

Research Article

# Experimental Verification and Further Reflection on the Peak-End Rule

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## Abstract

People make choices all the time, and sometimes the results of choices are unexpected, and the existence of the peak-end rule can explain the counterintuition in our decision evaluation. In fact, changes in "peak" and "end" experiences affect the choices people make all the time and greatly affect the evaluation of decisions. This article summarizes the characteristics of the Peak-End Rule and provides a large number of real-life examples to explain it. Based on this, three experiments were designed to verify the correctness of the Peak-End Rule from different perspectives. Among these experiments, Experiment 2 was the most important, and all participants participated in two stages of the experiment. In the first stage, they ran 100 meters with full effort, and in the second stage, they slowed down and ran 50 meters after running 100 meters with full effort. It was recorded that all participants chose to participate in the second stage of exercise, and more people chose to complete the second stage. This conclusion is contrary to common sense because the second stage covered an additional distance of 50 meters. But this result precisely confirms the conclusion of the Peak-End Theorem, because the end of the second stage run is easier, and more participants choose to run in the second stage. Meanwhile, through in-depth analysis of the data from Experiment 3, the author believes that the impact of the "endpoint" on decision-making is greater than that of the "peak".

## Keywords

Peak-End Rule, Peak, End Point, Counterintuitive

## 1. Introduction

The peak-end rule states that if the experience is pleasurable at the peak and end of an experience, then the experience as a whole will be pleasurable. This rule, developed by psychologist Daniel Kahneman [1-3], states that the peak and the end of an experience play a decisive role in how people remember and feel, while other experiences along the way have little impact on how they feel overall. The discovery of this rule has provided new perspectives and ideas for economic research, business management, government decision-making

and other fields, forming influential service models.

The "peak" in the peak-end rule refers to the peak moment in the experience process, including the positive and negative peak experience and "end" refers to the feeling at the end of the experience. Therefore, the peak-end rule can also be understood to mean that people rate an experience mainly on how they feel at the peak and the end of the experience, rather than on average over the course of the whole experience [4].

After the perception of the body during a long training

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session, people seemed to prefer the hard part first and the easy part later, and rated the training method as more relaxing, describing it as "bitter first and sweet later". However, compared with the other training method, that is, the easy part is completed first and the difficult part is completed later, the training amount of the two training methods is the same, and the completion time of the training plan is roughly the same. However, people have this cognitive bias, which is attributed to the "peak-to-end rule". The first training method ends in a relatively easy way. It gives people a better experience at the end, while the second training method ends with a larger response to the body, giving people a poor experience at the end, so most people will choose "bitter first, then sweet", that is, the first training method [5].

In order to verify the existence of the peak-end rule, the author conducted three designed experiments. The central idea of the design of the experiments was to change the psychological or physical state of people at the end of the experiments through controlled experiments, and to reach experimental conclusions by means of questionnaires to quantify experiment scores, statistical analysis or multiple choice questions.

## 2. Characteristics of the Peak-End Rule

### 2.1. Existence of Universality

The peak-end rule generally exists in people's decision-making and evaluation activities [12, 14, 15]. Where there is evaluation and decision-making, the peak-end rule will play a role in everything from daily life to industrial management.

There is a barbecue restaurant at the gate of the community where Xiaoming is located, which is of good quality and low price and has a good reputation. Many people in the community often go there for dinner. One day Xiao Ming was about to go to the barbecue restaurant for dinner, but his neighbor Xiao Zhang came back from the hospital with medicine and asked what was wrong. Xiao Zhang said that after eating in the barbecue restaurant at the door, the whole family vomited and diarrhea, went to the hospital and found that it was food poisoning. Xiao Ming heart startled, look at the pale Xiao Zhang, look at his often go to the barbecue shop, fell into meditation, he should not go to the barbecue shop to eat tonight?

Many people will use running software when running, when the end of the exercise you will receive a variety of MEDALS sent by the platform "March fastest", "refresh the farthest distance" and so on, but also the platform will produce a variety of linkage activities, the completion of the specified sports can get MEDALS and titles and other rewards, through the reward invisibly enhance the movement of the "end" experience, Thus improving the overall sense of pleasure.

