

Using Mathematics except for Statistics for the Scientific Development of Psychology: Decreasing Entropy of Clients' and Counselors' Thinking in the Counseling Process

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Abstract: - In science, complete reproducibility is the ideal for pursuing the issue of the causal relationship and complete reproducibility exists only in mathematics, except for statistics.

Here, the human mind obeying chaos theory has poor reproducibility, therefore, psychology is explained by various languages and statistics. However, a normal distribution as a premise of statistics never exists in chaotic phenomena and all languages are always misunderstood. Therefore, scientific development is delayed in the field of psychology.

Now, counseling techniques are explained not with equations but with language such as "listening," "reception," and "synesthesia." Therefore, they are understood incompletely because the most important role of a counselor is never taught to Japanese nurses. Consequently, nurses condone some illegal acts, including committing self-injurious behavior or inflicting injury on others. In particular, they condone child abuse by misusing the counseling technique.

In this report, the counseling process is explained by chaos theory, some equations, and entropy change, mathematically. Because the counselor's role, the client's role and the counseling process will become clear, misusing counseling techniques will be prevented with this theory.

Also, as far as the scientific development of psychology goes, it will be very useful that the counseling process is explained with mathematics (especially equations) without statistics.

Key-Words: - counseling, decreasing entropy, chaos theory, mathematics, statistics, continuous covariation, reproducibility, listening, reception, synesthesia

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1 Introduction

In science, complete reproducibility is the ideal, therefore, the issue of the causal relationship can be pursued. Complete reproducibility exists in only mathematics, except for statistics [1-4]. Now, psychology is explained by various languages and statistics; however, both are insufficient to show reproducibility because the human mind obeys chaos theory.

A normal distribution being a premise of statistics never exists in chaotic phenomena [3, 4] and all languages are always misunderstood, therefore, mathematics (especially equations) is required in psychology and treated as a science.

The counseling technique is explained not with equations but language such as "listening," "reception," and "synesthesia" [2, 3, 5].

They are understood incompletely because the most important role of a counselor is never taught to Japanese nurses. The counselor approves some illegal acts, including committing self-injurious

behavior or inflicting injury on others. Likewise, the nurses who understand the counseling techniques incompletely condone child abuse [2, 3].

In this report, a counseling process is explained by chaos theory, some equations and entropy changes, mathematically. Because the counseling process is explained with mathematics, without statistics, the reasons for mistakes in counseling become very clear. This theory will address the misuse of counseling and be useful to the scientific development of psychology.

2 Method

2.1 Explanation of chaos theory

Here, we explain chaos theory, the relationship between human thinking, and chaos theory, and some important preliminary results concerning this.

The contents of "Explanation of chaos theory" is similar to the author's articles [2, 3, 4, 6, 7]. However, it is repeated in this report because of its importance.

2.1.1 Definition of chaos theory

The definition of chaos theory was reported as below [4, 6]. Chaos theory can be defined as "the qualitative study of unstable a periodic behavior in deterministic non-linear dynamical systems" [8]. Chaos theory is a part of complexity theory that concerns itself with nonlinear dynamic systems whose behavior does not follow clearly predictable and repeatable pathways. In linear systems, the relationship between an environmental factor and system behavior is predictable and easily modeled.

As the presence of an environmental factor increases, system behavior changes linearly in response to it. In contrast, behavior in chaotic systems might be perceived as unpredictable [9]. 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).

2.1.2 Relationship between continuous covariation and chaos theory

Three or more variables and continuous covariation are required to have a chaotic equation [10, 11]. In any chaos equation, fixed and chaotic solutions can be obtained that are continuous and have a bifurcation point between them, known as the Feigenbaum point [12].

For example, a chaos equation that is representative of chaos is expressed as follows:

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

In Fig. 1, a schema near the Feigenbaum point is shown in parts B, C, and D, where the converging fixed (parts B₁, B₂, and B₃), localized (part C), and proliferating chaotic (part D) states are illustrated. The arrow F is the Feigenbaum point. All natural phenomena except mathematical principles and historical facts obey chaos theory because of the existence of three or more variables and their continuous covariation between several phenomena, including matters and the mind.

Three or more variables and continuous covariation exist between human and the human's environment. A chaotic state is changed to a fixed state by living creature. Its phenomenon can be confirmed in thinking and evolution. However, the fixed state will be changed to a new chaotic state with environment. And the new chaotic state will be changed to a new fixed state by living creature. Therefore, human thinking obeys to chaos theory because of filling the necessary conditions of it. There are a fixed state and a chaotic state in the human's thinking. If human thinking shifts to one

side excessively, he may have some mental illness. Therefore, human must understand both and change thinking to each site according to an environment.

