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Research Article

A Study on Some Probability Problems in Proverb Situations

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From the perspective of probability theory, this study makes a mathematical model of the proverbs themselves or the background stories reflected by them, carries out experiments and analyses, fully excavating the philosophical, scientific, and cultural connotations contained in the proverbs, and reveals the relationship between "mathematics," "philosophy," and "culture." With the interpretation of probability theory, common sayings show their charm in traditional culture, and the application of probability theory has also been expanded and extended. In this paper, the problems reflected in the proverbs, such as "slanders three to, the mother does not love," "In repentance, there is salvation., "Three cobblers with their wits combined exceed the mastermind of Zhuge Liang.," and "Gain the initiative by preemptive strike, otherwise you will be very passive." are mathematically and modelically analyzed and tested from the perspective of probability theory and the philosophical culture, and scientific thought behind the proverbs are expounded. "One who sticks to his folly and does nothing to stand by a tree stump waiting for a hare," "dripping water wears through a stone," and "iron pestle grinds a needle" are a group of common sayings, which directly reflect the principle of small probability events and its two sides through the story behind them.

1. Introduction

Probability theory is the wisdom accumulated in the long-term social practice and production activities of human beings. It is a mathematical discipline to study the laws of random phenomena. However, proverbs are widely oral, concise, and easy-to-understand phrases or rhymes created by folk. They are regular summaries of the rich wisdom and shared experience of working people. These proverbs are popular, ideological, and artistic [1], and the combination with probability theory makes proverbs more philosophical and can increase people's frequency of using this cultural language, which also makes our communication more humorous and productive.

We use the basic knowledge and basic principle of probability theory to interpret and dig saying aphorism contained in philosophy, scientific thought, and cultural origins, to reveal the relationship between mathematics, philosophy, and culture, and dry and boring in the textbooks of theoretical knowledge and colorful life, combining theory with practice, to deepen the understanding and sublimation [2].

2. Literature Review

Liu Suwen [3] analyzed the artistic characteristics of proverbs from the perspectives of incisive content, profound implication, beautiful intonation, and strong ideology and proposed that it is beneficial to stimulate students' innovative thinking and creativity. Hu Guangquan [4] proposed that teaching English proverbs can arouse students' interest in learning English, enabling them to understand western history and culture well, inspiring students to think, and spurring them to make progress. Tang Jun [5] sorted out the proverbs and sayings of management from the perspective of management practices and discussed their application in teaching. Zhao Yudan and Yi Yin [6] analyzed the biological phenomena in poetry and proverbs and applied them in teaching; they thus played a role in activating the classroom atmosphere. Luo Xiaoyuan [7] explained the inevitability of small probability events occurrences from the perspective of the law of large numbers but did not discuss the two sides of small probability events, nor did she elaborate them from the perspective of proverbs. Wang Jianping et al. [8], as for the saying "two heads are better than one," only explained a special case but did not discuss the general situation and the rules they contained. Wang Qiong [9] expounded the saying "two heads are better than one" from the example of the three-person jury but did not discuss the empirical analysis of a multiperson jury in detail.

Tayyara [10] examined how proverbs stimulate active learning in students, the cross-cultural perception in teaching, and how they provide new teaching concepts and strategies for educators. Hatipoglu [11] focused on proverbs in English language teaching materials and how the concise structure and "wisdom" loaded content of proverbs contribute to the development of foreign language learners' communicative competence. Rachel A. Grant [12] emphasized proverbs, especially those from Africa, as a springboard for teaching civics to students in urban classrooms, as a means of developing their awareness, and supports the theoretical framework for using African proverbs in civics education. Robert Jan Van Pelt [13]discussed "The Cunning of Reason "from philosophical, behavioral, and cognitive perspectives. Yu Tian and Kim-hung Pho [14] statistically analyzed and compared proverbs in "The Koran" from a technical perspective.

