Is deck B a disadvantageous deck in the Iowa Gambling Task?
Link: http://www.biomedcentral.com/content/pdf/1744-9081-3-16.pdf

以下所整理的資料（「引用內容」）是依據引用「Is deck B a disadvantageous deck in the Iowa Gambling Task?」論文內文中所做的敘述，文內同時引用到本團隊其他相關文章則一併陳列（所引用文章列於「引用本團隊論文」），論文來源列於「參考文獻出處」並同時提供部分訊息「網址連結」。期刊文章、專書與碩博士論文之引用來源主要來自於 Google Scholar(引用時間點為2014/01/14)、「其他」則來自個人部落格。本文所呈現之論文引用不包含自引，本資料僅供參考相關文獻陸續整理修訂中。

「Deck B」、「Deck C」、「SGT」、「再驗SGT」及「IGT-fMRI」分別代表以下五篇論文：


論文引用狀況資料呈現方式分兩部分：
一、論文引用文章，二、文章引用具體內容
一、論文引用文章

期刊與研討會論文

罗 禹、冯廷勇、唐向东、黄 好、李 红 (2011)。不同类型罪犯在爱荷华赌博任务中的决策功能缺陷。心理学报，43(1)，30-41。


專書


碩博士論文


Hou, S. S. (2010). Characterization of decision-making deficits among individuals with alcohol dependence (Master Thesis). Department of Psychology, National Taiwan University, Taipei, Taiwan.


其他

二、文章引用具體內容（按最新生年代依序呈現）

期刊與研討會論文

| 引用 | “A aleatorização da disposição espacial dos baralhos foi adotada por vários estudos (e.g. Cella, Dymond, Cooper, & Turnbull, 2007; Chiu & Lin, 2007; Crone & van der Molen, 2004; Dretsch & Tipples, 2008; Garon & Moore, 2004; Geurts, van der Oord, & Crone 2006; Lin, Chiu, Lee, & Hsieh, 2007; Pecchinenda, Dretsch, & Chapman, 2006).” (p. 202) |
| 引用內容 | “Alguns participantes parecem valorizar mais a frequência de resultados positivos do que as quantias de dinheiro (ganho ou perdido), por isso preferem os baralhos B e D” (p. 205) |

| 引用 | “Thus, it is possible that differences in preferences between Decks A and B (and Decks C and D) can be attributed to individual differences in preference for a high frequency of positive short-term outcomes over long-term gains (Chiu et al., 2008).” (p. 2) |
| 引用內容 | “Previous research that manipulated long-term outcomes on the IGT to be even more positive has shown participants continue to focus on the frequency of gains/losses (Lin et al., 2007, 2009; Chiu et al., 2008), resulting in continued non-optimal decisions.” (p. 7) |


Overman, and Pierce, recognized the phenomenon of female participants' preference for high-frequency gain cards. Their results add another twist to this analysis: females drive the preference for high-frequency-gain cards. There are additional studies that report “high frequency of gain” preference (Chiu and Lin, 2007; Lin et al., 2007; Chiu et al., 2008). However, the data in these papers are difficult to interpret for two reasons. First, none of the reports analyzed/reported effects of gender. Secondly, these authors employ task versions that differ significantly from the mainstream IGT procedures. For example, in the IGT modification used by Chiu et al. (2008), the schedule of wins and losses repeats every five trials for each deck.” (p. 13)
|---|---|

**Pennolazzi 等人在研究中呈現本團隊「輸贏頻率」的現象**

<table>
<thead>
<tr>
<th>引用內容</th>
<th>“In this regard, particular attention was devoted to the preference, if any, for deck B – an effect known as ‘prominent deck B’ [10,25], an index of irrational decision making sometimes reported among healthy participants.” (p. 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Participants generally preferred decks with high-frequency gains – B and D – compared with decks with low-frequency gains – A and C. Conversely, in the IGT-v, the ‘prominent deck B effect’ [25] was present, as there were significantly more selections made from this deck as compared with all other decks, including deck D (all ps &lt; 0.05).” (p. 5)</td>
<td></td>
</tr>
</tbody>
</table>