2.2 Decreasing Entropy

The explanation to decreasing entropy is repeated in this report because of its importance [2, 3, 4, 6, 7].

2.2.1 Relationship between entropy change and chaos theory

"Entropy" is a statistical word and was originally unrelated to any physical phenomena [13]. Entropy decreases when there is a change of direction from a chaotic state to a fixed state [1-4, 7, 11, 14-22], shown as the arrow G in Fig. 2. A schema of near Feigenbaum point (arrow F) is shown as parts B, C, and D in Fig. 2.

On the other hand, it increases whenever there is a change of direction from a fixed state to a chaotic state. This is shown as the arrow H in Fig. 2.

2.3 Mathematical classification: inside and outside chaos theory

A chaos equation has either possible or impossible solutions. While impossible solutions are those with either no solution or with infinite solutions, possible solutions comprise complete fixed, incomplete fixed, chaotic, and random states [1-4, 7, 14]. In complete fixed states, time is not required because no change occurs [23]. Examples are mathematical principles and historical facts, which do not change along with the environment. In chaos theory, a fixed state can become a chaotic state depending on the variables in the equation, meaning that the state of a solution can also change as the environment changes. Therefore, in chaos theory, a fixed state is incomplete.

In Fig. 2, the extreme left side of parts B (part A) is a complete fixed state and lies outside chaos theory. However, both the incomplete fixed (parts B₁, B₂ and B₃) and the chaotic (part C and D) states are amenable to chaos theory. On the other hand, the extreme right side of part D (part E) is a random state and it is not amenable to it. Since a chaos equation is based on mathematical principles, it is a complete fixed state, and it can be used to resolve incomplete fixed and chaotic states as well.

Many incomplete fixed states such as a mountain and many chaotic states such as cloud coexist in natural phenomena (Fig. 3). Because living creature is experiencing both, the increasing entropy (arrow H) or the decreasing entropy (arrow G) can exist in its thinking. And decreasing entropy is an ability of only living creature.

2.4 The counseling process

In counseling, the necessary conditions of the client and the counselor will be explained in section 2.9 "Necessary conditions in counseling" and counseling will never be effective unless their conditions are satisfied [3, 6]. It was reported mathematically that the counseling process is akin to looking for an equation in science. In this report, the process is explained with each entropy change of a counselor and a client.

A counselor understands their own thinking state, for example, $y = \sin x$ [3, 6]. This means that the counselor's thinking is a fixed state such as many mountains in Fig. 3 and 4. However, a client cannot understand their own thinking state, for example,

$y = 6\sin \frac{3x}{4} + 10\sin \frac{x}{3}$ [3, 6]. This means that the

client's thinking is in a chaotic state such as a cloud in Fig. 3. We cannot see the mountain when it is covered by a cloud.

There is no decreasing entropy in the client's thinking because it remains in a chaotic state [3, 4, 24]. Humans feel some fear and anxiety with no decreasing entropy in their thinking, whereas they feel peace of mind with decreasing entropy. Entropy in the client's thinking decreases when the client can understand their own thinking state. This is the purpose of counseling and the counselor facilitates it. Counseling can be explained with the following seven steps.

In the first step, the counselor changes from fixed thinking to chaotic thinking. The purpose of this is to understand the thinking that is different from the counselor's thinking. If the counselor's thinking shifts to a fixed state, the counselor can judge the information as good or bad. In that case, the counselor cannot correctly understand the client's thinking state because of making some negative judgments. The fixed-type counselor cannot go to the second step because they do not have the skills of listening and reception. Only in the fixed thinking state can the feeling with the judgments exist [3, 4, 24]. In the chaotic state, all answers are correct in a limited range, therefore, a bad feeling never exists in the chaotic thinking state. In this step, the entropy of the counselor's thinking increases. The counselor may feel some fear and anxiety, but the entropy of the client's thinking does not change because it remains in a chaotic state.

In the second step, the counselor confirms the client's thinking state by listening. The counselor asks the client what the counselor cannot understand in the client's thinking state and the client answers the counselor's questions. In this step, continuous

covariation exists in a relationship between the counselor's thinking and the client's thinking. If a method of mutual communication such as language or pictures does not exist, the relationship between the counselor and the client does not obey chaos theory because there is no continuous covariation, therefore, counseling stops in this step. It is most important that the counselor can confirm the smooth and continuous flow of information from the client in this step. "Smooth" and "continuous" satisfy continuous covariation as the necessary condition of chaos theory [6, 3, 4, 6, 24]. The counselor's thinking will shift to a localized state (part C) from a predominantly chaotic state (part D) in Fig. 1 and 2. Therefore, the entropy of the counselor's thinking will decrease, while that of the client's thinking may not change because of the chaotic state. When the client can understand the change with this continuous covariation, the entropy of the client's thinking may decrease. If the information from the client is not smooth and continuous, the client's thinking does not obey chaos theory because there is no continuous covariation. In this case, the entropy of the counselor never decreases because the relationship between the counselor and the client does not obey the chaos theory. The client may have a mental illness or the counselor may become confused and fall ill. In this case, the counselor should stop counseling for the sake of their mental health. The counseling stops at this step.