When you check into a hotel, you will return to find a new room, there are fruit bowls on the table prepared by the hotel,

you will be treated politely when you leave the hotel, and you will receive branded mineral water, postcards and other gifts, which will be swept away when you meet in the hotel.

### 2.2. Feeling Subjectivity

What is subjective? Subjective is the human brain on the basis of objective things processed, filtered to get the overall view; However, our brain is very good at "overgeneralization", each person's personality, work, family environment, education level and other factors are different, resulting in each person's processing of objective things in different ways, filter the content is different, and the final result is not the same, as the saying goes "a thousand people have a thousand hamerets in their minds" [6].

Our brain will not record a whole thing in great detail, on the contrary, it will only take a specific record of the closest and most impressive things from their moment of occurrence. Therefore, the basis for people to evaluate a thing or make decisions is often the "peak" and "end" of things.

If we look carefully, we will find that on the podium of the race, the champion is undoubtedly the happiest, but the counterintuitive third runner-up often has more smiles on his face than the runner-up. Why? According to the process of the game, the runner-up lost to the champion in a recent game, which is the most exciting and most eye-catching game in the game, the runner-up's loss undoubtedly became both the "peak" and "the end" of his memory of the game [7], while the third beat the fourth place in a recent game and walked on the podium. From no prize to walk on the podium is a glorious process, this matter became the "end" of the third recall of this game, so the frustrating end and pleasant end effect on the runner-up and the third, which produced a confusing scene [8]. Objectively speaking, the value of the runner-up is undoubtedly higher than that of the third runner-up, but people's subjective processing makes the value of the runner-up decline, and the value of the third runner-up rise, resulting in subjective impression [9].

### 2.3. Process Neglect

It can be seen from the above that when the human brain evaluates or makes decisions, it is often based on the "peak" and "end point" of things, so the vast majority of processes will be ignored, and the small frules or insignificant advantages of some things will be insignificant [10, 11, 13].

When it comes to IKEA, many people first think of their exquisite model rooms, fashionable decoration style and affordable prices. At the exit of IKEA's experience Hall, there is IKEA ice cream for sale, which is sweet and tasty but cheap. Ikea ice cream is priced at 1 yuan, which has received a lot of praise, and many people think it is unnecessary. The sales of IKEA ice cream exceeded 12 million. Is this proof that in 2015, the customer flow of IKEA home was far more than 12 million people? Just ice cream to IKEA brought 12 million yuan

of income, 1 yuan of ice cream "conspiracy" for IKEA has gained a huge reputation, invisible to make up for some of its own shortcomings, such as long queuing time, less waiters, service quality is relatively not high, but now "shopping IKEA" has become the first choice for young people to buy new furniture, Through the correct use of "peak" and "end", play their own brand advantages, successfully open up the domestic market.

### 3. Experiment 1

#### 3.1. Object and Method of Experiment 1

##### 3.1.1. The Participants

The participants were organized to organize 30 young students with basic physical fitness level, wearing uniforms numbered 1-30. At 7 o'clock in the evening, when the temperature was about 25 degrees Celsius and the students got enough rest during the day, the students were brought to the oval plastic track of 400 meters standard, and the experiment was organized and carried out in an orderly manner after full warm-up activities.

##### 3.1.2. Experimental 1 Design

The specific experimental program is: a total of four laps of 1600 meters running training, four laps are divided into two groups, the completion of 800 meters training is completed one group, the first group of training program for the first lap of slow running, the pace of 2 minutes to 2:20 or so, the second lap of full sprint, the pace of 1 minute to 1:20 (there are differences in physical level); The second group of training program was the first lap of sprint, the pace ranged from 1 minute to 1 minute 20, and the second lap was slow running, the pace was from 2 minutes to 2 minutes 20. At the end of the 200 meters, a man equipped stopwatch was set for speed monitoring. Numbers 1-15 start first, and then numbers 16-30 start after the first 15 people finish the first group training, numbers 1-10 start after the first group training, numbers 11-20 start after the first 10 people finish the training, numbers 21-30 start after the completion of the training on 11-20. At the finish line, record the question "Which training style do you think was easier?" and ask the trainee to give hand signals.

#### 3.2. Experimental 1 Results

At last, a questionnaire survey was conducted at the end point to obtain the results. 30 students chose the first group of training.

