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# The experiment of convergence property for circuit layout demonstrates the defect in evolutionary mechanism

***Abstract***. *In the current recognized evolutionary mechanism, an elementary fact has always been ignored: a predominant trait can come from the relationship of diverse characters, besides the quantity of a single character. This research has designed a series of experiments of simulation for circuit layout to test whether the current recognized evolutionary mechanism is effective for the predominant trait from relationships. The results of these experiments demonstrate the defect in the current recognized evolutionary mechanism, which cannot account for the heritable predominant traits from relationships.*

***Streszczenie.*** *W artykule przedstawiono serię eksperymentów, symulujących przy pomocy układu scalonego współczesny mechanizm ewolucyjny, pod kątem jego efektywności w przypadku pochodzenia cech dominujących. Wyniki badań wskazują błędne podejście w obecnie znanym mechanizmie ewolucyjnym, nie biorące pod uwagę dziedziczenia głównych cech w wyniku powiązania innych. (**Badanie cechy zbieżności w wykrywaniu defektu w mechanizmie ewolucyjnym**).*

**Keywords:** circuit layout; evolutionary mechanism; genetic algorithm; convergence property.
**Słowa kluczowe:** układ scalony, mechanizm ewolucyjny, algorytm genetyczny, zbieżność.

## Introduction

In the recent 150 years after "the Origin of Species" appeared, Darwinian evolution theory has always been discussed and developed from Darwinism to Neo-Darwinism, and from the Modern Evolutionary Synthesis to the Extended Synthesis [1][2]. Some popular problems have been deeply discussed in many literatures, such as how the complexity can come from the current evolutionary mechanism and some called "Darwin's dilemma"[3][4].

The Darwin's evolutionary process is a typical optimization procedure, which has been simulated by the evolution algorithm, and some results in evolution algorithm have been at the level of application [5]. It is evident that the current recognized evolutionary mechanism is true if the optimization procedure is convergent with the mechanism, otherwise is false. Therefore, the convergence property of an evolution algorithm strictly simulating the current evolutionary mechanism can be employed to verify whether the current evolutionary mechanism is correct. In fact, there have been a few successful examples in finding the defects of current evolutionary mechanism through experiments in genetic algorithms, such as the conclusion of "natural selection theory by itself cannot account for increases in structural complexity" [4]. This research is based on the elementary fact: A predominant trait can come from the relationship among diverse characters, besides the quantity of the value of a single character.

This research demonstrates the defects in the current evolutionary mechanism through a series of experiments of circuit layout to test whether the current recognized evolutionary mechanism is effective for the predominant trait from relationships.

## Predominant traits from quantity or relationship

A predominant trait can come from the quantity of a single character. The typical instance is the Darwin's giraffe represented by Darwin. In Darwin' viewpoint, giraffes with longer necks are easier to achieve foods in trees, consequently the quantity of the single character of the "length of neck" decides on the fitness. The "origin of species" and the modern evolutionary synthesis concentrate on the principle of evolution considering predominant traits from quantity, such as the peppered moth's color in which the degree of dark decides on the fitness [6][7]. However, a predominant trait can also come from the relationship among diverse characters. For example, the cheetah's predominant capability in running does not come from a longer leg or a bigger body, but from the unique compatible relationships among its locomotoriums. In fact, most of predominant traits, as it were, can not come from the value of a single character, but from the relationships among many characters. For example, the high balanced capacity in dragonfly does not come respectively from its bigger head or longer body, but from the scales among these organs at a just right level. Even for the Darwin's giraffe, it is inconceivable that a single trait of longer neck, without the support or cooperation from other characters, can produce higher competitive strength for survival. It is an important fact that a predominant trait can come from relationships among diverse characters, however which is ignored in the "origin of species" and the modern evolutionary synthesis, and into which there is no deep probe in current literatures.

## The convergence property of a predominant trait from only the quantity of a single character

In the experiment, the fact that the predominant trait from quantity can be kept and spread in a population under current evolutionary mechanism is verified.

The experiment is designed as the Fig.1 where there is a circuit including four sliding electrical conductors A, B, C D and an electrical conductor fixing at the position 0. Each of the four sliding electrical conductors has a station from 0 to 15. Obviously the circuit will be closed when all sliding electrical conductors are at the station of 0.

