligence as substitution of human counselors, and discusses their validity from methodological perspectives of psychotherapy.

. Viewpoints of Clinical Psychology

In this section, we introduce a methodological basis of clinical psychology for our consideration of software counseling systems.

Clinical psychology is one of disciplines to study basic theories of psychology, which was produced by need of medical training for psychologists and psychological training for doctors [1]. Moreover, it aims at solving problems occurring in human bodies based on psychological knowledge and techniques. It includes observation, diagnosis, indication, research on psychotherapy, interpretation, and psychopathology for mental depths in individuals, as well as those in groups.

Clinical psychology consists of psychological diagnosis and psychotherapy. Psychological diagnosis is to explore problems which clients may have by using interviews and psychological tests such as Rorschach tests. Psychotherapy is a concrete technique to assist clients. Therefore, clinical psychology is a practice of a specific diagnosis and a treatment [2]. Counseling mainly aims at improvement of clients' capacity to solve their problems. Paradigms in counseling are as follows [1][2]:

1. Two persons are in psychological contact.

2. A person, called a client, is in an incongruent, vulnerable, or anxious state.

3. Another person, called a therapist, is congruent or integrated in relationship between them.

4. The therapist experiences unconditionally positive consideration for the client.

5. The therapist experiences empathic understanding of the client's internal frame of reference and endeavors to communicate this experience to the client.

6. The therapist's empathic understanding and unconditional positive consideration is communicated to the client to a minimal degree.

. Software Counseling Systems

Next, we introduce and consider software counseling systems which were developed from two viewpoints of counseling.

A. Systems by Client-Centered Approaches

There are some programs which simulate a dialog between a Rogerian psychotherapist and a client. ELIZA which Weizenbaum in MIT developed in 1966 is the first one of these systems by using natural language processing systems. The mechanism of the program of ELIZA is as follows [3][4].

1. Identification of the most important key word in input messages,

2. Discovery of minimal contexts where the identified keyword appears,

3. Selection and execution of appropriate transformation rules,

4. Generation of responses in the absence of key words, and provision of an editing capability for ELIZA "scripts"

O'Dell and Dickson [5] reported that in their experiment on ELIZA the subjects gradually became to feel intimacy for ELIZA while questioning for it by using interrogatives. In other words, a trend that humans regard interactive computer programs as if they have their own minds, called ELIZA effects [3], was observed.

B. Systems by cognitive-behavioral approach

In 1970's, cognitive-behavioral approach was accepted scratchily and became one of the mainstreams in psychotherapy. Its important characteristics in mental therapy are solving concrete problems in short terms, and emphasis of clients' cognition and thinking process. It gives clients systematic instructions to modify their unsuitable thinking patterns into adaptive ones so that they can manage their behaviors by themselves. Thus, this approach has the following advantages:

1. Since clients can determine some factors such as frequency, date and time that counseling should be done, by themselves, clients have their responsibility to treatment for them and can have a stronger sense that they are controlling treatment by themselves.

2. Cost per a client can be reduced.

3. Processes in counseling can be exactly reproduced.

The third advantage mentioned above leads to a characteristic that counseling methods based on cognitive-behavioral approach are easier to be formalized as rules executable in computers   that is expert systems for psychotherapy can be realized more easily than those based on client-centered approach

Several systems were proposed and the literatures [3-6] introduce some representative systems as follows:

- PLATO DCS (PLATO Dilemma Counseling System):

    This system was developed in 1970's by Wagman in Illinois University. It is a simple interactive counseling method to solve dilemma based on a cognitive counseling paradigm.

    Wagman and Kerber conuted an experiment to confirm an effect of the system at Illinois university, and as a result they showed that the subjects who used the system were less annoyed about their problems than those in the controlled group   Wagman reported that most subjects positively evaluated the system and their personal problems were solved by the system.

- MORTON

    It is a system developed in 1980's by Selmi and uses Beck's cognitive therapy. It aims at treatment of depression and has questionnaire items with selection of answers to be used in counseling.

    A clinical effect of MORTON was verified as follows. At first, subjects with depression were selected through screening based on Hamilton's rating scale for depression, and they were divided into three groups: the group in which nothing, was done, that in which cognitive-behavioral counseling with MORTON, was done and that in which cognitive-behavioral counseling with human therapists was done. As a result, the subjects in the two groups in which counseling was done were improved and there was not a large difference on the results of improvement between these two groups

    Their study showed that software counseling had a treatment effect same as counseling that a human did. However, they provided a careful opinion for practical use of MORTON based on the fact that the subjects had high educational backgrounds and studies on computer counseling had been insufficient.

- Overcoming Depression

    It is a cognitive behavioral therapy system for depression treatment proposed by Colby. A verification experiment reported a result that the subjects who received cognitive-behavioral counseling showed more improvement than those who received counseling using this system and those who received non cognitive-behavioral counseling.