Jamie L. Rehmel [15] analyzed and tested the cognition of proverbs from the perspective of brain function and pathology. Roberto Cano-de-la-Cuerda [16] used proverbs related to neuroscience and neurological rehabilitation to help understand the nervous system and provide methods and techniques for the rehabilitation of neurological patients. From the perspective of neuroscience, Kljajevic, V [17] took 333 healthy individuals aged 18 ~ 89 years as samples and found that age had a significant impact on the interpretation of proverbs.

The abovementioned studies can be categorized as follows: the first is a professional attribute analysis of the linguistic and artistic characteristics of proverbs from the perspective of linguistics. Second, from a pedagogical perspective, the popularity, interest, and cultural characteristics of proverbs can improve students' interest and learning efficiency, activate the classroom, and provide new educational ideas for educators. Third, the brain mechanism and pathology of proverbs are analyzed from the perspective of methods and techniques. These studies do not analyze the realistic background of social life reflected by the proverbs themselves, the basic principles of probability theory, and the philosophical and cultural levels contained in them. Based on these analyses, the following assessments were carried out in this study.

3. Study on the Probability Theory under the Situation of Proverbs

3.1. "Slanders Three to, The Mother Does Not Love". "Slanders three to, the mother does not love" comes from a saying in Cao Zhi of "The Three Kingdoms'"When the Wall Wants to Go High." The story background reflected by this saying is modeled first, and then the law of total probability and Bayes'theorem [18] are used for iterative analysis.

This idiom refers to the spring and autumn period in China; in the hometown of a student of Confucius, Zeng Shen, there is a person with the same name, also called Zeng Shen killed people in the countryside. When someone reported to Zeng's mother that Zeng Shen had killed someone, Zeng's mother said, "My son will not kill anyone." Not long after, another man ran up to Zeng Shen's mother and said, "Zeng Shen really killed someone outside." Zeng Shen's mother still did not pay any attention to the person, she sat there leisurely shuttling wire, as usual weaving her cloth. After a while, a third messenger ran up to Zeng's mother and said, "Everyone says Zeng Shen did kill someone." Zeng's mother was suddenly nervous. She threw away her weaver, picked up a ladder and fled over the wall.

In order to mathematically model this popular story, we suppose event A: the others slander, event B: believing in your children. People who believe in their children have a high probability, $P(B) = 0.9$. The opposite event is $\overline{B}$, which means not trusting your children (i.e. not loving), so the probability is $P(\overline{B}) = 0.1$.

Let us take a look at the probability of accepting slanderers from others while believing in your child, $P(A|B)$, A does not seem to have a high probability and is set to be 0.1, namely, $P(A|B) = 0.1$, the probability of accepting slander from others is generally high when you do not believe your own children but you still tend to believe your own children, which is assumed to be 0.6, that is, $P(A|\overline{B}) = 0.6$. First, the full probability formula [18] is used to find the probability of "malicious talk by others.

$$P(A) = P(B)P(A|B) + P(\overline{B})P(A|\overline{B}) = 0.9 * 0.1 + 0.1 * 0.6 = 0.15. \tag{1}$$

You can see that the probability is not low, that is to say, in general, they trust their children. If someone is slanderous now for the first time, then how much credibility does the child have? In other words, $P(A|B)$ can be obtained according to Bayes' theorem for the first time as displayed

$$P(B|A) = \frac{P(B)P(A|B)}{P(B)P(A|B) + P(\overline{B})P(A|\overline{B})} = \frac{0.9 * 0.1}{0.9 * 0.1 + 0.1 * 0.6} = 0.6. \tag{2}$$

This shows that Zeng's mother heard her son "murder" for the first time, that is, after "slanders one," although the degree of trust in her son reduced from the original 0.9 to 0.6, Zeng's mother still believes her son: "My son will not kill".

Soon, the second man ran to tell Zeng's mother that "Zeng Shen really killed people outside." Then, the confidence of Zeng's mother in her son $P(B) = 0.6$ is entered into the following formula:

$$P(B|A) = \frac{P(B)P(A|B)}{P(B)P(A|B) + P(\overline{B})P(A|\overline{B})} = \frac{0.6 * 0.1}{0.6 * 0.1 + 0.4 * 0.6} = 0.2. \tag{3}$$

It can be seen that after Zeng's mother heard about her son "murdering someone" for the second time, that is, "slanders two," Zeng's mother's trust in her son dropped from 0.6 to 0.2. Based on her understanding and trust in her son, she can still "unhurriedly shuttle wire, weaving as usual.".