**Sallum 等人在研究中使用本團隊分析 IGT 的方式**

<table>
<thead>
<tr>
<th>引用內容</th>
<th>“Other outcome measures used for analysing IGT performance include total money won (van den Bos et al., 2006); total of cards selected on individual decks (Chiu and Lin, 2007); comparison between the number of cards selected from the decks A and C (low-frequency losses) and decks B and D (high-frequency losses) (Chiu and Lin, 2007); and analyses of deck selection in all the 100 trials vs. the last 50 trials (Rocha et al., 2011).” (p. 1)</th>
</tr>
</thead>
</table>
Seeley等人在研究中提到本團隊「輸贏頻率及分析方法的影響」

"It is an extensively used tool to identify the neural processes underlying decision making (Bechara, Damasio, Tranel, & Anderson, 1998; Bechara, Damasio, Damasio, & Lee, 1999; Bechara et al., 2001; Lin, Chiu, Cheng, & Hsieh, 2008) and to assess decision making impairments in many clinical populations."

"However, a growing body of literature suggests that this simple metric has led to an oversimplified understanding of the decision making process (Chiu & Lin, 2007; Chiu et al., 2008; Lin, Chiu, Lee, & Hsieh, 2007; Lin, Chiu, & Huang, 2009; North & O’Carroll, 2001; Stocco, Fum, & Napoli, 2009; Yechiam, Stout, Busemeyer, Rock, & Finn, 2005)."

"Numerous studies have evaluated the original structure and propose that loss frequency can predict deck choice, rather than OEV (Chiu et al., 2008; Chiu & Lin, 2007; Lin et al., 2007)."

"It has previously been noted that decision makers are sensitive to decks with high frequency of loss in the IGT (Chiu et al., 2008; Chiu & Lin, 2007; Lin et al., 2007)."

引用本團隊論文

參考文獻出處
Singh在研究中引用受試者偏好高贏錢頻率牌的現象

引用內容

“This preference is incompatible with the SMH–IGT framework as demonstrated, for example, by the finding that deck B was considered “risky” on the basis of the intertemporal attribute and is preferred to other “safe” decks (Lin et al., 2007), where as deck C that was considered “safe” is avoided by healthy participants (Chiu and Lin, 2007).” (p.2)

“Decision making in the IGT is observed to be governed by frequency of reinforcement rather than the intertemporal attribute in several cultural contexts including Taiwan (Chiu and Lin, 2007; Lin et al., 2007; Chiu et al., 2008), Iran (Ekhtiar et al., 2009), Brazil (Schneider et al., 2010), and India (Singh and Khan, 2008).” (p.6)

引用本團隊論文


參考文獻出處


|---|---|

<table>
<thead>
<tr>
<th>Citation</th>
<th><em>“Yet, the IGT has been confronted by a substantial number of criticism (Chiu &amp; Lin, 2007; Chiu et al., 2008; Dunn et al., 2006; Lin et al., 2007; Steingroever et al., 2013).” (p.25-26)</em></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Citation</th>
<th><em>Note that these procedures collapse choice proportions over the two good decks and over the two bad decks, leading to a loss of potentially diagnostic information (Chiu &amp; Lin, 2007; Dunn et al., 2006; Lin, Chiu, Lee, &amp; Hsieh, 2007), a point to which we will return later.” (p. 3)</em></th>
</tr>
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<th>Citation</th>
<th><em>“Note that these procedures collapse choice proportions over the two good decks and over the two bad decks (Chiu &amp; Lin, 2007; Dunn et al., 2006; Lin et al., 2007).” (p. 5–6)</em></th>
</tr>
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<tr>
<th>Citation</th>
<th><em>“Studies applying the Soochow gambling task (SGT)—a variation of the IGT in which both good options yield high-frequent losses and both bad options yield low-frequent losses—show that healthy participants prefer the bad options over the good options, indicating again that healthy participants base their choices on the frequency of losses (Ahn, Busemeyer, Wagenmakers, &amp; Stout, 2008; Chiu et al., 2008).” (p. 8)</em></th>
</tr>
</thead>
</table>

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**Note**: The above text is a natural representation of the document content. The table and citation format have been adapted for clarity and ease of reading.
"It is important to note that for many published IGT studies, the selection proportions for the two good decks and the two bad decks have been collapsed. This presentation method obscures the impact of the frequency-of-losses effect (Chiu & Lin, 2007; Dunn et al., 2006; Lin et al., 2007)." (p. 9)

