

Comparative Analysis on the Effect of Illumination Color in Clinical Environment of Preventive Care

Tsuyoshi Moriyama, Akihiro Hasegawa *, Shun Nakamura **, Naoshi Ogawa **, Ting Tao **, Tadaaki Kizu *, and Hiroshi Sasaki *****

Tokyo Polytechnic Univ., 1583 Iiyama, Atsugi, Kanagawa 243-0297, Japan

* Toyo Eiwa University, 5-14-40 Roppongi, Minato-ku, Tokyo 106-0032, Japan

** Corlab Inc., 2-24-16 Nakacho, Koganei, Tokyo 184-8588, Japan

*** KIZU Chiropractic, 3-8-6 Nihonbashi, Chuo-ku, Tokyo 103-0027, Japan

ABSTRACT

The preventive care which we call in this work specifies therapeutic counselling sessions for maintaining human health from the mental aspect, which often takes place online over the Internet under today's circumstances with COVID-19. Increasing occasions of telecommunication require not only devices that provide immersive environment but also knowledge of how to use them for realizing such conversation that brings good therapy. Although conventional film theory helps people being aware of changing their nonverbal messages by the position of their faces in the terminal window, the angle of camera to their faces, the background music, which background color of the speaker affects how is left unknown. This paper introduces the clinical dohsa therapy as one of the authorized counselling methods in psychology together with anatomical interpretation for investigating the efficacy of counselling over the Internet, and show an experimental result of color effects during therapeutic conversation.

1. INTRODUCTION

The clinical dohsa therapy is known as one of psychological therapeutic methods that exploits body motion[1]. The therapist uses verbal interaction with the client that makes him/her focus on the physical state of his/her own body and helps them improve the motion that simultaneously expects to strengthen their sense of self-existence, self-affirmation, and stableness. The whole process implements conceptual manipulation of body motions that usually use onomatopoeia very often and it is also conducted in person. Although the efficacy of the clinical dohsa therapy has already been established, its execution over the Internet is quite new and experimental.

On the other hand, not limited to the clinical dohsa therapy, therapy over the Internet, generally speaking, contains new factors because the attendees use camera and microphone that physically truncate the real world that is supposed to affect the quality of therapy. Many experimental facts have been piled up and summarized in the film theory over a hundred year, that gives the formula of what camera works bring what effects on the content displayed on the screen (e.g., an image of a person taken from low angle gives the impression of the person being strong). But rules for color effects are not seen in film theory, yet. No scientific explanation on what background

color a counsellor should use in online therapy when he or she make a patient relaxed or tell a personal confession.

This presentation first introduces the clinical dohsa therapy with the anatomical interpretation and shows an experimental result that demonstrates its efficacy when conducted over the Internet. Secondly, another experimental results with respect to the effect of color used in online therapy are shown where the background color of a therapist varies.

2. CLINICAL DOHSA THERAPY

The clinical dohsa therapy divide the process of human motion into three steps, *i.e.*, intention to make a specific motion, effort to move the particular body part, and the motion produced as the result. The method was originally applied to cerebral palsy but now widely used for many applications such as mental illness (autism, anxiety disorder, and depression), health support (stiff shoulder), and even development of potential abilities of athletes.

2.1 Motion task

We picked the "shoulder-raising" task in this experiment. While a client raises his/her shoulder (only right, only left, and both in order) slowly, the guide has him/her experience both the sense of relaxation and that of self-control. The guide may touch the client's body when conducted in person for checking if he/she tightens appropriate muscle with appropriate power (it is not possible when online).

2.2 Anatomy of shoulder raising motion

Shoulder raising motion consists of 1) outer rotation of *clavicle* (*sa-kotsu*) at the *sternoclavicular* joint, 2) inner rotation of *scapula* (*kenko-kotsu*) at the *acromioclavicular* joint, and 3) inner rotation of *humerus* (*jowan-kotsu*) at the shoulder *brachial* joint. Also, the upper *trapezius* muscle (*sobo-kin*) and the *levator scapula* (*kenko-kyokin*) work together for raising shoulders.

Clients who have the head bending to the same side of the shoulder and the chest bending to the opposite direction (coupling motion of shoulder raising motion) can make the motion smoothly without any pain.

2.3 Experimental results of clinical dohsa therapy

OpenPose detects twenty-five key points trained on human body including those on neck, shoulders, and waist[2]. Eq.(1) calculates the angles of left (x_2, y_2) and right (x_1, y_1) shoulders from the origin of the neck point (x_0, y_0) (positive when shoulders are raised).

