Mediterranean Journal of Clinical Psychology MJCP
Doi:10.6092/2282-1619/2014.2.974

ISSN: 2282-1619

VOL II N.2 (2014)

RELATION OF CHAOS EQUATION TO THE SCHEDULE FOR THE EVALUATION OF INDIVIDUAL QUALITY OF LIFE-DIRECT WEIGHTING METHOD

YANAGISAWAHIDEAKI[1]

[1] *Kounosu Public Health Center. Address: 4-5-10 Higashi, Kounosu, Saitama, Japan 360-0031*

Email Corresponding author: science2001007@ybb.ne.jp, Telephone: +81485410249, Fax: +81485415020

Abstract:
The SEIQoL-DW (Schedule for the Evaluation of Individual Quality of Life-Direct Weighting) method may be misused because of lack of confirmation by scientific theory. It is compared with the representative chaos equation.

$$Y(n+1) = p[1 - Y(n)]\,Y(n)$$

The Z (m) axis is perpendicular to the "p" and Y (n) axes.

$$Z(m+1) = p[1 - Z(m)]\,Z(m)$$

From both equations, a three dimensional logistic map is imagined.

$$[Y(n+1) / Z(m+1)] = [1 - Y(n)]\,Y(n) / [1 - Z(m)]\,Z(m)$$

According to "p" that changes from 3.0 to 4.0, the numbers of answers in this equation change to 1, 4, 16, localized chaotic state, and proliferated chaotic state.
Cue (area), level and weight of the SEIQoL-DW are compared with each group in the localized chaotic state. The erased "p" is considered as a personal ability. Misuse can be avoided provided that the user understands the relation of chaos theory to the SEIQoL-DW.

Keywords: SEIQoL-DW, Psychotherapy, Misuse, Chaos, Covariation

INTRODUCTION

The SEIQoL-DW (Schedule for the Evaluation of Individual Quality of Life-Direct Weighting) method (O'Boyle, McGee, Hickey, O'Malley, & Joyce, 1992) is used in nursing care of nerve intractable diseases. However, psychotherapy may be misused because of lack of confirmation by scientific theory. Therefore, this is report to compare the SEIQoL-DW method with the chaos equation. Misuse can be avoided provided that the user understands the relation of chaos theory to the SEIQoL-DW method.

METHODS

Explanation of the Chaos Theory

Definition of chaos theory

According to Stanford Encyclopedia of Philosophy, "chaos theory" is defined as "the smallest of changes in a system can result in very large differences in that system's behavior." The mathematical phenomenon of chaos is studied in sciences as diverse as astronomy, meteorology, population biology, economics and social psychology. While there are few (if any) causal mechanisms such diverse disciplines have in common, the phenomenological behavior of chaos - e.g., sensitivity to the tiniest changes in initial conditions or seemingly random and unpredictable behavior that nevertheless follows precise rules - appears in many of the models in these disciplines (Stanford Encyclopedia of Philosophy, 2008).

In this regard, it is important that such a chaotic state is not confused with the term "random." In mathematical terms, "random" means the "statistics governed by or involving equal chances for each item" (New Oxford American Dictionary).

On the other hand, Stephen Kellert defined chaos theory as the "qualitative study of unstable a periodic behavior in deterministic nonlinear

dynamical systems" (Kellert, 1993, p. 2). During the 1960s, meteorologist Edward Norton Lorenz noticed that when he calculated his weather model using differential equations on a computer, minute initial conditions eventually led to significant changes in weather conditions (Valle, 2000).

Thus, a basic feature of chaos theory is the high sensitivity to initial conditions in which "chaotic state" never means the "statistics governed by or involving equal chances."

Relationship of continuous covariation to chaos theory

A

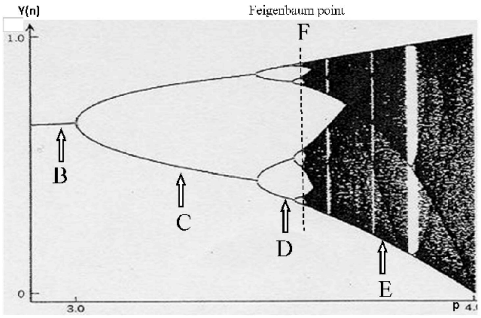

Figure 1: Logistic map of Equation 1

representative chaos equation is given as follows:

$$Y(n+1) = p[1 - Y(n)]Y(n) \qquad (1)$$

A logistic map of Equation 1, as described by Kohda (1990) is shown in Figure 1.