"Our findings reveal the presence of a frequency-of-losses effect in healthy participants, as already indicated by many studies (Ahn et al., 2008; Caroselli et al., 2006; Chiu & Lin, 2007; Chiu et al., 2008; Dunn et al., 2006; Huizenga et al., 2007; MacPherson et al., 2002; Lin et al., 2007; Wilder et al., 1998; Yechiam & Busemeyer, 2005).” (p. 23)

**Reference**


**Referenced Content**

et al., 2006; Fernie and Tunney, 2006; Chiu and Lin, 2007; Lin et al., 2007). Several studies have shown that normal decision makers do not learn to prefer the two advantageous decks, but rather prefer one of the advantageous (deck D) and one of the disadvantageous (deck B) decks (e.g., Wilder et al., 1998; O’Carroll and Papps, 2003; Rodríguez-Sánchez et al., 2005; Toplak et al., 2005; Fernie and Tunney, 2006; Martino et al., 2007; Caroselli et al., 2010; Fridberg et al., 2010). Attention to long-term outcome alone cannot explain such choice behavior. Consequently, the validity of the simple difference score, taking into account long-term outcome only, has recently been ques- tioned, as it may hide effects pertaining to differences between decks with identical expected long-term outcome (Chiu and Lin, 2007; Lin et al., 2007).” (p.1-2)

“Our results suggest that for normal subjects gain and loss frequency are the primary factors driving their decisions. We observed that subjects weighted both factors higher than long-term outcome. This clearly contrasts with the initial assumptions made by Bechara et al.(1994). Looking at individual preferences for each deck, we observed that subjects in general preferred choices associated with high-frequency gains (9:1, decks Band D) to those with low-frequency gains (5:5, decks A and C), regardless of their magnitude and long-term outcome (see Figure 2). This is in line with previous observations (e.g., Wilder et al., 1998; MacPherson et al., 2002; Yechiam and Bussemeyer, 2005; Dunn et al., 2006; Huizenga et al., 2007; Lin et al., 2007; Carlson et al., 2009; Caroselli et al., 2010). However, among the option with low-frequency gains (decks A and C), subjects learned to distinguish between choices that led to advantageous (deck C) and disadvantageous (deck A) long-term consequences. Such distinction was not present for the decks with high-frequency gains (B and D). This can be explained by the weight given to loss frequency, the only feature where A and C but not B and D differ. As this weight increases after the first block of trials, the preference of deck C over deck A becomes observable, while cards from decks B and D are still chosen equally often. Thus, our model makes it possible to relate decisions on all four decks to the relative importance given by the subjects to one or more of the three features characterizing the options in the IGT.” (p.6)

“With in the decks with high-frequency gains, we observed after an initial exploration phase comparable choice pattern for decks B and D, but with in the low-frequency gain decks a clear preference for deck C over deck A. This corroborates findings by Lin et al.(2007), who observed the same pattern in a modified version of the IGT that directly contrasts deck A with C and deck B with D. The authors suggest that the clear preference for deck C over deck A in the original version of the task might be due to the fact that despite the seemingly identical gain/loss frequency, deck C in fact contains fewer trials with net losses than deck A. In ours study, participants experience for 10 selections from deck A five net gains ($100 gains −$0 loss) and five net losses ($100 gains −$150 . . . $350 losses). In contrast, for 10 selections from deck C participants experience five net gains ($50 gain −$0 loss) and five standoffs ($50 gain −$50 loss). Thus, while for both card decks participants are shown on the screen 5 losses in 10 trials, the frequency of net losses differs between these two
decks. Such a distinction does not exist for decks B and D, as for both decks, comparable to deck A, every trial associated with a loss also results in a net loss. Chiu and Lin (2007) modified the task in such a way that the frequency of net losses was identical between decks A and C. After his modification, they no longer observed differences between preferences for deck A and C. Hence, it is likely that the observed effects in the current study hinge on the difference in frequency of net losses between decks A and C. But, importantly, note that deck A and C do not differ regarding their gain frequency.” (p.7)