In the third step, the counselor almost understands the client's thinking state, which means that the counselor's thinking changed to a new fixed state from the chaotic state. The new fixed state is the client's thinking state. It is equal to the process changing the equation $y = \sin x$ to the equation

$y = 6\sin \frac{3x}{4} + 10\sin \frac{x}{3}$, mathematically. In this

step, the entropy of the counselor's thinking decreases, but the entropy of the client's thinking may still not decrease. When the client can understand the change with the continuous covariation, the entropy of the client's thinking may decrease according to the decreasing entropy of the counselor's thinking.

In the fourth step, the counselor shows the client what they understood, as it is meaningless if only the counselor understands it. In this step, the entropy of the counselor's thinking does not change. The entropy of the client's thinking may decrease with the client's understanding by degrees.

In the fifth step, the client understands the client's thinking state. In this step, the entropy of the counselor's thinking does not change. Because the

client's thinking shifts to a fixed state, the entropy of the client's thinking decreases. To do so, the client must be able to understand the presentation by the counselor. If the client does not have this ability, counseling stops in the fourth step. In this step, the most important purpose of counseling is achieved.

In the sixth step, the counselor must separate their thinking from the client's thinking state. To do so, the counselor's thinking changes to a new chaotic state from the client's fixed state, too. In this step, the entropy of the counselor's thinking increases, therefore, the counselor may feel some fear and anxiety, but the entropy of the client's thinking does not change. If the client follows the counselor's thinking with no separating, it is called "transference" [3, 6]. In that case, the entropy of the client's thinking increases due to moving away from their original thinking.

In the seventh step, the counselor returns to their original fixed thinking state, which is equivalent to returning to the equation $y = \sin x$ from the equation $y = 6\sin \frac{3x}{4} + 10\sin \frac{x}{3}$, mathematically.

In this step, the entropy of the counselor's thinking decreases, while that of the client's thinking does not change. If the counselor stays in the client's thinking, it is called "counter-transference" [3, 6]. In that case, the entropy of the counselor's thinking never changes in the sixth and seventh steps. In short, the sixth and seventh steps do not exist.

The entropy of the counselor's thinking increases in the first and sixth steps and decreases in the third and seventh steps. Since the second step exists because it leads on to the third step, the entropy of the counselor's thinking decreases in the second step; however, it never decreases if the counselor cannot understand a smooth and continuous flow of information from the client. Because the client's thinking starts in a chaotic state, the entropy of the client's thinking only decreases in the fifth step.

Here, the counselor whose original thinking is not the fixed type but the chaotic type cannot compare the client's thinking of the third step with many laws. Therefore, the counselor condones some illegal acts, including committing self-injurious behavior or inflicting injury on others and Japanese nurses tend to fit this category [2, 3].

2.5 Misunderstandings with only language explanation to counseling

Listening, reception, and synesthesia are taught as counseling techniques to all Japanese nursing students [2, 3]. However, they are understood

incompletely because the most important role of a counselor is never taught solely with language. Listening and reception are possible when the nurse's thinking is in a chaotic state such as in the first step. However, the nurse condones some illegal acts by the person concerned if the nurse using this counseling technique believes there is synesthesia in their chaotic thinking. Besides, the nurse cannot advise stopping self-harm and other harm; they may be permitted if the counselor has no social liability, however, nurses always have some social liability. Therefore, nurses must understand the difference between the counselor's role and the nurse's role. To avoid misuse such as this, listening, reception, and synesthesia must be explained with mathematics, except for statistics, in detail.

2.6 The difference between hearing and listening to decreasing entropy

The entropy of the counselor's thinking never decreases in hearing alone. In the second step, the counselor listens to the client to achieve the third step. If the counselor's thinking approaches the client's thinking state, the entropy of the counselor's thinking decreases. Listening is equivalent to decreasing entropy in the counselor's thinking; however, there is no reaction of changing entropy in hearing.

