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College Students' Mental Health Climbing Consumption Model Based on Nonlinear Differential Equations

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Abstract

College students continue to improve their consumption levels due to compassion or vanity, but it not only increases the financial burden of the family, but is also not conducive to their personal health. In order not to affect the mental health of college students, to solve the problem of mutual comparison consumption, this paper establishes differential equation models to describe this phenomenon, from qualitative and quantitative angles to interpret and predict the results of comparison consumption. The results show that the current consumption behaviour of college students also has a reasonable place for being unreasonable, mainly from college students' own and living environment.

Keywords: Differential equation model, college students, compare consumption, mental health

AMS 2010 codes: 34C60

1 Introduction

China is currently in the period of social transformation. People have faced a new challenge in the evolutionary process, and there is also an incentive contradiction. Against the driving of the market economy, it is increasingly affirming the rationality of the individual's pursuit of legitimate interests, and strong individual value demands have become an irreversible trend in social transformation. Due to this fierce social competition, there is a significant gap between the rich and the poor, and this gap is constantly impacting people's psychology, which is inevitable. Therefore, the climbing psychology is a social psychological phenomenon that will occur in the social transformation period, and research on climbing psychology helps to understand people's expectations and behavioural power [1].

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After entering university, the knowledge and contact of study becomes more broader than high schools, especially in a network era, through a wide range of information. Since university children are in the ‘psychological discreation period’, the self-conscious growth has grown rapidly. According to the social comparison theory, individuals will conduct self-evaluation through comparisons with people with similar living situations.

College students tend to compare with students around themselves, that is, make comparisons. However, the unscrupulous psychology of college students tends to lead themselves to lose their self, produce their own psychology, and even psychology such as embarrassment, vanity and inferiority. College students are not only concerned, but also pay special attention to their appearance, to their uniqueness, and usually use substances as carriers, such as dazzling clothes, unique shoes, expensive mobile phones and so on. As a carrier, it is more high-end, more beautiful, more unique, and more of the face. Some students will meet their needs through some unfair means for substances, such as stealing. And the climber between parents, for example, compares someone with others, often taking the children of others, which may also lead their own children to generate inferiority, and even because of their disgusting behaviour, become more rebellious.

China has something called a ‘Student Code’. In the international sphere also, there are similar practices, such as the German education sector is reconsidering to use unified school uniforms to restrict the pursuit of campus brand name; Singapore clearly defines that middle-school students are not allowed to wear brand names; and Japan has a similar provision with irritation of middle-school students.

Harvard University Psychologist Kwiatkowski D believes that the climber is a kind of game that is unpleasant, and the climber will only make himself fail. People should not climb, especially blind comparison, otherwise they will develop a negative psychology, always being self-centered [2]. Harvard scholars give three suggestions for overcoming the psychological impact of comparison: (1) when are compared with people, we must first determine a practical goal according to its own capacity. If the target exceeds that there is too much range, it will become malignant. Climbing, thus makes yourself lost.

When choosing a comparison object, choose the appropriate object, whereby selecting the object that exceeds yourself may bring too high pressure. It is also good to find a flash point from a successful person, and continuously improve yourself in the process of learning, close to the goal.

One should always keep the mind clear, not blindly compare and try to get progress at work. Some foreign scholars have also explained the psychological behaviours of climbing consumption. Xw A proposed the concept of ‘Sports’ and analysed the motivation generated [3]. It is believed that the upper society shows its economic and social status through sports, and therefore leads to the social consequences of the status competition. On one hand, the actual internal life and public performance are very different in the external life in front of others; on the other hand, people often do not dare to show their internal life, and long time, personal privacy habits become one of the important features of social class etiquette. US psychologist Yue J has pointed out that human behaviour is often maintained by the motivation caused by three internal drives, one of which is a desire caused by the achievement of the inner drive, which is a kind of person, an important internal strength [4].

There are numerous domestic-related research works, and most consumer behaviour patterns are built on investigation data. They use this model to predict consumer behaviour. Dimitrienko Y I has mentioned that in the psychology of the reform process, the climb has a conventional meaning: more than compensation, more work [5]. Since most of the social members have a fair psychology, this fair psychology is based on a comparison between themselves and other members in society, and is used to determine whether what they pay is fair. Therefore, he believes that from the direction of the social role, the climb is not positive and negative. Because people always feel that others have more than they pay, therefore produce cannot overcome the sense of frustration and fight in the enthusiasm for work. Similarly, Wang X also believes that comparison is a social comparative behaviour, and through some examples, the rural climb is more serious [6].

The reason for its prevailing is that the farmers are not high, lack of respect, and they want to meet the basic temperature to pursue higher demand. Therefore, the climb is a social comparison, which is negative. Bl A also mentioned that primary school students were climbed with psychology, primary school student’s climb psychology is a narrow and one-sided psychological phenomenon produced in comparison with others [7].

