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The Study on Affective Decision-Making of Criminals in China

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Abstract In order to explore and analyze the affective decision-making of criminals, 49 criminals (divided into two groups: 19 economic criminals and 30 violent criminals) were chosen from a Henan province using the method of random sampling and 20 persons in the society were chosen as a control group. We compared the selected times of the 49 criminals and 20 controls when they completed the Iowa gambling task (IGT), which is an effective way of assessing the affective decision-making. On the choice of the card A/K/L/S, the criminals' selected times on the card L were significantly less than the controls, on the card S were significantly more than the controls; On the choice of the advantageous card and the disadvantageous card, the control group selected the advantageous card significantly more than the criminals, the criminals selected the disadvantageous card significantly more than the control group; For the control group, the selected times on the advantageous card is significantly more than the disadvantageous card; for the violent criminals, the selected times on the disadvantageous card is significantly more than the advantageous card; On the choice of Low frequency punishment cards/High frequency punishment cards, all three groups' reaction times on the Low frequency punishment cards were significantly more than the High frequency punishment cards. The results of this study provide novel behavioral evidence of criminals in affective decision using the IGT, the criminals had some difficulty in affective decision-making, seeing the long term interests is difficulty for them; On the other hand, they were easier to choose the low frequency punishment cards similarly with the control group, which confirmed that the criminals had the normal sensitivity to punishment.

Keywords Affective decision-making, Criminals, The Iowa Gambling task (IGT)

1. Introduction

The capacity of affective decision-making has always been thought to be a senior social cognitive ability, and been attached to considerable importance by psychologists, neuroscientists and social scientists. The main purpose of the researches on the affective decision-making is to help people make good decisions which are beneficial to themselves (Zelazo & Mller, 2002; Li, 2007). In 1994, Bechara developed the Iowa Gambling Task (IGT) by stimulating the real-world situation to research the group with the defective affective decision-making deficit for the first time (Bechara, Damasio, & Anderson, 1994). The deeper the field is studied, the more research paradigms of the affective decision-making are, such as the Game of Dice Task (GDT), the Cambridge Gambling Task (CGT) (Clark, 2003), the Bangor Gambling Task (BGT) (Bowman & Turnbull, 2004) and so on.

Criminal behaviors are the behaviors which cause harm to society, violate the criminal law, and should deserve punishments. However, the penal law only cares whether the behavior generates a bad result, doesn't care the internally cognitive process and the psychological factors which affect the formation of the criminal behaviors. The criminal behaviors are the results of the criminals' subjective cognitive process, therefore, studying the criminals' affective decision-making has very important value to the crime prevention, the reform of criminals, and the formation of criminology theory. The potential criminals' decision-making is to decide whether commit a crime after the comparison and analysis of some kind of crime's benefits and costs. If the criminals choose to commit a crime, it means that he has made the crime decision in their mind. In brief, the decision-making of the criminal behavior is to make the decision of crime in one's mind. In order to study criminals' affective decision-making, our research performed an Iowa Gambling Task on the criminals in a Henan prison.

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2. Methods

2.1. Participant

This investigation recruited 58 male criminals serving sentences from a prison in Henan province, using the following rules: (1) literate; (2) did not have any brain lesions; (3) no other psychotic diseases or drug/tobacco abuse, or other types of personality disorder. Those criminals were divided into economic criminals and the violent criminals according to their preceding accusation. 20 control groups were recruited from the multiple industries in society. All the criminals and control groups had normal eyesight or corrected eyesight, and were right-handed (as indicated on the Edinburgh Handedness Inventory). None of them had color blindness (tested using a seven color board). All participants provided their written informed consent to participate in the current design; the study protocol was approved by a local ethics committee.

2.2. Task and Procedure

Affective decision-making is considered as a senior social cognitive ability, and has gotten great importance for a long time. The main purpose of these kind of study is to help a person make the advantage choice. In 1994, Bechara B, as the one to study the groups' affective decision-making, designed the Iowa Gambling Task (IGT) by simulating the real life situations (Luo, Feng, Tang, Huang & Li, 2011). The IGT was used to test the affective decision-making of the criminals and the control groups. In order to avoid thinking the red or the black color in front of the cards as the criterion of win or lose, we set the colors into the same one. On the second line at the top of the screen, a green strip would be shown as a reminder to tell participants the earnings after they made decisions. A red strip above the green strip would be shown as a reminder to tell participants the Principal, fixed 2000yuan. Below the green strip, four kind cards respectively signed A, S, K, L would be shown. If the participants selected card A, they can get 100yuan every time, selecting 10 times, 5 of them would make the participants loss 150yuan to 350yuan at the same time of get 100yuan, after 10 times selections, they will get -250yuan; If the participants selected card S, they can get 100yuan every time. Selecting 10 times, 1 of them would make the participants loss 1250yuan at the same time of get 100yuan, after 10 times selections, they will get -250yuan; If the participants selected card K, they can get 50yuan every time. Selecting 10 times, 5 of them would make the participants loss 50yuan at the same time of get 50yuan, after 10 times selections, they will get 250yuan. If the participants selected card L, they can get 50yuan every time. Selecting 10 times, 1 of them would make the participants loss 250yuan at the same time of get 50yuan, after 10 times selections, they will get 250yuan. Card A and card S are disadvantageous and lead to long-term losses. Card K and card L are advantageous and lead to long-term gains. The loss frequency of card is higher than card S, similarly, the loss frequency of card K is higher than card L.