The vertical axis is Y (n). And the horizontal axis is "p." According "p" that changes from 3.0 to 3.56995 (Feigenbaum **(**1978**)** point), the numbers of fixed points in Equation 1 change to 1 (Part B), 2 (Part C) and 4 (Part D). When "p" is less than the Feigenbaum point, the answer (or Y (n)) converges. When "p" is greater than the Feigenbaum point, the answers change to the localized (Part F) and proliferated (Part E) chaotic states. The answer does not converge in the chaotic state. From Equation 1, the Z (m) axis is perpendicular to the "p" and Y (n) axes. In addition to Equation 1, the following chaos equation is assumed:

$$Z(m+1) = p[1 - Z(m)]Z(m) \qquad (2)$$

From Equations 1 and 2, a three dimensional logistic map is imagined. An equation for a plane including the Y (n) and Z (m) axes is as follows:

$$\frac{Y(n+1)}{Z(m+1)} = \frac{[1 - Y(n)]Y(n)}{[1 - Z(m)]Z(m)} \qquad (3)$$

"p" is erased in Equation 3. According to "p" that changes from 3.0 to 4.0, the numbers of answers in Equation 3 change to 1, 4, 16, localized chaotic state, and proliferated chaotic state. The processes from the chaotic state to the fixed state are equivalent to the methods of organizing thoughts. The information collected at random is unified to one thought by these processes. As one of its procedures, the SEIQoL-DW method is compared with Equation 3. A relationship between the proliferated chaotic state of Equation 3 and "p" of Equation 1 is shown in Figure 2. The empty circles on the left-hand pane are all correct answers and are shown with no organization of thoughts.

The

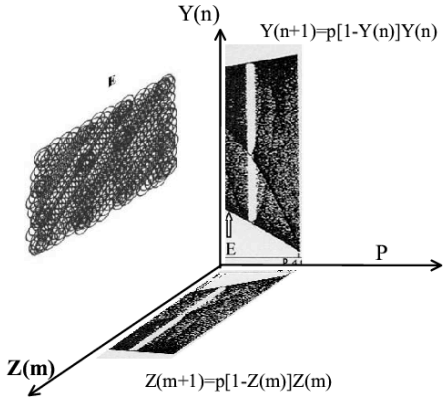

Figure 2 Relationship between the proliferated chaotic state of Equation 3 and "p" of Equation 1

relationship between the localized chaotic state (Feigenbaum point neighborhood) of Equation 3 and "p" of Equation 1 is shown in Figure 3.

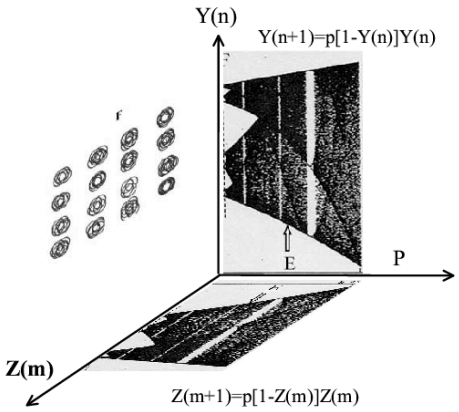

Figure 3: Relationship between the localized chaotic state of Equation 3 and "p" of Equation 1

Relationship of SEIQoL-DW method to chaos equation

The state on the left-hand pane of Figure 3 is more localized than that of Figure 2, and each localized chaotic group in Figure 3 is compared with the SEIQoL-DW method. According to the Y (n) and Z (m) values, each group is designated to D-4 from A-1 in Figure 4 and comprised a quantity of both Y (n) and Z (m). For example, each quantity of Y (n) and Z (m) in A-1 is Y and Z, respectively. The quantities of Y (n) and Z (m) are different in each group.

Cue, level and weight according to the SEIQoL-DW method (O'Boyle et al., 1992) are compared in Figure 4.

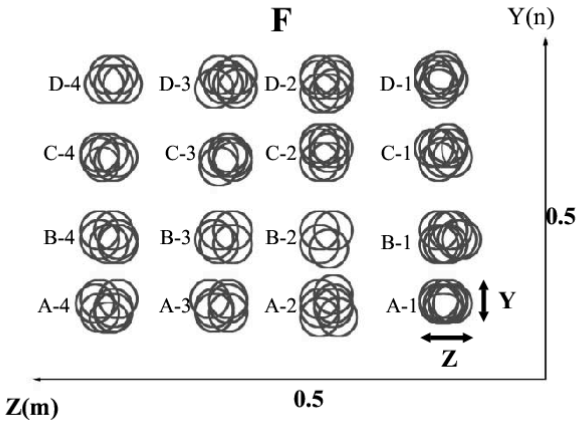

Figure 4: According to the quantities of Y (n) and Z (m), each partial chaotic group is designated A-1 to D-4

Cue is explained as health, family, social activities, finances and spirituality. These all have the same meaning as each localized chaotic group in Figure 4. Labels of cue are each named from A-1 to D-4. Each level and weight is Y and Z, respectively, in Figure 4. Between Y and Z, one is level while the other is weight. Multiplication of level by weight is equivalent to multiplication of Y by Z. Each area of localized chaotic groups is shown as multiplication of Y by Z.

RESULTS

The process evaluating QoL by the SEIQoL-DW method can be explained by referring to Figure 4. Because the SEIQoL-DW method is equivalent to each state of Equation 3, it is equivalent to each state of Equation 1. "p" of Equations 1 and 2 is erased in Equation 3. A direction rearranging the thought is decided by changing "p" value.