Performance is more than substances, than family, more than honours. If it is long, it will affect learning or even distorted heart. Huang M believes that the climb is a hidden danger of inferiority. The climb of parent flows will be born with inferior seeds [8, 9].

2 Model hypothesis and composition

The consumption amounts of the Meth Ben part at T are $X(t)$, $y(t)$, assuming that their changes only depend on the following four factors:

1. Due to the phenomenon of mutual comparison, the larger the consumption of one party, the faster the other party consumption [10, 11];
2. Due to the restrictions on economic strength of the parties, the greater the consumption of the consumption, the greater the growth of consumption growth;
3. Due to their respective vanity, there is an inherent potential to increase consumption;
4. Due to the incorrect guidance of parents, social environment and mass media, the growth of the number of consumption amounts of the two parties will further assume the effects of the first two factors is linear, and the effects of subsection (3) (4) are constant, then differential equations available for the number of funds $X(t)$, $Y(t)$ as

$$\begin{cases} x(t) = -\alpha x + ky + g' + g \\ y(t) = 1x - \beta y + h' + h \end{cases} \quad (1)$$

For representation, the coefficients are greater than or equal to zero. K , 1 is the metric of the interstitial consumption; α , β is the measure of the degree of economic strength restriction; g' , h' is an inherent potential of the increase in consumption; g'' , h'' . The growth of consumption caused by external factors. For convenience, $g = g' + g''$, $h = h' + h''$, then (1) varies

$$\begin{cases} x(t) = -\alpha x + ky + g \\ y(t) = 1x - \beta y + h \end{cases} \quad (2)$$

What we are interested is what the results of college students compare consumption are determined by the factors, but they don't care about the entire process of consumption, so we only need to discuss the time sufficient length of the stability theory of differential equations, $x(t)$, $y(t)$ The change trend, that is, the stability of the equilibrium point of the equation (2) is as follows:

Order $\begin{cases} -\alpha x + ky + g = 0 \\ 1x - \beta y + h = 0 \end{cases}$, can be equilibrium (x_0, y_0)

$$x_0 = \frac{kh + \beta g}{\alpha\beta - k1}, y_0 = \frac{1g + \alpha h}{\alpha\beta - k1} \quad (3)$$

It is also that the coefficient matrix of the process (2) is $A = \begin{pmatrix} -\alpha & k \\ 1 & -\beta \end{pmatrix}$, and the method of judging the stability of the balance point can be

$$P = -(A_{11} + A_{22}) = \alpha + \beta > 0 \quad (4)$$

$$q = \begin{vmatrix} -\alpha & k \\ 1 & -\beta \end{vmatrix} = \alpha\beta - k1 \quad (5)$$

When

$$\alpha\beta > k_1 \quad (6)$$

Stability guidelines (see Table 1)

When $\alpha\beta > k_1$ (6), the balance point (x_0, y_0) is stable (Figures 1 and 2), that is, when $\alpha\beta > k_1$, the time is sufficient, and the consumption amount will tend to a limited value, no longer varying by other factors.

Table 1 Types and stability of balance points determined by the feature equation

Λ, Λ	p, q	Equilibrium type	Stability (Yes/No)
$\Lambda_1 < \Lambda_2 < 0$	$P > 0, q > 0, p^2 > 4q$	Stable node	Y
$\Lambda_1 > \Lambda_2 > 0$	$P < 0, q > 0, p^2 > 4q$	Unstable node	N
$\Lambda_1 < 0 < \Lambda_2$	$P < 0$	Saddle point	N
$\Lambda_1 = \Lambda_2 < 0$	$P > 0, q > 0, p^2 = 4q$	Stable degradation point	Y
$\Lambda_1 = \Lambda_2 > 0$	$P < 0, q > 0, p^2 = 4q$	Instable degradation point	N
$\Lambda_{1,2} = \alpha \pm \beta i, \alpha < 0$	$P > 0, q > 0, p^2 < 4q$	Stable focus	Y
$\Lambda_{1,2} = \alpha \pm \beta i, \alpha > 0$	$P < 0, q > 0, p^2 < 4q$	Unstable focus	N
$\Lambda_{1,2} = \alpha \pm \beta i, \alpha = 0$	$P = 0, q > 0$	Center	N

Fig. 1 $\alpha\beta > k_1$, $x(t)$, $y(t)$ change trend

Fig. 2 $\alpha\beta > k_1$ phase track line image

On the contrary, when $\alpha\beta < k1$, it is unstable (Figures 3 and 4), that is to say, when $\alpha\beta < k1$, after a long enough time, the consumption amount of both sides will tend to infinity, which will lead to adverse consequences for both sides of comparing consumption [12].

Fig. 3 Alpha beta & lt; the trend of $x(t)$ and $y(t)$ at $k1$

Fig. 4 Alpha beta & lt; phase orbit image at $k1$

3 Model of model explanation

According to Eq. (2) and balance point stability analysis, you can explain several simple and important phenomena.