At the beginning of our study, all the subjects were asked to fill the demographic information firstly. Then, they were asked to complete the IGT. The task was programmed by E-Prime 1.0, was executed on the Great Wall desktop computer (16 inches color monitor). The four kind cards would be shown to the participants on the reverse side. Then they were required to select one card (A, S, K, L) with the ultimate goal to gain more money by pressing the keys, the card would be reversed and show participants the feedback about the gains and losses.

2.3. Statistical Analyses

All data was conducted using IBM SPSS 16.0, including the methods of descriptive statistics, mixed-model ANOVA and one way ANOVA. The 0.05 level *P*-value (2-tailed) for all the analyses was corrected for deviations according to Greenhouse Geisser.

3. Results

3.1. Statistics of the Demographic Data

We excluded 9 criminals from the criminal group because 6 of them could not understand the experiment and 3 of them made the choices in a fixed order, leaving 49 criminals (19 economic criminals, 30 violent criminals). The demographic data is shown in Table 1. There was no significant difference in the age ($F = 4.56$, $P = 0.07$) or education (F=1012, P=0.35) of the healthy controls, the economic criminals and the violent criminals.

3.2. Statistics of the IGT Task Data

A total of 100 trails were presented in our experiments. We recorded the selecting times of card A, S, K, L, the selecting times of advantageous card (card K plus card L) and disadvantageous card (card A plus card S), the selecting times of the low frequency punishment card (card S plus card L）and the high frequency punishment card (card A plus card K). The performance of these three groups was shown in Table 2.

Table 1

	Economic Criminals (n=19)	Violent Criminals (n=30)	Control Group (n=20)	F	P
age	53.58±6.33	38.91±7.75	42.84±8.01	4.56	0.07
education	13.58±2.52	9.28±0.89	11.36±2.98	1.12	0.35

Table 2. The specific performance of the three groups in task (time, x±s)

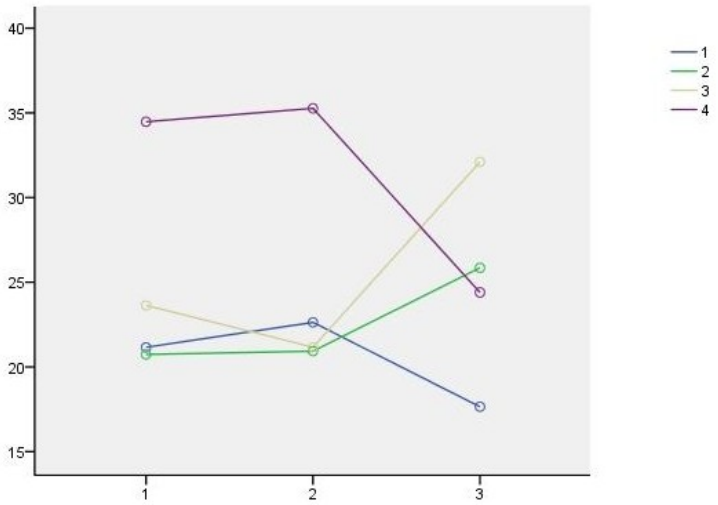
Categories of Cards	Economic Criminals (n = 19)	Violent Criminals (n = 30)	Control Group (n = 20)
A	21.16±9.78	22.63±11.08	17.65±10.53
K	20.74±9.27	20.93±8.01	25.85±17.73
L	23.63±12.89	21.17±12.08	32.10±20.45
S	34.47±18.39	35.27±11.92	24.40±12.04
Advantageous card	44.37±19.11	42.10±16.70	57.95±15.19
Disadvantageous card	55.63±19.11	57.90±16.70	42.05±15.19
Low frequency punishment card	58.11±13.04	56.43±9.16	56.50±19.71
High frequency punishment card	41.89±13.04	43.57±9.16	43.50±19.71

Note: n: the number of each group; 1 economic criminals; 2 violent criminals; 3control group

Table 3. The ANOVA of groups and card types (card A, S, K, and L)

	SS	df	MS	F	*P*
Card type	4484.57	3	1494.86	6.593	0.000 **
Interaction	3731.69	6	621.95	2.74	0.014 *
Group	0.000	1	0.000	0.000	1.000

* P<.05; ** P<.001



Note: horizontal axis: 1 economic criminals; 2 violent criminals; 3control group
vertical axis: 1 card A; 2 card K; 3 card L; 4 card S

Figure 1. The interaction between three groups and card A, K, L, S

Separate ANOVAs were performed on the card A, S, K, L, the advantageous card and disadvantageous, the low frequency punishment card and high frequency punishment card.