However, the third person ran over and said to Zeng's mother, "Everyone said that Zeng Shen did murder someone." At this time, Zeng's mother's trust degree $P(B) = 0.2$ was also iterated into the following formula:

$$P(B|A) = \frac{P(B)P(A|B)}{P(B)P(A|B) + P(\overline{B})P(A|\overline{B})} = \frac{0.2 * 0.1}{0.2 * 0.1 + 0.8 * 0.6} = 0.04. \tag{4}$$

Thus, when Zeng's mother heard for the third time that her son "did kill", that is, Zeng's mother's trust in her son collapsed completely. At this time, her trust in her son dropped from 0.2 to 0.04, so she immediately "moved the ladder, climbed over the wall and fled." This story reflects the harm of slanders in trust, even of the mother for her virtuous son, three times after the slander, the degree of trust was also little, proving that the so-called "Gossip is a fearful thing".

3.2. "In Repentance, There Is Salvation". "In repentance, there is salvation," is originally an epigram of Buddhism, which is used to describe that there is a way out for people who do bad things as long as they completely repent. It is often used to persuade people not to go all the way to do bad deeds. To illustrate this epigram with probability theory, first, a scene problem model is established and then geometric distribution is used for experimental analysis.

Assuming that the probability of success of an experiment is $p(0 < p < 1)$, and the experiment is repeated (p is always the same) until the first success, and the random variable X is used to represent the number of trials n,

$$P(X = n) = p(1 - p)^{(n-1)}(n = 1, 2, \ldots). \tag{5}$$

In a geometric distribution [19], in this concept, the sentence "until the first success" has a kind of "never give up" spirit and mettle, so it is sometimes colloquially called "dead-set distribution".

If the probability of success is assumed to be $p = 0.3$; then, the probability of failure is $1 - p = 0.7, P(X = i) = p(1 - p)^{(i-1)}(i = 1, 2, \ldots),$. that is, the probability of not succeeding until the i th time. The probabilities of the eight trials are listed below

$$\begin{aligned}
P(X = 1) &= 0.3 \times 0.7^0 = 0.3,\\
P(X = 2) &= 0.3 \times 0.7^1 = 0.21,\\
P(X = 3) &= 0.3 \times 0.7^2 = 0.147,\\
P(X = 4) &= 0.3 \times 0.7^3 = 0.1029,\\
P(X = 5) &= 0.3 \times 0.7^4 = 0.07203,\\
P(X = 6) &= 0.3 \times 0.7^5 = 0.050421,\\
P(X = 7) &= 0.3 \times 0.7^6 = 0.0352947,\\
P(X = 8) &= 0.3 \times 0.7^7 = 0.02470629.
\end{aligned} \tag{6}$$

As can be seen from the aforementioned example, when $p \leq 0.3$, the probability of success in the first time is not very high, and when the further one goes, the probability of success decreases. When the probability of... tcannot be too stubborn." is grammatically unclear. Please rephrase the sentence for clarity and correctness."?$p > 0.3$, the probability of the first success is relatively large (p(X=1) > 0.3), basically there will be no second or third success. Therefore, on the one hand, in the process of striving for success, we should see "Upright stands the bamboo amid green mountains steep; Careless of the wind from north or south, east or west." of perseverance and indomitable, and this spirit may bring joy of success; But on the other hand, we should also understand that there may be "No coffin do not cry, do not give up until the Yellow River" the downcast and desolate, sometimes we really should be to "In repentance there is salvation," "listen to people advised to eat a full meal," can not be too stubborn.

3.3. "Three Cobblers With Their Wits Combined Exceed the Mastermind of Zhuge Liang". "Three cobblers with their wits combined exceed the mastermind of Zhuge Liang" is often used to praise the fact that there are many ways and many people are wise. Therefore, as for the saying, "Three cobblers with their wits combined exceed the mastermind of Zhuge Liang," a scene problem model was first established, and then the sum of multiple events [20] was used for experimental analysis.