引用本團隊論文

参考文獻出處

網址聯結

Buelow & Suhr 引用本團隊發現壞牌 B 異於壞牌 A 的現象
引用內容
“Although most research to date has assessed IGT performance based on the number of advantageous minus disadvantageous selections, either as a whole or broken down into blocks of trials, a growing number of researchers has raised concerns that Decks A and B may not be equally disadvantageous. Decks A and B both result in a higher immediate reward but long-term negative consequences; however, Deck B results in a net gain on 90% of the trials, whereas Deck A results in a net gain only 50% of the time (Bechara, 2008). In addition, the immediate losses in Deck B are of a larger magnitude than those in Deck A. A similar difference is seen between Decks C and D, as Deck D is associated with more frequent gains (90%) but a higher magnitude of losses, while Deck C has more frequent losses (50%) but they are of a lower magnitude. A significant minority of healthy control samples shows a preference for Deck B (e.g., Bark, Dieckmann, Bogerts, & Northoff, 2005; Fernie & Tunney, 2006; Overman et al., 2004; Toplak, Jain, & Tannock, 2005). This preference may suggest a greater focus on the high frequency of immediate gains rather than the longer-term outcomes of the decks (Lin, Chiu, Lee, & Hsieh, 2007). ”(p.2)

“Adaptations of the IGT have been created to further assess the relative emphasis on long-term outcomes versus frequency of wins=losses among controls. Utilizing the Soochow Gambling Task (Lin et al., 2007), healthy control participants preferred decks with a high frequency of wins but a long-term negative outcome over decks with a lower frequency of wins but long-term positive
outcomes (Chiu et al., 2008; Lin, Chiu, & Huang, 2009). Using a different modified IGT, Caroselli et al. (2006) found that healthy control participants' selections from ‘‘Deck A,’’ with a 50% win frequency but long-term negative outcomes, decreased as the task progressed, while selections from ‘‘Deck B,’’ with a long-term negative outcome but a 90% win frequency, increased. Collectively, these studies provide evidence that decision making in healthy controls may be guided more by the frequency of gains rather than the overall, long-term outcome associated with a particular behavior, contrary to the original conceptualization of the IGT decks.” (p.2)

“These results have implications for real-world decision making. During a period of acute nicotine abstinence, when risky decision making may be most pronounced on the IGT, individuals may be more likely to make a risky decision. This could include deciding to return to smoking or to engage in other behaviors that produce the same ‘‘thrill’’ that the brain is seeking. There is evidence from other clinical populations that performance on the IGT can relate to risky decision making in the real world. For example, pathological gamblers—individuals who have a history of making risky decisions with money that have a strong potential for negative outcomes—perform worse on the IGT, failing to shift to the advantageous decks over time, compared with control participants (Cavedini, Riboldi, Keller, D’Annucci, & Bellodi, 2002; Goudriaan, Oosterlaan, de Beurs, & van den Brink, 2004, 2005; Linnet, Rojksjaer, Nygaard, & Maher, 2006). However, as the present deck-type analysis has shown, assessing risky decision making on the IGT appears more complex than originally thought. Future studies should utilize the IGT, alternative versions of the IGT that have been designed to assess different aspects of risk taking (including frequencies of rewards= punishments and extent of short-term versus long-term gains=losses [Caroselli et al., 2006; Lin et al., 2007]), and other reward-based measures (e.g., Brand et al., 2005; Frank, Seeberger, & O’Reilly, 2004; Lejuez et al., 2002) to more fully assess risky decision making and how it may relate to real-world decision making.” (p.6)

引用本團隊論文

| 網址聯結 | http://www.tandfonline.com/doi/abs/10.1080/21622965.2012.691065 |

Bertoux 等人研究指出頻率效應出現在正常控制組的情形與動物研究的結果一致
A similar result was obtained by Lin et al. [51], who showed that control participants in particular chose the “B” deck of the IGT, which provides a higher frequency of rewards, whereas, at the same time, offers few losses of larger amounts. The findings of these studies are consistent with animal reinforcement studies showing that animals are influenced more strongly by the frequency of reward than by amount of reward [52].

**Reference**

**Reference**

“*The somatic marker hypothesis (SMH) states that emotions are indispensable to long-term decision making (Damasio, 1994). Support for the hypothesis comes from observing healthy participants’ ability to make long-term advantageous decisions on a task called the Iowa gambling task (IGT; Bechara et al., 1994). In order to rule out reward and punishment sensitivity as an alternative explanation for decision making on the task, Bechara et al. (2000b) compared reward and punishment variants of the IGT to demonstrate long-term advantageous decision making irrespective of the immediate reward and punishment frame of the IGT. However, in the most examined reward variant, the magnitude (Tomb et al., 2002; van den Bos et al., 2006) and frequency of immediate reward and punishment (Chiu and Lin, 2007; Lin et al., 2007; Chiu et al., 2008) continue to confound long-term decision making in the IGT.*” (Singh and Khan, p.1)