Card A, S, K, L

3 (groups) × 4 (card A, S, K, L) ANOVA performed on the selecting times of card A, S, K, and L, found a significant main effect of the card [$F(3, 66)=6.593, P<.01$] and a significant interaction significant effect [$F(6, 66)=2.74, P<.05$] (please refer to Table 3). Post hoc analysis revealed that the control group selected the card L significantly more times than the economic criminals and the violent criminals [$F_L(2, 66)=3.23, P<-.05$], the criminals selected the card S significantly more times than the control group [$F_S(2, 66)=4.05, P<.05$]. The two groups of criminals had no significant differences on the selection of card L or S (please refer to Fig. 1).

The advantageous card and the disadvantageous card

3 (groups) × 2 (The advantageous card, the disadvantageous card) ANOVA performed on the selecting times of the advantageous card and the disadvantageous card, found a significant interaction significant effect [$F(6, 66)=2.74, P<.05$] (Please refer to Table 4). Post hoc analysis revealed that the control group selected the advantageous card significantly more than the criminals [$F(2, 66)=5.62, P<.05$], the criminals selected the disadvantageous card

significantly more than the control group [*F(2, 66)=5.62, P<.05*]. There were no significant differences between the two criminal groups on the selection of the advantageous card and the disadvantageous card. For the control group, the selected times on the advantageous card is significantly more than the disadvantageous card [*F*(1, 66)=4.38, *P<.05*]; For the violent criminals, the selected times on the disadvantageous card is significantly more than the advantageous card [*F(1, 66)=6.48, P<.05*]. (Please refer to Fig. 2).

Table 4. The ANOVA of groups and card types (The advantageous card, the disadvantageous card)

	SS	df	MS	*F*	*P*
Card type	458.27	1	458.27	0.79	0.376
Interaction	6485.83	2	3242.91	5.62	0.006*
Group	0.000	1	0.000	0.000	1.000

* P<.05; ** P<.001

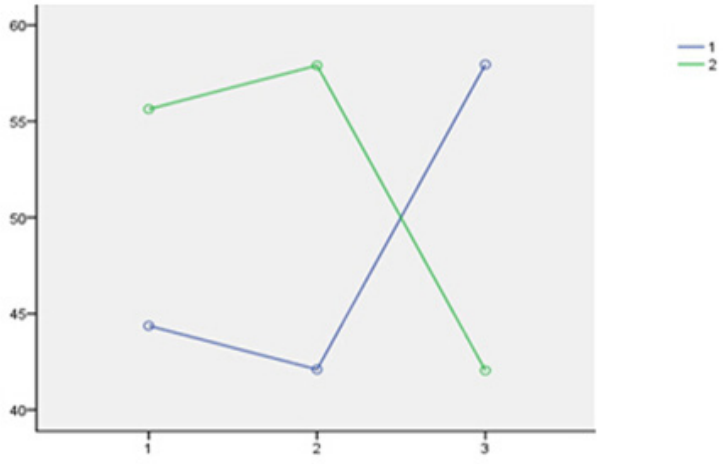
Table 5. The ANOVA of groups and card types (The low frequency punishment card, the high frequency punishment card)

	SS	df	MS	*F*	*P*
Card type	6510.83	1	6510.83	16.69	0.00**
Interaction	74.64	2	37.32	0.096	0.909
Group	0.000	1	0.000	0.000	1.000

* P<.05; ** P<.001

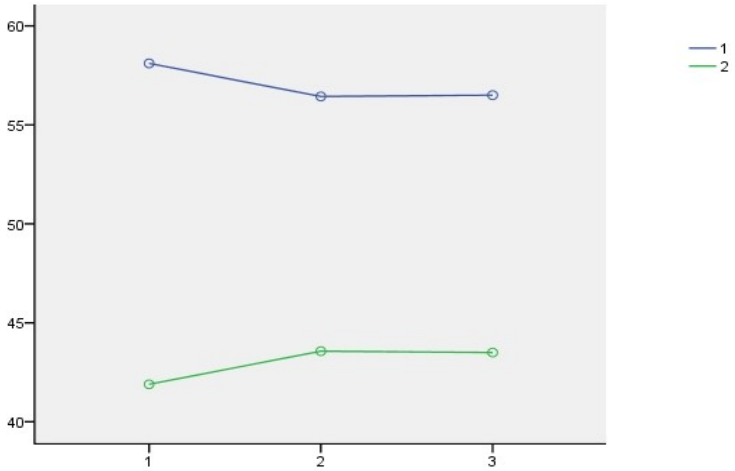
The low frequency punishment card and the high frequency punishment card

3 (groups) × 2 (The low frequency punishment card, the high frequency punishment card) ANOVA performed on the selected times of this classification, found a significant main effect of the card category [*F*(1, 66)=16.69, *P<.05*] (Please refer to Table 5). For all three groups, the selected time on the low frequency punishment card is more than the high frequency punishment card. (Please refer to Fig. 3).