#### 3.3. Experiment 1 Discussion

The experimental results of experiment 1 cannot deny the existence of the peak-end rule. In this experiment, due to the

fast pace of sprint running, the human body enters a state of exhaustion after the completion of sprint running, so as to get a very painful experience. In the first group of training, the students first finish the slow run, the physical consumption is small, and then accelerate sprint, in the second lap of acceleration sprint students do not have a psychological burden, can devote their energy to sprint running, and finish the sprint is to rest as the "end", can give students a better "end" experience. In the second group of training, the students were required to sprint first, after finishing the sprint, the human body entered a very tired state of exhaustion, and in the following slow run, it was carried out in the state of exhaustion, which is equivalent to extending the state of exhaustion. We extended the overall negative effect of the aversion state, although we finally took a rest at the end. However, the physical state at the finish line was significantly worse than that at the end of the first group of training, giving students a relatively poor "finish" experience.

After reflection and summary of experiment 1, it is concluded that the direct reason for the failure of this experiment is that the speed of sprint running is too fast, which makes the human body enter the state of exhaustion early, and insufficient rest is arranged between the two groups of training, and the pace gap between slow running and sprint running is too large, which does not play the role of controlled experiment. The fundamental reason is that the pressure difference set by the outside world is too large, and the wrong judgment of the "end" experience expectation and the "end" experience arrival time. Compared with the Kahneman cold water experiment, it can be seen that the water temperature of the experiment was selected as 14 °-15 °, which not only has little temperature change, but also the two temperatures will not cause the human body to have a greater resistance temperature, so two points should be paid attention to in the follow-up experiment: 1. The test pressure set by the outside world is in line with the acceptable range of the human body, and will not cause people great discomfort. The change of pressure is small, and the difference of experimental results caused by small changes can explain the experimental conclusion.

### 4. Experiment 2

#### 4.1. Object and Method of Experiment 2

The subjects organized 40 young students with basic physical ability, wearing uniforms numbered 1-40. At 7 o'clock in the evening, when the temperature was about 25 degrees Celsius and the students got enough rest during the day, the students were taken to a 100-meter standard straight plastic track, and the experiment was organized and carried out in an orderly manner after full warm-up activities.

A total of 250 meters of running training, the first group is 100 meters of uniform speed, requiring students to complete

the training at a more comfortable speed, about 20s, the second group is 150 meters of variable speed, requiring students to complete the first 100 meters at a more comfortable speed, about 20s, and the last 50 meters at a slower speed than the first 100 meters. From the number 1-20 to start the first group of training, the first 20 to complete the training, 21--40 to complete the first group of training; Then start from 1 to 20 to complete the second group training, and start from 21 to 40 to complete the second group experiment after the first 20 completed the training. At the end of the experiment, record the question "Which training method do you think was easier just now?" and ask the trainee to give hand signals. According to Daniel Kahneman's cold-water experiment posed the question "If you had to train again, which one would you choose?" ", considering that this experiment is a training project, if the inquiry method is used for reference, there may be some students' mental activities that the more tired the body is, the better the training effect will be, which may lead to bias in the experiment results, so the question is changed.

## 4.2. Experimental 2 Results

The final experimental result is "27 people choose the second training group, 11 people choose the first training group, and 2 people think it is OK".

The 100-meter pace selected in this experiment is relatively slow, and the students have physical strength foundation. After completing the first group of 100-meter training, the students are in good physical condition, leaving more physical strength remaining and not reaching exhaustion. After the second group of 100 meters training, the students had more physical strength left and did not reach the state of exhaustion, so they arranged 50 meters jogging, the speed was slower than 100 meters, although the students' physical strength was also consumed, but the consumption was far less than the first 100 meters. Compared with the first group training, the physical consumption increased, but more people thought that the second group training program was easier. Because the students' physical feelings at the end of the second group are better than the students' physical feelings at the end of the first group.

## 5. Experiment 3

### 5.1. Object and Method of Experiment 3

#### 5.1.1. The Participant

The participant wears A number suit and assigns No. 1-16 to classroom A+B, No. 17-32 to classroom A, No. 33-40 to classroom B. Classroom D is used to store experimental materials, and experimental equipment is snacks of different combinations. And were asked to rate their pleasure rate on the basis of the candy they got. Item A was 280 grams of

Nestle ice cream and item B was a small bag of spicy strips.