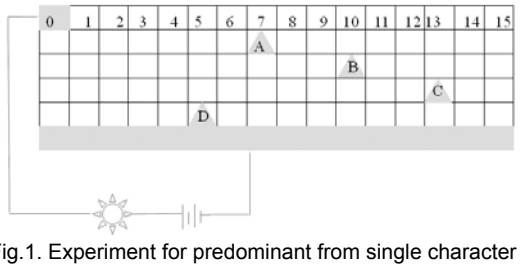


Fig.1. Experiment for predominant from single character

The plans of the experiment are followings:

(1) A variable is represented by a sixteen-digit binary number. The elements can be worked out by the decimal numbers transformed from every sequential four-digit binary numbers. For example, the sixteen-digit binary code "1 0 0 1 0 0 1 1 1 0 1 0 0 0 1 1" defines the values of "A, B, C, D" by "9, 3, 10, 3".

(2) The original population consists of 600 individuals, who are assigned by random variables in the field of definitions. The original population is randomly divided into 300 couples. Every couple reproduces four children by random elements exchanges to generate the new expanded generation, which consists of 1200 individuals.

(3) Ten elements in the 1200 individuals are randomly picked out to execute the complementary operation to realize the variation in a low probability.

(4) Taking the sum of the four elements in a variable as the foundation for evaluation of fitness, the less value for the sum, the higher fitness, the 600 individuals with higher fitness are selected as the updated population.

(5) Go back step (1) to do the recursions over some successive generations until the scale of the individuals updated to the optimum value in the population reaches over the given criterion.

The above plans have strictly simulated the current recognized evolutionary mechanism. According to the above plans, the experiments show 95 per cent of the individuals in the population can be updated to the optimum values "0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0" in 1000 generations. One result of these experiments is shown as figure 2, in which the x-axis represents the iterations, the y-axis is the amount of optimum individuals in a single generation. Figure 1 shows 571 individuals, namely 95.17 per cent in the population, are updated to the optimum value after 649 iterations under the current evolutionary mechanism.

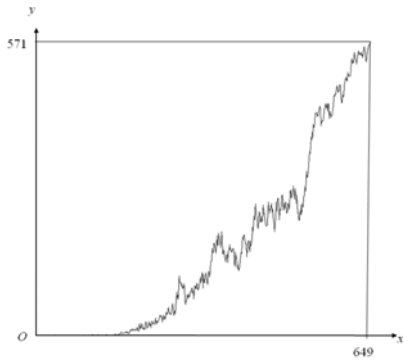

Fig.2. One result of evolution process in experiment one

Repeatedly experiments demonstrate the convergence is stable, the predominant trait from quantity can be kept and spread in a population, and the population can be updated to a higher fitness in current evolutionary mechanism.

**The convergence property of a predominant trait from totally quantum relationship**

The experiment two is designed to check the convergence property of a predominant trait from totally quantum relationships. In the experiment, the fact that the predominant trait from totally quantum relationships cannot be kept and spread in a population under current evolutionary mechanism is verified. The experiment is designed as the Fig.3. Compared to experiment one, the only difference of the experiment two is the fixed electrical conductor cover from 0 to 15. Obviously it is not required that all sliding electrical conductors are at the station of 0 to close the circuit. The circuit will be closed when all sliding electrical conductors are at the same line. Namely the evaluation criterion for “natural selection” is set as the relationship of collinearity. Compared to the experiment one, the experiment two changes only the optimization objective that is defined by "four points on one line" instead, which means an individual has the highest fitness when its four elements appear on the same unique line in any one of the sixteen positions. Considering the totally quantized feature, the fitness is evaluated as "1" when the four elements are on the same unique line, or "0" otherwise.

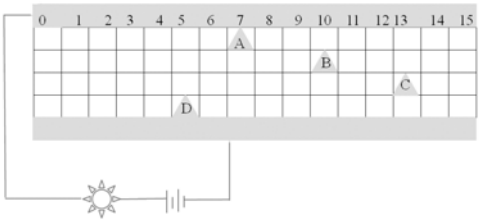

Fig.3. Experiment for predominant from totally quantum relationship

Experiment two with 100000 iterations in every experiment is done for many times. The table 3 lists ten results of these experiments, in which the maximum amount of optimum individuals in a single generation of the 100000 generations is recorded. In the instance shown in table 1, the max amount of optimum individuals in a single generation is 37, namely 6.17 per cent in the generation, and the generation with the maximum amount of optimum individuals rises erratically. Others experiments have the same features that there is no systematic feature in the occurrence of the optimum individuals and few optimum individuals appear in random. According to these experiments, it can be concluded that no steady mathematic relationship can be fitted between the amounts of the optimum individuals and the iterations, and the iteration process for a predominant trait from totally quantum relationship is not convergent.