“The on-the-surface difference of greater long-term advantageous decision making in the punishment variant observed in the original study (Bechara et al., 2002) had led to the present investigation. As suspected, the number of participants making more long-term advantageous decisions in the punishment variant was higher (more than 60%) than in the reward variant. The results point out a difference in long-term decision making in the reward and punishment variants, contradicting the claim that IGT decision making is immune to reward and punishment orientation (Bechara et al., 1994, 2000b). The role of rewards and punishments has been a contentious issue in IGT studies. For example, contrary to the SMH-IGT assumption, the learning of rewards and punishments (Rolls et al., 1994), knowledge of rewards and punishments (Maia and McClelland, 2004), immediate rewards and punishments (van den Bos et al., 2006), and frequency of immediate rewards and punishments (Chiu and Lin, 2007; Lin et al., 2007; Chiu et al., 2008) are believed to confound long-term decision making in the reward variant of the IGT, weakening the assertion that IGT decision making is immune to reward and punishment sensitivity. The present results obtained from comparing both the variants of
the IGT suggest that reward and punishment has an effect on long-term decision making in the IGT in the form of the variant type (reward and punishment), order type (reward followed by punishment and vice versa), and instruction type (either approach reward or avoid punishment, and approach reward while avoiding punishment).” (Singh and Khan, p.4)

“The results underscore the role of socio-economic and cultural factors in understanding decision making in the IGT. Inconsistent with the IGT assumptions, frequencies of immediate reward and punishment rather than the inter-temporal nature of choices were determinants of IGT decision making in Taiwan (Chiu and Lin, 2007, Lin et al., 2007; Chiu et al., 2008), Iran (Ekhtiari et al., 2009), and Brazil (Bakos et al., 2010). While it is assumed that risk is perceived in terms of inter-temporality and risky decision making is manifested in the tradeoff between an immediate versus a delayed outcome (irrespective of reward or punishment as an outcome) in the IGT, socio-economic, and cultural differences in the IGT suggest an alternative definition of risk and risky decision making in the IGT. When socio-economic and cultural differences are investigated as a part of the decision neuroscience studies, it would benefit areas such as cultural neuroscience, and social neuroscience, by helping us understand the link between culture-specific decision making behavior and brain functioning.” (Singh and Khan, p.4)

**引用本團隊論文**


**参考**


**Jansen**

**引用内容**

**引用本團隊論文**


**参考**

Jansen, BRJ, van Duijvenvoorde, ACK, & Huizenga, HM (2012). Development of decision making:
Steingroever等人引用本團隊在「頻率」上的發現

“Over the last two decades, the IGT has become what is arguably the most popular neuropsychological paradigm to measure decision-making deficits in clinical populations (Toplak, Sorge, Benoit, West, & Stanovich, 2010). To illustrate, a search for “Iowa gambling task” yields about 178,000 hits on Google, and about 3,640 hits on Google Scholar.2 Prior to 2005, the IGT had already been used in almost 100 neurological and psychiatric studies (Bowman, Evans, & Turnbull, 2005). Studies that use the IGT have involved a broad variety of clinical populations such as patients with vmPFC lesions (Bechara, Damasio, Tranel, & Anderson, 1998; Bechara et al., 1999, 2000), pathological gambling (Cavedini, Riboldi, Keller, D’Annucci, & Bellodi, 2002), obsessive-compulsive disorder (Cavedini, Riboldi, D’Annucci, et al., 2002), psychopathic tendencies (Blair, Colledge, & Mitchell, 2001), schizophrenia (Bark, Dieckmann, Bogerts, & Northoff, 2005; Martino, Bucay, Butman, & Allegri, 2007), cocaine users (Stout, Busemeyer, Lin, Grant, & Bonson, 2004), traffic offenders (Lev, Hershkovitz, & Yechiam, 2008), and inmates (Yechiam, Kanz, et al., 2008). The traditional way to compare performance of a clinical group to that of a control group is based either on the overall proportion of choices from the good decks, or on a difference score between the overall proportion of choices from the good and bad decks. Note that these procedures collapse choice proportions over the two good decks and over the two bad decks, leading to a loss of potentially diagnostic information (Chiu & Lin, 2007; Dunn et al., 2006; Lin, Chiu, Lee, & Hsieh, 2007), a point to which we will return later.” (Steingroever et al., p.2-3)