DISCUSSION

Many types of psychotherapy (the KJ (Kawakida Jiro) method, mind maps, counseling, etc.) are utilized to organize thoughts. "Comparison of Public Health Nurse's action to chaos equation" was reported by Yanagisawa (2010). Community diagnosis is equivalent to the application of the KJ method to community. The SEIQoL-DW method is equivalent to using the KJ method with regard to the consciousness of the patient. In the KJ method, much information with the proliferated chaotic state is organized to some localized chaotic state. They are named with some titles, finally. The subject's thoughts are organized by the SEIQoL-DW method alike. It was proved in this report that the SEIQoL-DW method is explained by chaos theory.

Of course, it means that a law of the SEIQoL-DW method is explained as the character of some variables in the chaos equation. The process of the SEIQoL-DW method is explained by Equation 1, although visually it can be confirmed only by Equation 3. Therefore, the erased "p" of Equations 1 and 2 must be reconsidered when the SEIQoL-DW method is used.

A necessary condition of chaos phenomena is continuous covariation (Yanagisawa, 2012). In many chaos equations, there is a variable such as "p" of Equation 1 changing the state beyond a Feigenbaum point. "n" related to continuous covariation does not change the state beyond Feigenbaum point. However, the "p" deciding two different states beyond Feigenbaum point is meaningless with no "n." Each "p" and "n" of Equation 1 is equivalent to the thought and time. Therefore, mistake is made by two factors.

One is a personal ability, i.e., the ability to select cue, such as changing "p" of Equation 1. In Figure 1, a state with greater "p" on the Feigenbaum point is a chaotic state and that with lesser "p" on the Feigenbaum point is a fixed state. A direction organizing the thought is decided by changing "p" of Equation 1. Misuse is expected following erasure of "p" in Equation 3. If an incorrect cue is selected, a client will become more confused. For example, the client may be induced to a new dependence excepting modern medicine. The user with an absolute or conclusive thought will induce the client to achieve his fixed result. Because the confused client depends on someone, the user of the methods to rearrange thoughts can easily induce the client. Therefore, the user's thought must not be fixed. When the value of the Y (n) does not change with changing "n" in fixed point such, stopping time is possible. It is not a chaos phenomenon. For improvement of the client's

QoL, the user must understand not only the fixed state but also the chaotic state. The thought changing "p" of Equation 1 can be attained only with repeated rearrangement of personal experience.

The other is an existence of time such as "n" of Equation 1. Human can confirm the environment by much information. They are equivalent to many calculations such as "n" of Equation 1. Many calculations are equal to his experiences or time. Stopping time is equal to ignoring "n." It destroys a meaning as a chaos equation in Equation 1. "p" and "n" of Equation 1 are not required when time being equivalent to many calculations is stopped. A fixed answer is made with no continuous covariation. Therefore, the user with only the fixed thought cannot make a chaos relation to the client.

It is very important that the user understand a direction to fixed point from chaotic state in the client. It is not the user's fixed point. It is a mistake that all phenomena are considered as fixed state. Misuse can be avoided provided that the user understands the relation of chaos theory to the SEIQoL-DW method.

CONCLUSIONS

The SEIQoL-DW method can be explained by a chaos equation. The correct use of the SEIQoL-DW method is entrusted to a personal ability. If a change in the "p" value (e.g., Equation (1) is not considered, the client may be induced to a new dependence excepting modern medicine. Misuse can be avoided provided that the user understands the relation of chaos theory to the SEIQoL-DW method.

REFERENCES

Feigenbaum, M. J. (1978). Quantitative universality for a class of nonlinear transformations. *Journal of Statistical Physics,* 19(1), 25-52.

Kellert, H. S. (1993). *In the Wake of Chaos: Unpredictable Order in Dynamical System*(pp.2). Chicago: Chicago University Press

Kohda, N. (1990). *Chaos - Bases and Applications of Chaos Theory*. Aihara K. (Ed).(pp.4). Tokyo: Saiensu-sha Co. (in Japanese)

O'Boyle, C.A., McGee, H.M., Hickey, A.M., O'Malley, K., & Joyce, C.R.B. (1992). Individual quality of life in patients undergoing hip replacement. *Lancet*, 339, 1088-1091.

Stanford Encyclopedia of Philosophy (2008). *Chaos*. Retrieved March 9, 2014, from http://plato.stanford.edu/entries/chaos/

Valle, V. (2000). *Chaos, Complexity and Deterrence*. Retrieved March 9, 2014, from http://www.au.af.mil/au/awc/awcgate/ndu/valle.pdf

Yanagisawa, H. (2010). Comparison of Public Health Nurse's action to chaos equation (community diagnosis = using the KJ method to community). *Japanese Journal of Community Health Care*, 42(11), 56-63. (in Japanese)

Yanagisawa, H. (2012). Relation of the chaos equation to God Perceived by Pascal, Nietzsche and Nightingale. *Scientific GOD Journal*, 3(2), 207-212.

Paper presented: Apr 2014; Published online: Sept, 2014

Mediterranean Journal of Clinical Psychology, Vol. II, No. 2 (2014).
Doi: *10.6092/2282-1619/2014.2.974*