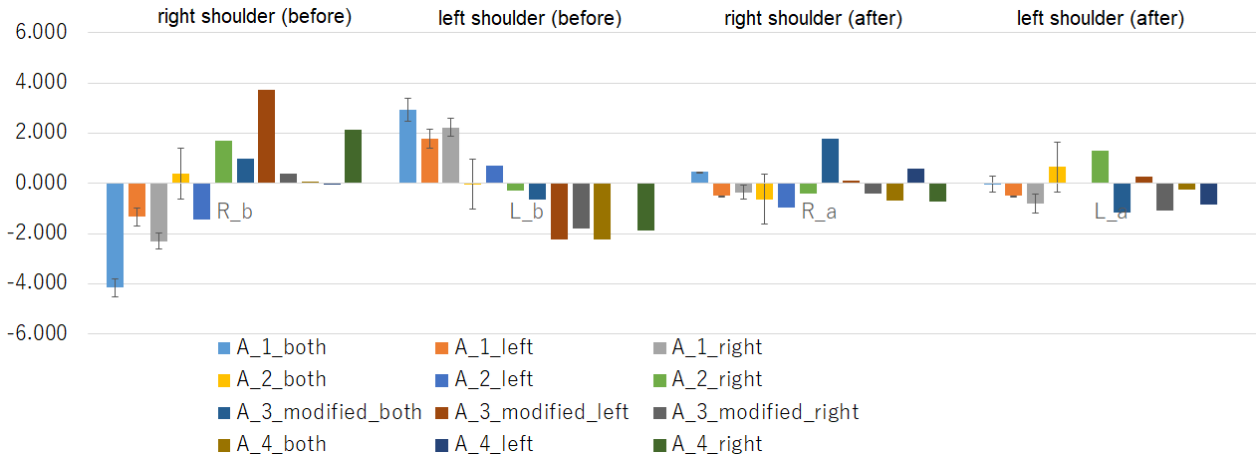


Fig. 1 Mean angles before and after clinical dohsa therapy, where “A” means subject #, “1-4” session (day) #, “both” both shoulders, “left” left shoulder, and “right” right shoulder.

$$\theta_L = \tan^{-1} \frac{y_0 - y_2}{|x_2 - x_0|}, \quad \theta_R = \tan^{-1} \frac{y_0 - y_1}{|x_1 - x_0|} \quad (1)$$

Three female subjects (A, B, and C) attended the clinical dohsa therapy for separate four days and the results for the subject A are shown in Fig. 1. She had her right shoulder low and her left shoulder high before the therapy of the first day but they came to mostly horizontal afterward. Also, the horizontal balance between both shoulders continued later as well. Although individual differences are seen, the feasibility of the clinical dohsa therapy over the Internet has been demonstrated at a certain level.

3. COLOR IN ONLINE THERAPY

To clarify what color affect what in the context of therapeutic conversation, here changed the background color of the therapist during conversation and measured the amount and kind of body motions and the facial expressions of the subjects. Head motions are known to be larger when people are relaxed[3].

3.1 Experimental settings

The subjects were asked to prepare some bad news from past a week or so beforehand and to share them with the therapist during the online conversation. Each session takes twenty minutes and the subjects were asked to answer a questionnaire that asks the impression of background color and the quality of conversation.

3.2 Results

The limited number of subjects were suffered from a

variety of personalities of the subjects, yet the variety of head motions and facial expressions indicated a trend.

4. DISCUSSION AND CONCLUSION

The importance of maintaining the quality of human communication has become much stronger under the circumstances with COVID-19. Conversation even among friends has the function of a kind of therapy and maximizing its efficacy is a big issue worldwide. This research firstly demonstrated the efficacy of a conventional therapeutic method of the clinical dohsa therapy using a teleconference system, and secondly conducted an experiment that clarified the effect of the background color of a therapist. The preliminary results assured the necessity of further investigation.

5. REFERENCES

- [1] H. Fujino, "Subjective experience of Dohsa-hou relaxation: a qualitative study," *Asia Pacific Journal of Counselling and Psychotherapy*, 4(1):66-75, (2013).
- [2] Z. Cao, et al., "OpenPose: realtime multi-person 2D pose estimation using Part Affinity Fields," *arXiv preprint arXiv:1812.08008* (2018).
- [3] T. Moriyama, A. Yoto, H. Yokogoshi, "Multimodal Evaluation of Stress Level Affected by Beverage Intakes," *International Journal of Affective Engineering*, 12(2):656-664, (2013).

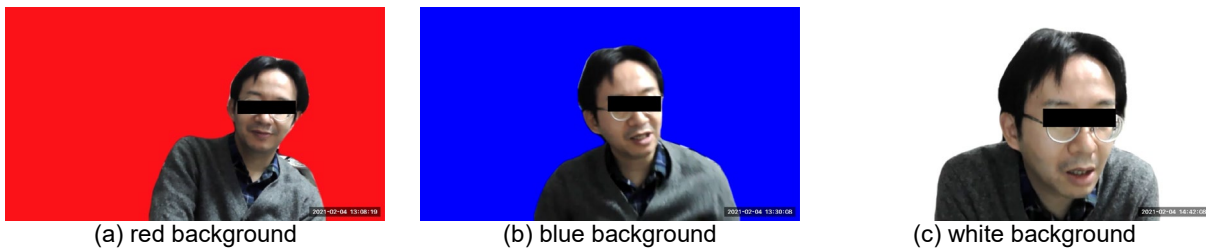


Fig. 2 A guide with colored background in online therapy.