Students in Room A receive a box of ice cream, accounting for two-fifths of the total number of students. Students in Room A+B will receive a box of ice cream and spicy strips, two fifths of the total number; Students in room B can only receive spicy strips, accounting for one-fifth of the total number of students. The difference between group A+B and group A is the key of this experiment, so the number of students in room A and Room A+B is larger.

#### 5.1.2. Experimental 3 Design

All the students participated in the experiment voluntarily. Item B is a popular snack, which can ensure that it can bring positive experience to the students. The specific experimental plan is as follows: in the first round, item A was distributed to classroom A and Classroom A+B; in the second round, item B was distributed to classroom B and classroom A+B; and in the third round, the questionnaire was distributed to the three classrooms successively. The questionnaire was in the form of a table, and satisfaction was divided into 7 levels from "very dissatisfied ---- very satisfied", and their satisfaction was graded from "poor" to "good" on a scale of 1 to 7. Students were asked to rate according to their subjective feelings after receiving the items. By organizing 40 young participants, who were old enough to answer the survey question "How satisfied are you with the items you received?" The statistical method was to complete the questionnaire;

## 5.2. Results

Class A is numbered 2, class A+B is numbered 1, and Class B is numbered 3. First, H test is used to determine whether the three groups of data come from the same whole, and then Mann-Whitney U test is performed on the data of group A and group A+B to determine whether there are differences between the two groups of data. If there are differences, the conclusion can be proved.

**Table 1.** Test statistics a and b (a. Kruskal -Wallis H test b. grouping variable).

Kruskal -Wallis H	9.069
degree of freedom	2
Progressive significance	011.

After Kruskal-Wallis H test,  $H=9.069$  and asymptotic significance  $p=0.011<0.05$  are shown in the figure, which proves that there are significant differences among the three methods. According to the Mann-W hitney U test, the following two figures are obtained: It can be found that the satisfaction of group A is significantly higher than that of group A+B

( $Z=2.482$ ,  $p=0.013<0.05$ ), indicating that the difference between the two groups is statistically significant.

**Table 2.** Independent sample Mann-Whitney U test digest.

Total N	32
Mann-Whitney U test	185.000
Wilcoxon test W	321.000
test statistics	185.000
standard error	22.961
Standardized test statistics	2.482
Progressive significance	013.
Exact significance	032.

### 5.3. Experiment 3 Discuss

By setting up classroom B, that is, the experimental control group only given spicy strips, it can be proved that if only given spicy strips, students' experience feedback is also positive, and there is no situation that spicy strips will reduce the overall pleasure of the combination. It is obvious that the overall pleasure of group A+B is obviously greater than that of group A, because group A+B gets more snacks than group A, and they get more snacks than group A. However, it is obvious that students' overall evaluation of this matter is not a simple mathematical addition, but a product processed and filtered by the brain. Students' evaluation of the whole matter comes from the "peak" and "end point". It is not difficult to see that the "peak" and "end" of group A's students in this matter are getting ice cream, but the "peak" and "end" of group A+B's students in this matter are getting ice cream and getting spicy strips, and the pleasure of getting spicy strips is obviously lower than that of getting ice cream in the general feeling.

And different from Daniel Kahneman's chocolate experiment, this experiment was different from the chocolate experiment in which all the snacks were given to the participants at one time, and the two snacks were not regarded as A joint experiment. In the organizational experiment, for the students in group A+B, The experimental sequence of ice cream first and then Spicy strips was carried out, and the interval between the two was not long enough to make group A+B forget the pleasure of getting ice cream. Through this measure, it is intended to compare the "peak" experience and the "end" experience, which has a greater impact on people's decision evaluation. Finally, through the experimental data, it can be concluded that the "end" experience has a greater impact on people's decision evaluation.

## 6. Summary

The peak-end rule is pervasive in our daily lives, making us less than 100 percent "objective" when making decisions or evaluations, and our impressions of how things develop to their climax and how they are perceived at the end have an important influence on us, even to the point where we overlook the whole course of things.

## Conflicts of Interest

The authors declare no conflicts of interest.

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