1. Condition (6) indicates that when the economic constraints of the two parties are greater than the stimulation of both parties, the comparative consumption will tend to stabilise. Conversely, $x(t)$, $y(t)$ will tend to endless, compare consumption the phenomenon will be in unlimited, which may lead to poor consequences.

2. from (3), if $g = h = 0$, $X_0 = 0$, $Y_0 = 0$ is a balance point of Eq. (2), and is stable in condition (6). So if at some point, there is a T_0 in $X(T_0) = Y(t_0) = 0$, x , y will always remain zero. This situation can be explained as the two sides do not have vanity and any climb behaviour, family, mass media can actively the correct guidance, the two sides can maintain a long-lasting and harmonious relationship, the relationship between classmates is friendly and harmonious.
3. If $g = h \neq 0$, even for some reason (the two parties are not allowed to spend), the consumption amount is largely reduced at a certain moment, and we may wish to set $x(t_0) = y(t_0) = 0$, then because $x = g$, $y = h$ will also restart the two sides to compare the consumption phenomenon. This means that the reconciliation of the respective vanity is not eliminated.
4. If for some reason (such as a certain source of economic sources), the consumption amount of a certain party is reduced, and $X(T_0) = 0$ may be set, then because $x = ky + g$ will make the party once the economic situation is improved, and it will be re-caught in the ranks of consumption. This shows that there is a unilateral reduction consumption of a climb ($k \neq 0$) or vanity ($g \neq 0$).

4 Conclusion

In sum, college students' consumption behaviour is not isolated, but is closely related to their consumption concepts and consumer psychology. The education and guidance of college students' consumption behaviour is an important part of the ideological and political education in colleges, which not only affects the formation of college students' livelihood, world view and values, but also affects college students' growth and comprehensive development. This article is based on the differential equation for the establishment of college students' 'climbing consumption. In order to abandon college students' climb idea, you should actively strengthen study and conduct self-education, improve your own quality, and establish the correct consumption concept; the fundamental is the pairing of family and the education and guidance of college students. 'consumption behavior and its basis the school's education and guidance of college students' consumption behaviour. Due to the combination of internal and the multi-tube, it is difficult to guide college students to form a reasonable consumption behaviour.

References

- [1] Ziane D, Cherif M H, Cattani C, et al. Yang-Laplace Decomposition Method for Nonlinear System of Local Fractional Partial Differential Equations[J]. *Applied Mathematics and Nonlinear Sciences*, 2019, 4(2):489-502
- [2] El-Borhamy M, Mosalam N. On the existence of periodic solution and the transition to chaos of Rayleigh-Duffing equation with application of gyro dynamic[J]. *Applied Mathematics and Nonlinear Sciences*, 2020, 5(1):93-108.
- [3] Assis R, Pazim R, Malavazi M C, et al. A Mathematical Model to describe the herd behaviour considering group defense[J]. *Applied Mathematics and Nonlinear Sciences*, 2020, 5(1):11-24.
- [4] Yue J, Wu Q, Li J, et al. Study on the Influence of Mental Health Course on the Mental Health Level of College Students[J]. *Creative Education*, 2019, 10(13):3286-3292.
- [5] Dimitrienko Y I, Li S, Niu Y. Study on the dynamics of a nonlinear dispersion model in both 1D and 2D based on the fourth-order compact conservative difference scheme[J]. *Mathematics and Computers in Simulation*, 2021, 182:661-689.
- [6] Wang X, Liu Y, Tao Z, et al. Study on the Failure Process and Nonlinear Safety of High Arch Dam and Foundation Based on Geomechanical Model Test[J]. *Engineering Failure Analysis*, 2020, 116(5):104704.
- [7] Bi A, Ao B, Jmyh C, et al. A comparison between American and Chinese college students on suicide-related behavior parameters - ScienceDirect[J]. *International Journal of Clinical and Health Psychology*, 2020, 20(2):108-117.
- [8] Huang M, Liu S, Y Zhang, et al. Research on the university intelligent learning analysis system based on AI[J]. *Journal of Intelligent and Fuzzy Systems*, 2021(31):1-10.
- [9] Umah U. Comparison of Students' Covariational Reasoning Based on Differences in Field-Dependent and Field-Independent Cognitive Style[J]. *NUMERICAL Jurnal Matematika dan Pendidikan Matematika*, 2020, 4(1):41-54.
- [10] Gao J, Song J H, Yuan K. An Empirical Study on the Mechanism of College Students' Green Consumption in China[J]. *The Journal of Eurasian Studies*, 2019, 16(1):211-238.

- [11] Kosson D S, Chi T, Riser N, et al. Facial affect recognition in college students with psychopathic traits: A comparison using tests matched in discriminating power[J]. *Journal of Research in Personality*, 2019, 78:52-60.
- [12] Huang D, Wen J, Xing L, et al. Study on a Nonlinear Dynamic Model and Its Parameters Determination Method for Half-Sine Programmer[J]. *Xibei Gongye Daxue Xuebao/Journal of Northwestern Polytechnical University*, 2019, 37(6):1085-1094.

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