Suppose there are three cobblers, A, B, and C, and the probability of them solving a problem independently is 0.536, 0.536, and 0.536, respectively. The probability of Zhuge Liang solving the problem independently is 0.90. It can be seen that there is a big gap between any one of the three cobblers and Zhuge Liang in their ability to solve a problem independently. Then, is it possible for the three cobblers to surpass Zhuge Liang through unity and cooperation? According to the hypothetical problem, the three cobblers solve the problem independently with their wisdom. As long as one of them can solve the problem, the problem is solved and belong to the "Sum event" [9].

The independent solution of A, B, and C are represented by events A, B, and C, respectively. Then, the problem can be represented by the sum of the three events $P(A + B + C)$ [21]. Event D means that Zhuge Liang solves the problem, and the event can be displayed as

Table 1: The probability test of balancing point of the three cobblers working together and Zhuge Liang working alone.

A	B	C	Cooperation	ZhugeLiang	Result
0.6	0.6	0.6	0.936	0.9	superior
0.536	0.536	0.536	0.9001	0.9	balance
0.5	0.5	0.5	0.875	0.9	inferior

Table 2: A comparative experiment of solving problems by multiple cobblers cooperating with Zhuge Liang alone.

Cobbler number	3	4	5	5	7	8
Independent	0.536	0.438	0.37	0.3188	0.2805	0.2502
Cooperation	0.9001	0.9002	0.9007	0.9000	0.9001	0.9001

$P(A) = P(B) = P(C) = 0.536, P(D) = 0.90$. According to the general formula of the sum of the three events and the independence of the events, we obtain as follows:

$$\begin{aligned} P(A+B+C) &= P(A) + P(B) + P(C) - P(AB) - P(AC) \\ &\quad - P(BC) + P(ABC) \\ &= P(A) + P(B) + P(C) - P(A)P(B) \\ &\quad - P(A)P(C) - P(B)P(C) + P(A)P(B)P(C) \\ &= 0.536 + 0.536 + 0.536 - 0.536 \times 0.536 \\ &\quad - 0.536 \times 0.536 - 0.536 \times 0.536 \\ &\quad + 0.536 \times 0.536 \times 0.536 = 0.9001, \end{aligned} \tag{7}$$

or it can be dealt with it in terms of opposing events,

$$\begin{aligned} P(A+B+C) &= 1 - P(\overline{A+B+C}) = 1 - P(\overline{A \cup B \cup C}) \\ &= 1 - P(\overline{A})P(\overline{B})P(\overline{C}) = 1 - 0.464 \\ &\quad \times 0.464 \times 0.464 \\ &= 1 - 0.0999 = 0.9001 > 0.9 = P(D). \end{aligned} \tag{8}$$

It can be seen that three cobblers with average IQ can slightly surpass Zhuge Liang with superior intelligence through cooperation; therefore, if we find some cobblers with a higher probability of solving the problem, for example, if the cobbler's intelligence level is $P(A) = P(B) = P(C) = 0.6$, $P(A+B+C) = 0.936 > 0.9 = P(D)$; then, the intelligence of the three cobblers can be calculated by the same method, which is more than that of Zhuge Liang. On the contrary, if we find some cobblers who have A lower probability of solving the problem successfully, for example, we set them as $P(A) = P(B) = P(C) = 0.5$, and we can get P(A+B+C)= 0.875<0.9 by calculation. At this time, we find that cobblers are inferior to Zhu Geliang (Table 1 shows specific experimental results).