- Therapeutic Learning Program (TLP)

    It is a system for people suffering from a stress production problem in their lives of personal relationships, proposed by Colby. The experiment by Dorezal-Wood showed the result on treatment effects similar to human counselors.

- The program of rational-emotive behavioral therapy:

    It is a system to modify using client's irrational

beliefs into rational ones based on questionnaire items of Japanese Irrational Belief Test developed by Fukui.

. Critical Consideration of Software Counseling Systems

Here, a question, "can software counseling systems be therapists?" can be discussed. We critically consider this problem from methodological perspectives of clinical psychology.

A. A Problem on Judgment of Timing

It is considered to be valid in all methods of psychotherapy that important is timing in treatment. It means that it is necessary to execute appropriate treatment in appropriate time in psychotherapy. In other words, timing in psychotherapy is a key determining whether the treatment succeeds or not.

However, it is just therapists that judge timing. Therapists individually judge it and take appropriate correspondence for clients. This individual judgment needs the therapists' insight to see through conditions in which the clients stay. This judgment is dependent on perspectives of the therapists on the clients and changed by the therapists' methods and experiences in psychotherapy. Thus, even if a client has the symptom same as another client, it may not be guaranteed that a treatment method effective for the latter is also effective for the former. This judgment of timing in psychotherapy is hard to be executed by computers.

B. Problems on Rapport

The paradigm of clinical psychology mentioned in section implies that construction of a well relation between a therapist and client needs sympathy, warmth, and beliefs of them. However, computer programs do not have these factors necessary for therapy.

This problem leads us to a concept of "Rapport ". Rapport is a state of relations that persons feel friendly and can confidentially talk with each other. It is necessary between clients and therapists in psychotherapy and can exist on confidential relationships between them. Mutual confidence in persons requires their mutual understanding. Understanding in humans is based on their personal experiences and subjectivity. It has sufficiently not been clarified what kind of process understanding is in humans. Therefore, the process of understanding cannot be formally defined, and understanding in computers is just to look as if they understand.

Moreover, in processes of understanding, humans can omit unnecessary information through accumulation of discovery. This omission of unnecessary information is hard for computers.

C. Problems on Language Processing

There is another problem that computer programs have just a poor degree of freedom in communication with users. In general, human communication is based on pragmatic analysis for sentences, which deals with "indirect" or "deep" meanings of sentences, in contrast with semantic analysis which deals with "direct" or "surface" meaning. Semantic analysis for sentences clarifies meanings of sentences by using results of structural analysis for the sentences. On the other hand, pragmatic analysis for sentences clarifies what messages the sentences communicate based on contexts and situations where the sentences are put. Although semantic analysis can be executed by computer programs, pragmatic analysis is hard to be executed by them, even by humans in some cases.

Moreover, human communication is generally done at several levels. Several levels mean linguistic contexts and communication based on non-linguistic contexts. By using both linguistic and non-linguistic contexts, we can send our intention in information and communication to the others, as senders of information. On the other hand, by extracting the others' intention and considering current situations in communication, we can give replies suitable for the others' utterances and behaviors, as receivers of information. These processes can be executed by understanding not only linguistic contexts but also contents in non-linguistic contexts, which is realized by accumulation of learning and experiences. In other words, natural language processing in processes of communication requires not only surface processing but also understanding meanings contained in the background, according to the situations. This processing cannot be dealt with in some cases even by humans. If this process is executed by computers, much knowledge of humans' social behaviors and mental states are necessary. However, it has sufficiently not clarified how this knowledge should appropriately be used.

Moreover, daily life conversation between humans includes irregularity not following grammar. In other words, it has rich unexpectedness, which means that it is not predictive what utterances appear. If computers realize this unexpectedness, a wide range of

exception handling must be performed. In addition, some preparations are necessary to prevent computers from executing inappropriate replies for humans' unexpected behaviors. This type of processing is the most important in psychotherapy and difficult for computers.

According to the above problems A-C, we can summarize that it is difficult for computer to build confidential relationships with humans, and as a result, psychotherapy by computers, more concretely, substitution of human therapists for computers is difficult at present.

. Conclusions

This paper critically considered software counseling systems using artificial intelligence as substitution of human counselors in psychotherapy.

In this research subject, there are some future problems to be considered:

1. Research about safety and effects must be done through clinical tests with many subjects, and must be considered personal traits such as ages and gender.

2. These methods are considered to be useful as an entrance of counseling or supplementary tools for human counselors. However, it is important that they should be used after clinicians, therapists, and clients understand their merits and demerits.

3. Public qualification on persons who manage and operate software systems, and rules on management should be clarified.

Finally, we should investigate existence of markets related to software counseling techniques and trends of demand in these markets, and then introduce results of this investigation to our consideration. Moreover, sociological research results on social and cultural tendencies affecting these markets should also be introduced in the future research.

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