2.7 Necessary conditions for reception

Reception means that the counselor's thinking became a chaotic state. If the counselor's thinking is in a fixed state, the counselor will make some judgments about the client [2, 3, 6]. Because the client may not believe the counselor, the client will not divulge more information.

However, some information flows that are not smooth and continuous are permitted in the counselor's chaotic thinking, too [3, 6]. In this case, the counselor should be understanding because the client may have some mental illness and counseling cannot proceed to the third step. Therefore, the counselor must stop chaotic thinking. Entropy never decreases in reception alone with no synesthesia and only reception with no synesthesia is confirmed in a pseudo-counselor. In this case, the entropy of the client's thinking never decreases because there is no decreasing entropy in the counselor's thinking. The third and fourth steps never exist. A person without the ability to do the third and fourth steps must not do any counseling because the client will be more confused.

Of course, the entropy of the client's thinking never decreases if the client cannot change their chaotic thinking to a fixed state in the fifth step.

In this case, counseling cannot proceed to the fifth step if the counselor can do the third and fourth steps because of the poor ability of the client.

2.8 The difference between understanding and synesthesia to decreasing entropy

Synesthesia means the third, fourth, and fifth steps.

In the third step, the counselor understands the fixed parts of the client's thinking covered with the chaotic state, which is equivalent to the mountain covered with clouds in Fig. 3.

The client cannot understand the fixed parts of their thinking because the client still sees only clouds.

Here the entropy of the counselor's thinking never decreases if the counselor only understands the chaotic parts of the client's thinking state.

This is equivalent to only reception because of stopping at the second step [2, 3].

Because the counselor does not see the mountain but only the clouds in Fig. 3, the counselor shifting to chaotic thinking cannot address the client's fixed parts.

In the fourth step, the counselor shows the client's fixed parts to the client.

In the fifth step, the client understands the fixed parts that the counselor has shown.

Thus, continuous covariation as a necessary condition of chaos theory exists in the relationship between the counselor and the client.

Therefore, the client may understand the client's fixed parts almost at the same time.

If there is no fifth step, the purpose of counseling is never achieved because there is no decreasing entropy in the client's thinking.

This state is not synaesthesia but understanding for the counselor.

Because there is no continuous covariation in the relationship between the client and the counselor, counseling stops.

2.9 Necessary conditions in counseling

2.9.1 Necessary conditions of the counselor

First, the counselor can shift their thinking to a chaotic state. In a chaotic state, all answers are correct within a limited range, therefore, humans shifting to chaotic thinking cannot make a judgment right or wrong. Humans are weak as living creatures in the thinking shifting to the chaotic state because there is no judgment. With increasing entropy, humans will feel some stress with fear and anxiety [3, 4, 24]. Therefore, the counselor will empathize with them in the first and sixth steps.

Second, the counselor can shift their thinking to a fixed state. The counselor can decide if a judgment

is right or wrong based on the information if their counselor thinking is in a fixed state. In that case, the counselor cannot understand the client's thinking state correctly because of making some negative judgments. However, the counseling stops in the first step if the counselor cannot shift to fixed-type thinking.

Third, the counselor must not shift their thinking to a fixed state to an extreme degree as doing so would prevent proceeding to the first step.

Fourth, the counselor must not shift their thinking to a chaotic state to an extreme degree as doing so would prevent proceeding to the third step [2, 3].

Fifth, the counselor must be able to shift to a fixed state from a chaotic state based on the information from the client. The counselor without this ability cannot proceed to the third step.

Sixth, the counselor must be able to judge the information as smooth and continuous [3, 6]. If the counselor does not have this ability, they cannot perceive the client's mental illness and stop counseling.

A person shifting to an extreme degree to chaotic thinking is similar to this because of permitting all information from the client and the counselor cannot proceed to the third step.

2.9.2 Necessary conditions of the client

First, the client must have smooth and continuous thinking. The client has some mental illness besides [3, 6]. In this case, counseling cannot proceed to the third step because the client may have some mental illness.

Second, the client can understand that their thinking is becoming confused and troubled. If the client cannot understand the confusion, they cannot hope to change their thinking. If the client is satisfied with a chaotic state like clouds and does not hope to see a clear view of the mountain, Fig. 4 is not required.

Third, the client hopes to change their thinking to dispel the confusion. If the client does not hope to change their thinking, counseling is not required.

Fourth, the client can change their thinking from a chaotic state to a fixed state. If not, the counseling cannot proceed to the fifth step because a relationship between the counselor and the client cannot become synesthesia.

2.9.3 Necessary conditions in the relationship between the client and the counselor

A method of mutual communication such as language, pictures, and so on must exist between the counselor and the client. Without this, their relationship does not obey chaos theory because

there is no continuous covariation. The counseling process cannot go to the second and fourth steps.