In the aforementioned problem, the default number of cobblers is three. Will the increase or decrease in the number of cobblers affect the ability level of cobblers to solve the problem? A, B, C and D can be represented by events A, B, C, and D, respectively. Then, the problem can be represented by the sum of four events $P(A+B+C+D)$, and event E means Zhuge Liang solved the problem, which can be assumed as $P(A) = P(B) = P(C) = P(D) = 0.438$, then we obtain as follows:

$$\begin{aligned} P(A+B+C+D) &= 1 - P(\overline{A+B+C+D}) = 1 \\ &\quad - P(\overline{A \cup B \cup C \cup D}) \\ &= 1 - P(\overline{A})P(\overline{B})P(\overline{C})P(\overline{D}) = 1 \\ &\quad - 0.0998 = 0.9002 > 0.9 = P(E), \end{aligned} \tag{9}$$

More experimental results are shown in Table 2.We found that with an increase in the number of cobblers to solve this problem, the ability to solve problems needs to be a gradual decrease in the probability of a single cobbler; we seem to see many hands make the work light. Sometimes, this will be beyond the possibility of "authority," but this is based on the fact that the cobbler is familiar with the problem area, for example, the probability is usually greater than or equal to 0.3; originally "cobbler" means that there is a certain understanding of the "advantage officer" in the field, otherwise, they are not familiar with the solution to the problem; that is, even if there are many people, it is difficult to get more than Zhuge Liang's effect, just the so-called "A thousand armies are easy to get but one is hard to find."

3.4. "Gain the Initiative by Preemptive strike, Otherwise You Will be Very Passive". In competitive sports shooting or chess games, it is generally believed that the "first strike" is more likely to win, while the "last strike" is often not advantageous. So, is that the case? The next step is to build a scenario model and use conditional probability and multiplication to illustrate this idiom.

Let us use conditional probability and the multiplication formula to illustrate this idiom. This proverb can be translated into the following question with the knowledge of probability theory: suppose that in an air battle, if plane M fires at plane N first, the probability of shooting down plane N is P; if plane N does not shoot down, the probability of shooting down plane M is q; and in the second round, if M is not shot down, then N is attacked again and the probability of shooting down N is still P. If N is not shot down, the probability of shooting down M is q. In this way, the probability of M and N being shot down is calculated, respectively [22].

Solution: let event A represent that plane M shot down plane N, event B represents that plane N shot down plane M after returning fire without being shot down, the event $A_i (i = 1, 2 \ldots)$ means round i and N is shot down, and

$B_i\,(i = 1, 2 \ldots)$ means round i and M is shot down. If M fires first, then the probability of $MP(A)$ winning is as follows:

$$
\begin{aligned}
P(A) &= P\left(A_1 + A_2\overline{B_1A_1} + A_3\overline{B_1A_1B_2A_2} + \ldots\right) \\
&= P\left(A_1\right) + P\left(A_2\overline{B_1A_1}\right) + P\left(A_3\overline{B_1A_1B_2A_2}\right) + \ldots \\
&= P\left(A_1\right) + P\left(A_2\right)P\left(A_2|\overline{B_1A_1}\right)P\left(\overline{B_1}|\overline{A_1}\right)+ \\
&\quad \cdot P(A)_3P\left(A_3|\overline{B_2A_2B_1A_1}\right)P\left(\overline{B_2}|\overline{A_2B_1A_1}\right)P\left(\overline{A_2}|\overline{B_1A_1}\right)P\left(\overline{B_1}|\overline{A_1}\right) + \ldots \\
&= p + p(1-p)(1-q) + p(1-p)^2(1-q)^2 + \ldots = \frac{p}{1-(1-p)(1-q)}, \\
P(B) &= 1 - P(A) = \frac{q(1-p)}{1-(1-p)(1-q)}.
\end{aligned}
\tag{10}
$$

Based on the above calculation results, and using Python for Figure 1, it can be seen that $0 < p \leq 1, 0 < q \leq 1$, wherein $P(A)$ and $P(B)$ are two surfaces, respectively, and the two surfaces intersect the curve $p = q(1-p)$ (shown in Figure 1. jpg). In other words, plane M and plane N have an equal probability of being shot down on this curve, for example, $p = 0.5, q = 1$; $p = 0.4, q = 2/3$, and so on.