“IGT performance is typically recorded for a clinical group and a control group. Different outcome measures have been reported, but most studies compute either the overall proportion of choices from the good decks or a difference score between the overall proportion of choices from the good and bad decks. An overall proportion of choices from the good decks larger than .50 or a positive difference score are considered as non-impaired performance (Bechara et al., 1998, 1999; Bowman & Turnbull, 2003). The disadvantage of these outcome measures is that they do not reflect the change in the deck preferences across trials. Therefore, many studies report these outcome measures also in blocks of 10 to 20 trials. These trial-dependent outcome measures are often entered in a block x group analysis of variance (ANOVA). Note that these procedures collapse choice proportions over” (Steingroever et al., p.5-6)

“Despite its frequent use, the IGT has been confronted by a growing body of criticism. It is increasingly apparent that even healthy participants perform poorly because they fail to develop a
preference for both good options, contradicting the assumptions of Bechara et al. (1994). More specifically, many studies have shown that healthy participants prefer the decks with infrequent losses (decks B and D) indicating that healthy participants base their choices on the frequency of losses rather than on the long-term outcomes (Caroselli, Hiscock, Scheibel, & Ingram, 2006; Dunn et al., 2006; MacPherson, Phillips, & Della Sala, 2002; Lin et al., 2007; Wilder, Weinberger, & Goldberg, 1998; Yechiam & Busemeyer, 2005). Caroselli et al. (2006) even concluded that “the card selection preferences of undergraduates were more similar to those of Bechara et al. (1994)’s seven patients with frontal lobe damage than to those of their 44 normal controls” (p. 208).

Studies applying the Soochow gambling task (SGT)—a variation of the IGT in which both good options yield high-frequent losses and both bad options yield low-frequent losses—show that healthy participants prefer the bad options over the good options, indicating again that healthy participants base their choices on the frequency of losses (Ahn, Busemeyer, Wagenmakers, & Stout, 2008; Chiu et al., 2008). The frequency-of-losses effect has also been found in a different version of the IGT in which Chiu and Lin (2007) established a higher contrast between rewards and losses on each trial by increasing their magnitude while keeping the traditional long-term outcomes (i.e., −250 for 10 cards from the bad decks, and +250 for 10 cards from the good decks). Chiu and Lin (2007) conclude that “the IGT contains some redundant procedures, confounding features, and problems in interpretation” (p. 9) and that “these problems should be refined to make the IGT a truly useful assessment tool” (p. 9). Further evidence for the frequency-of-losses effect in healthy participants has been reported by Huizenga, Crone, and Jansen (2007) who showed that the dominant IGT strategy in the considered age groups ranging from 6 to 25 years is to focus on the frequency of losses, a dominance that increases with age.

It is important to note that for many published IGT studies, the selection proportions for the two good decks and the two bad decks have been collapsed. This presentation method obscures the impact of the frequency-of-losses effect (Chiu & Lin, 2007; Dunn et al., 2006; Lin et al., 2007). In this article we aim to overcome this complication by reviewing the literature that does contain information from each individual deck, by re-analyzing raw data of previous IGT studies that we received upon request, and by collecting data from a relatively large sample of healthy participants.” (Steingroever et al., p.6-9)

“This article focused on performance of healthy participants on the IGT. Two literature reviews and the analysis of eight data sets together challenge the assumptions of Bechara et al. (1994) about the IGT choice behavior of healthy participants. Our findings reveal the presence of a frequency-of-losses effect in healthy participants, as already indicated by many studies (Ahn et al., 2008; Caroselli et al., 2006; Chiu & Lin, 2007; Chiu et al., 2008; Dunn et al., 2006; Huizenga et al., 2007; MacPherson et al., 2002; Lin et al., 2007; Wilder et al., 1998; Yechiam & Busemeyer, 2005). In addition, we showed that performance of healthy participants is characterized by considerable variability, both across groups and across participants within the same study, and that healthy participants fail to progress from an initial stage of exploration to a later stage of exploitation. These findings clearly contradict
the common belief that “most healthy participants sample cards from each deck, and after about 40 or 50 selections are fairly good at sticking to the good decks”.6” (Steingroever et al., p.23)