In this way, many conditions are required in effective counseling. It is a cause of misuse that all necessary conditions are never taught to users of counseling techniques.

3 Results

In the counseling process, each entropy change of the counselor's and client's thinking is explained by chaos theory. Their thinking must be smooth and continuous to satisfy the necessary conditions of chaos theory. The counselor must not shift to fixed thinking or chaotic thinking excessively and the counselor must be able to move to both thinking and self-control. The counselor must be able to look for the client's thinking state together to the client. The counselor must always be able to confirm their thinking style with a self-check to return to their original thinking state. This is the only way to prevent counter-transference.

When many necessary conditions of the counselor and the client are fulfilled, counseling is effective. Various crimes such as child abuse are condoned by misusing counseling techniques and for the development of scientific psychology, it is very useful that the counseling process is explained with mathematics except for statistics.

4 Discussion

This author has witnessed many cases in which Japanese nurses misused counseling techniques [2, 3]. Listening, reception, and synesthesia are taught to Japanese nurses as absolute truth. The nurses misunderstand that synesthesia is equal to reception, therefore, the nurses cannot advise stopping self-harm and other harm. In particular, they cannot stop child abuse by parents because they hear the information from the parents with reception. Nurses have some social liabilities in preventing child abuse and the difference in the social liability of nurses and counselors is remarkable [3, 4].

However, nurses cannot understand this difference because counseling techniques are taught with language only and language is an incomplete fixed state near a chaotic state. The information without mathematics except statistics is misunderstood easily and this author thinks that it is dangerous to place absolute trust in statistics [3]. The premise of statistics is a normal distribution of a phenomenon, however, the normal distribution is not confirmed by almost chaotic phenomena. Because all natural phenomena obey chaos theory, any normal distribution does not exist in them,

therefore, it is wrong to say that statistics are taken as an absolute truth in science. Psychology must be explained by chaos theory because all natural phenomena have some continuous covariation and it develops as a true science when it is explained with mathematics except for statistics. We can predict some undiscovered phenomena using an equation and because the equation is a completely fixed state, using it is more scientific than many experiments and language. Therefore, this theory is very useful to the development of scientific psychology.

5 Conclusion

The counseling process is explained with chaos theory and entropy change. The client's thinking is led to a fixed state from a chaotic state with counseling. Therefore, it is the purpose of counseling that entropy decreases in the client's thinking. For the development of scientific psychology, it is very useful that the counseling process was explained with mathematics except for statistics and misuse will be prevented because using an equation is more scientific than many experiments and language.

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Hideaki Yanagisawa alone thought this article.

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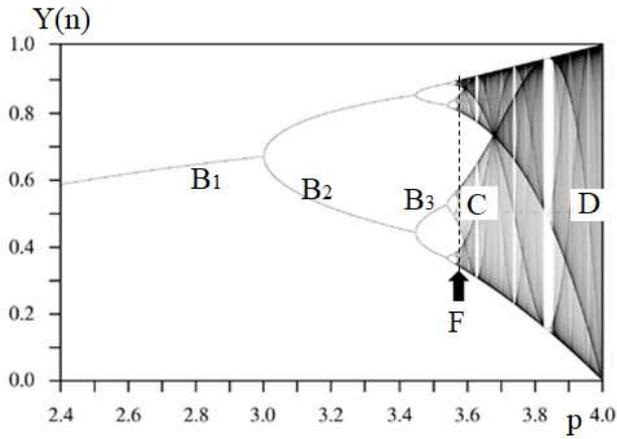


Figure 1: Logistic schema of equation (1)

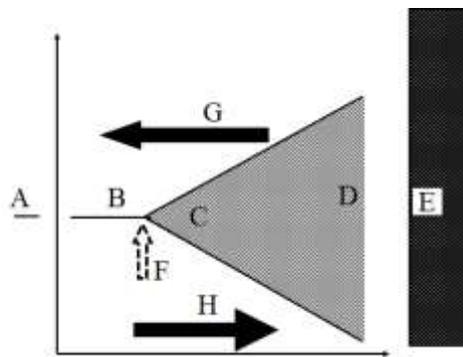


Figure 2: Schema of complete fixed, incomplete fixed, chaotic, and random states

A fixed state such as mountains and a chaotic state such as clouds coexist in reality. We must understand both and suppose the fixed state is covered by the chaotic state.



Figure 4.: Mt. Tanigawa with no clouds in winter. The mountains are clear because there are no clouds.



Figure 3: Mt. Tanigawa with clouds in winter.