Since the three-dimensional surface is not intuitive, the data of equal intervals are taken between 0 and 1, respectively, for p and q; the calculation results are shown in Table 3. We found that in the case of M firing first, as long as the probability p of shooting down N is greater than or equal to the probability q of shooting down M in the counterattack, M will definitely win and we can also see that in the intervals down here.

$p = 0.1, 0.1 \leq q < 0.11111$; $p = 0.2, 0.2 \leq q < 0.25$; $p = 0.3, 0.3 \leq q < 0.4285$; $p = 0.4, 0.4 \leq q < 0.66667$; $p = 0.5$, $0.5 \leq q < 1$,

Although $p \leq q$, as long as M fires first, it can still guarantee M's victory, which proves the truth of "Gain the initiative by preemptive strike, otherwise you will be very passive." So, is there any chance that player N will win by firing first? $p = 0.1, 0.11111 < q \leq 1$; $p = 0.2, 0.25 < q \leq 1$; $p = 0.3, 0.4285 < q \leq 1$; $p = 0.4, 0.66667 < q \leq 1$; $p = 0.5, q = 1$, These circumstances can ensure the "last to start first to arrive" effect of N but after $p > 0.5$, regardless of the value of q, M has an absolute chance of winning if he keeps firing first.

According to the aforementioned analysis, in this problem, the so-called "Gain the initiative by preemptive strike, otherwise, you will be very passive," is based on certain conditions. In general, if the probability of the "first mover" is greater than that of the "second mover", the first mover will have the first mover advantage to win. However, if the probability of "starter" and "backmover" are both greater than 0.3 and the gap is not too large, the backmover advantage will not be displayed. Only when the probability of "starter" is relatively small and the probability of "backmover" is relatively large, can the backmover advantage be displayed.

3.5. "One Who Sticks to His Folly and Does Nothing to Stand by a Tree Stump Waiting for a Hare, "Dripping Water Wears through a Stone," and "Iron Pestle Grinds a Needle". "One who sticks to his folly and does nothing to stand by a tree stump waiting for a hare" is originally an idiom. It is said that there was a farmer in the State of Song who had a tree stump in his field. One day, a fast-running hare bumped into the stump, broke its neck, and died. Therefore, the farmer put down his farm tools and waited by the stump day and night, hoping to get another dead rabbit. However, it was impossible to get a hare again and he was ridiculed by the people of the State of Song. The probability of the rabbit hitting the tree and dying was small but the farmer in The State of Song imagined this to be a big probability, that it happens often, and wished to lose the honest work and get something from doing nothing. Of course, it was a laughingstock and a daydream.

"Dripping wears through the stone" is also an idiom; a drop of water dripping through the stone is almost impossible, and the event probability is absolutely small; but in reality, we have seen the stone under the eaves of the old house dripping out of a small hole, indicating its occurrence in reality! this means that after years of this destructive accumulation, water droplets can cut through rocks!

"Grinding an iron pestle into a needle" also has a story allusion about Li Bai, a famous poet in the Tang Dynasty, who did not study hard when he was young. When he saw an old woman grinding an iron rod on a stone, he asked her curiously, "What are you doing?. Grandma told him she was sharpening a needle! Li Bai did not believe it, the grandmother told him "With persistent efforts, iron pestle can be grounded into a needle," and Li Bai understood that learning lies in unremitting efforts. So, he went back to study hard and finally became a generation of literary heroes. From the perspective of probability theory analysis, grinding an iron rod into a needle in ancient conditions is indeed a small probability event, but through unremitting efforts, this desire can be realized. This is a positive accumulation, and the key lies in accumulation!