Note: horizontal axis: 1 economic criminals; 2 violent criminals; 3control group
vertical axis: 1advantageous cards; 2disadvantageous cards

Figure 2. The interaction between three groups and categories of cards



Note: horizontal axis: 1 economic criminals; 2 violent criminals; 3control group
vertical axis: 1 low frequency punishment cards; 2 high frequency punishment cards

Figure 3. The main group between three groups and categories of cards

4. Discussion

This study used the IGT task to study the capacity of affective decision-making of the criminals. The following findings emerged. Result one: the control group selected the card L significantly more times than the criminals, the criminals selected the card S significantly more times than the control group; Result two: the control group selected the advantageous card significantly more than the criminals, the criminals selected the disadvantageous card significantly more than the control group. For the control group, the selected times on the advantageous card is significantly more than the disadvantageous card; for the violent criminals, the selected times on the disadvantageous card is significantly more than the advantageous card; Result three: for all three groups, the selected time on the low frequency punishment card is more than the high frequency punishment card. In this study we observed that the criminals had some deficit in the affective decision-making. In order to get more benefit, the control group could adjust their own strategy of selection according to the feedback in blocks. Nevertheless, the criminals did not perform the same tendency which leaded them into a loss situation in the IGT task. These findings were consistent with the findings discovered by Yu Luo from Southwest University (Luo et al., 2011).

According to the result one and result two, we found that the criminals would prefer the cards which have highly instant rewards, but would lead a loss for a long term, rather than the cards which have lowly instant rewards, but would lead a earning for a long term. The professor at the University of Chicago in the United States, Gary Becker, the winner of the Nobel Prize for economics thought that the criminal behavior is a kind of important activity and production, which also involve some typical economic problems, such as the costs and benefits, the optimal state and so on. Facing the highly instant rewards, the criminals were likely to ignore the punishment.

The psychological study showed that the criminal behaviors would form a steady dynamic stereotype system in their brain as other habits and skills, when the criminals especially the violent criminals were facing the selections, the habitual thinking made them only think about the immediate interests, even though they encountered setbacks and losses (Lin, 2000). They could not regulate their strategy so that they entered the criminal chasm step by step and resulted into the prison in the end. In our experiment, the criminals we chose had been in prison above 5 years, but their fixed thinking mode still let them pay attention to the immediate interests and neglect long-term interests. This situation involved the reform of the criminals. A survey had found that there is an increased secondary crime rate in our country (Liu & Liu, 2008). All those result pointed out that the reform of the criminals was not perfect. The secretary of the Central Committee, Yong-Kang Zhou pointed out that, in order to make the criminals repentant and turn over a new leaf, the reform of criminals should be put in the first supervision place. At the same time, we should treat the secondary crime rate as the primary standard (Zhou, 2012). In the new period, the criminal staff should pay their attention not only on the physical reform but also on the psychological reform. Using the psychological theories and methods (e.g. behavior modification therapy and cognitive therapy) to make the criminals realize their error cognitions (e.g. the fluke mind and greediness), so that we could reduce the secondary criminal rate (Lv, 2013).

According to the result three, we found that all the participants were inclined to select the low frequency punishment card, meaning that they had the same sensitivity to punishment. The criminals always needed to balance between the rewards and the punishments of the behavior before they acted. When the punishment frequency was low, they would have fluke mind in some degree, especially when they started to commit the crime, they hoped that they could hit the mark and escape the punishments of the law. To our knowledge, the criminals committed the crime with the consciousness of legal deterrent force, so the arrest rate of an area is significantly negative correlation with the crime rate (Song & Fu, 2005). It meant that in order to decrease the criminal rate, the government should enhance the arrest rate to make the residents perceive the legal deterrent force (Carroll & Weaver, 2004; Chen & Zhang, 2010). Hence, we need improve the crime detection rate by enhancing the strength of obtain evidence, strengthen the crime scene investigation and call for the citizens to assist investigation (Guan & Liu, 2005). Meanwhile, we should exposure the crime detection rate and the rigorous punishments to criminals by public information.

The results of the current study not only provide novel behavioral evidence of anomalies in the affective-decision making among criminals compared with healthy controls, but also pave the way for preventing criminal behaviors in current society.

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