Table 1. The results of the totally quantum relationship

| No. | The max amount of optimum individuals in a generation | The number of the generation with the max amount of optimum individuals |
|---|---|---|
| 1 | 19 | 48654 |
| 2 | 37 | 36276 |
| 3 | 13 | 74219 |
| 4 | 21 | 41809 |
| 5 | 23 | 19012 |
| 6 | 14 | 91211 |
| 7 | 35 | 84584 |
| 8 | 16 | 64219 |
| 9 | 10 | 94593 |
| 10 | 17 | 60417 |

The experiment two demonstrates that the predominant trait from totally quantum relationship can not be kept and spread in a population, the current recognized evolutionary mechanism cannot account for the heritable predominant traits from totally quantum relationship.

**The convergence property of a predominant trait from the partly quantum relationship**

Some relationships have the totally quantum feature like the metaphor of a computer's slots, any one error joint will lead the same result that the computer can not work as many error joints will lead. However, there are many more relationships with partly quantum features. Taking the dragonfly as instance, the high balanced capacity in dragonfly comes from the scales among its many organs, such as the sizes of the head and the body. If there is no one character far from the compatible relationships, a dragonfly has the higher balanced capacity when its relationships among organs are nearer to the optimum compatible relationships. However, if one organ for balance is far from the compatible relationship, the dragonfly will

have no any predominant trait in balanced capacity even if other organs have the unique compatible relationships. The feature is called partly quantum relationship in the paper. The experiment three is designed to test the convergence property of a predominant trait from the partly quantum relationship. The experiment three is designed as the Fig.4. Compared to experiment two, the only difference of the experiment three is that the three black lines are designed as electric resistance. Namely, even if the four sliding electrical conductors are not at the same line, the circuit is closed and the light will be lighten. Furthermore the nearer, the light will be brighter. Namely the evaluation criterion for "natural selection" is set as the relationship of distance.

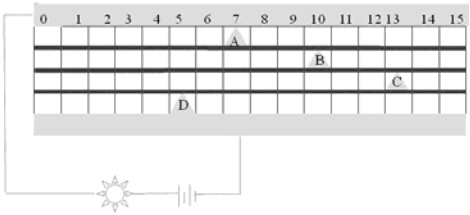


Fig.4. Experiment for predominant from partly quantum relationship

Compared to the experiment two, the experiment three changes only the evaluation criterion for fitness, which is partly quantized. Experiment three with 100000 iterations in every experiment is done for many times. The table 2 illustrates the results of experiment three for ten times. In the ten random experiments, the max amount of optimum individuals in a generation is 41, namely 6.83 per cent in the generation, which appears in the 25188 generation in the tenth experiment. Others experiments have the same features that there is no systematic feature in the occurrence of the optimum individuals, and the generation with the max amount of optimum solutions appears in a condition of confusion.

Table 2. The experiments results of the partly quantum relationship

| No. | The max amount of optimum individuals in a generation | The number of the generation with the max amount of optimum individuals |
|---|---|---|
| 1 | 19 | 99339 |
| 2 | 14 | 33725 |
| 3 | 17 | 14949 |
| 4 | 28 | 32037 |
| 5 | 22 | 29677 |
| 6 | 38 | 13971 |
| 7 | 20 | 16262 |
| 8 | 18 | 57300 |
| 9 | 17 | 77688 |
| 10 | 41 | 25188 |

The experiment three demonstrates that the predominant trait from partly quantum relationship can not be kept and spread in a population, the current recognized evolutionary mechanism cannot account for the heritable predominant traits from partly quantum relationship.

**Conclusions**

An elementary fact is that most of predominant traits for survival come from the relationships among characters, which is ignored in the "origin of species", the modern evolutionary synthesis, and these current literatures. The research explores the convergence property of a predominant trait from relationship among characters under the current recognized evolutionary mechanism by three experiments of simulation for circuit layout. These simulation experiments clearly demonstrate that the current recognized evolutionary mechanism cannot account for the heritable predominant traits from relationships.

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