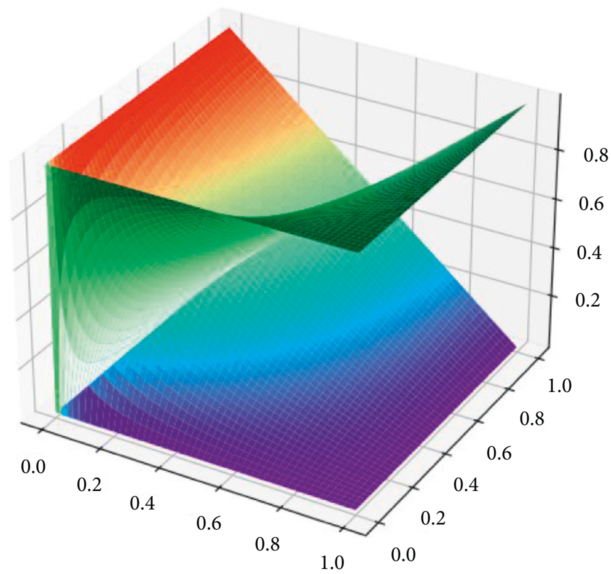

Figure 1: Equilibrium graph of the “preemptive strike” test.

Table 3: The “preemptive strike” test results.

p	q	$P(A)$	$P(B)$	Results	p	q	$P(A)$	$P(B)$	Results
0.1	0.1	0.52632	0.473684	>	0.4	0.5	0.571429	0.428571	>
0.1	0.2	0.357143	0.642857	<	0.4	0.6	0.526316	0.473684	>
0.1	0.3	0.27027	0.72973	<	0.4	0.667	0.499988	0.500012	=
0.1	0.4	0.217391	0.782609	<	0.4	0.7	0.487805	0.512195	<
0.1	0.5	0.181818	0.818182	<	0.4	0.8	0.454545	0.545455	<
0.1	0.6	0.15625	0.84375	<	0.4	0.9	0.425532	0.574468	<
0.1	0.7	0.136986	0.863014	<	0.4	1	0.4	0.6	<
0.1	0.8	0.121951	0.878049	<	0.5	0.5	0.66667	0.33333	>
0.1	0.9	0.10989	0.89011	<	0.5	0.6	0.625	0.375	>
0.1	1	0.1	0.9	<	0.5	0.7	0.588235	0.411765	>
0.2	0.2	0.555556	0.444444	>	0.5	0.8	0.555556	0.444444	>
0.2	0.3	0.454545	0.545455	<	0.5	0.9	0.526316	0.473684	>
0.2	0.4	0.384615	0.615385	<	0.5	1	0.5	0.5	=
0.2	0.5	0.333333	0.666667	<	0.6	0.6	0.714286	0.285714	>
0.2	0.6	0.294118	0.705882	<	0.6	0.7	0.681818	0.318182	>
0.2	0.7	0.263158	0.736842	<	0.6	0.8	0.652174	0.347826	>
0.2	0.8	0.238095	0.761905	<	0.6	0.9	0.625	0.375	>
0.2	0.9	0.217391	0.782609	<	0.6	1	0.6	0.4	>
0.2	1	0.2	0.8	<	0.7	0.8	0.744681	0.255319	>
0.3	0.4	0.517241	0.482759	>	0.7	0.9	0.721649	0.278351	>
0.3	0.4285	0.500042	0.499958	=	0.7	1	0.7	0.3	>
0.3	0.5	0.461538	0.538462	<	0.8	0.9	0.816327	0.183673	>
0.3	0.6	0.416667	0.583333	<	0.8	1	0.8	0.2	>
0.3	0.7	0.379747	0.620253	<	0.9	1	0.9	0.1	>
0.3	0.8	0.348837	0.651163	<					
0.3	0.9	0.322581	0.677419	<					
0.3	1	0.3	0.7	<					

According to Bernoulli’s law of large numbers [23]: in independently repeated tests, it is assumed that the probability of event A’s occurrence is $P(A) = p$, and when the number of tests $n \longrightarrow \infty$, the frequency of event A’s occurrence in n tests is $F_n(A)$ which converges to (or is infinitely close to) the probability p of event A’s occurrence in one test. That is, for any positive ε, there are

$$\lim_{n\longrightarrow\infty}\left(P\left(|F_n(A) - p| < \varepsilon\right) = 1.\right) \tag{11}$$

According to the “law of large numbers,” when the independent repeated test is carried out many times, the probability of occurrence frequency and deviation is very small. In practical applications, the frequency of event occurrence can be used to replace the probability when the number of tests is large; hence, the frequency of events with a small probability is small in a large number of repeated tests.

In the application of probability theory, a low-probability event refers to an event with a very low probability of occurrence, which is almost impossible to happen in one experiment but inevitably happens in many repeated experiments. In probability theory, events with probabilities close to zero (that is, very low-frequency occurrences over a large number of repeated trials) are referred to as low probability events. Generally, the events with the probability of occurrence below 0.01 or 0.05 are called low probability events, and these two values are often called low probability standards.

After learning the concept of the law of large numbers, in practical application, when experiments are repeated many times, frequency is often used to replace the probability. In this case, low-probability events are those with a low frequency that occurs in a large number of repeated experiments. Through the story of "one who sticks to his folly and does nothing to stand by a tree stump waiting for a hare," one realizes that the small probability events in the possibility of the specific experiment are very small, and this fantasy cannot be applied to a big probability event, otherwise, it will affect our judgment, making it a joke or a big mistake. This proverb lets us understand that we should not assume that a small probability event will happen often, otherwise, it will lead to wrong judgment; in addition, it also lets us realize that we should get rich diligently through honest labor and legal operation in our life. We call on everyone to "honest labor is glorious, and unearned is shameful." This is the first of the two sides of the small probability event.

The later stories of "dripping water wears through a stone" and "grinding an iron pestle into a needle" reflect the other side of the two sides of small probability events. Under natural conditions, it is difficult for water droplets to fall through the stone. It is a small probability event, but after persistent efforts of water droplets, it is completely possible to drop through the stone after, may be, one year, two years, one hundred years, or one thousand years. This reflects the occurrence and development of low-probability events as a process, which is a qualitative leap when the quantity accumulates to a certain degree. The change from quantitative change to qualitative change is a development process, which is of great significance for us to prevent and reduce the losses caused by "black Swan events". Through these two common sayings, we know that the accumulation of "bad" should be prevented, and the accumulation of "good" should be persistent, unyielding, and accumulated. Therefore, in many cases, "as long as there is 1% hope, we should also pay 100% efforts."

4. Discussion and Conclusion

Compared with the simple mathematical analysis of "Three cobblers with their wits combined exceed the mastermind of Zhuge Liang" in Wang Jianping Wang [8] and Wang Qiong [9], the general explanation of the background story and the law of the implication of proverbs is not discussed. No one has conducted mathematical modeling and experimental analysis from the perspective of probability theory, such as "Slanders three to, the mother does not love," "In repentance, there is salvation", and "Gain the initiative by preemptive strike, otherwise you will be very passive" and "Grinding an iron pestle into a needle".

This analysis was conducted from the angle of the theory of probability to the five groups proverb itself or the background story reflected by mathematical modeling. After quantitative testing and analysis, it is hoped that on one hand, saying aphorism contained in philosophy, scientific thoughts, and cultural connotation reveals the "mathematics" of the relationship between "philosophy" and "culture", to highlight the charm of the traditional culture. On the other hand, it also combines the boring and difficult theoretical knowledge in the textbook with colorful life practice, which also plays a role in deepening the understanding and sublimation of thoughts, and explains and expands the application of probability theory.

The biggest limitation of this study is that the sample data selected for analysis are not enough and the mathematical model that can be established can be further in-depth and revised. Next, we can try to establish a more refined mathematical model by using regression analysis to verify each other with the probability theory model. In the teaching of probability theory, proverbs can also be more integrated, which makes the teaching of probability theory closer to life, more mathematical and philosophical. Branch [24]and ŞAHİN A [25] used the form of drama to experience the study of proverbs and proverbs, which has achieved good results and is also a direction worth studying. As Yuqing Geng [26] and Xue Wang [27]said, to realize the coordinated development of higher education and scientific popularization proverbs are an important part of the national language and culture, and it is the crystallization of the wisdom of working people [28]; probability theory provides a more vibrant soil for proverbs, allowing them to burst out more rational and scientific light, so the teaching of probability theory is also closer to reality, close to life, so that students' learning is more interesting and efficient.

Data Availability

The data supporting the current study are given in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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