“Our results showed that many healthy participants perform poorly on the IGT, begging the question as to why they do not learn to prefer both good decks over both bad decks. Altogether, it seems that many participants find it particularly difficult to figure out that deck B is a bad deck—after all, deck B yields high immediate, constant rewards. One explanation for why healthy participants do not learn to prefer both good decks over deck B is related to the payoff scheme as developed by Bechara et al. (1994). As first pointed out by Lin et al. (2007), cards from deck C never yield a net loss, but cards from deck A do. This goes against Bechara et al. (1994)’s idea of designing one good deck and one bad deck with high-frequent losses and suggests that the good decks and bad decks are pseudo-balanced. Decks B, C, and D are more similar than expected because they yield either no or very few net losses, whereas deck A yields frequent and big net losses and is thus the only deck that clearly differs from the others with respect to the net outcomes. Another explanation is that the payoff scheme encourages participants to only focus on the immediate losses; the losses vary but the immediate rewards are completely predictable as they are constant across trials for each deck. The predictability of immediate rewards also contradicts Bechara et al. (1994)’s intention of “uncertainty of reward and punishment” (p. 8).” (Steingroever et al., p.23-24)

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disadvantageous deck. Deck 2 has been shown to be favoured in past studies (e.g. Lin, Chiu, Cheng, & Hsieh, 2008; Lin, Chiu, Lee, & Hsieh, 2007), although not always (Tomb, Hauser, Deldin, & Caramazza, 2002). Like the SDMT in the current study, IGT performance was not related to age, gender, or estimated intelligence. Although past research has revealed age differences in IGT performance (Crone & van der Molen, 2004; Hooper, Luciana, Conklin, & Yarger, 2004; Kerr & Zelazo, 2004), these studies were conducted in children and adolescents up to the age of 17. The literature suggests that following normal development, age differences on IGT performance are not observed again until normal ageing sets in (Denburg, Tranel, & Bechara, 2005). In contrast to age, the effects of gender and intelligence on the IGT appear to be inconsistent. While some studies have shown gender effects (Bolla, Eldreth, Matochik, & Cadet, 2004; Overman, 2004), this study did not. Further, while no relationship with intelligence was observed in this study, estimated intelligence has previously shown both a negative relationship with IGT performance (Evans, Kemish, & Turnbull, 2004), as well as a positive relationship (Suhr & Hammery, 2010). IGT performance was not related to mood in the current study, again inconsistent with past research that has shown that those with higher levels of negative affect made more disadvantageous decisions on the IGT (Suhr & Tsanadis, 2007). It is possible that associations between performance on the IGT, and age, intelligence and mood, were not observed here due to the relatively homogenous group of participants recruited from undergraduate psychology courses. However, it is clear that many inconsistencies exist within the IGT literature, and, the shortcomings of the task are well documented (Dunn, et al., 2006; Maia & McClelland, 2004, 2005).” (Kelly, p.49-50)

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引用本文引用本團隊「Deck B」的發現
“La Iowa Gambling Task (Bechara et al., 1994) simula situaciones de toma de decisiones de la vida diaria, en las cuales está la posibilidad de obtener recompensas o castigos en condiciones de incertidumbre y riesgo. En esta prueba, los sujetos eligen cartas de 4 mazos, y con cada elección se presentan ganancias monetarias junto con pérdidas ocasionales. Para su correcta ejecución, el sujeto debe seleccionar cartas de los mazos favorables (menores ganancias y menores pérdidas), y obviar aquellas de los mazos desfavorables, en los que las ganancias y penalizaciones son elevadas (Balodis, MacDonald y Olmstead, 2006; Dunn, Dalgleis y Lawrence, 2006; Fernie y Tunney, 2006; Lin, Chiu
y Huang, 2009; Lin, Chiu, Lee y Hsieh, 2007). Numerosos estudios indican que en los pacientes con daño en la región ventromedial de la corteza prefrontal y en los sujetos drogodependientes (consumidores de alcohol, cocaína, heroína, metanfetaminas o cannabis), existe deterioro en la ejecución de dicha prueba. Tienden a elegir más cartas de los mazos desfavorables, sin embargo los sujetos sanos acaban seleccionando más cartas de los mazos favorables (Bechara, 2003; Bechara, Dolan, Denburg, Hindes, Anderson y Nathan, 2001; Bechara y Damasio, 2002; Grant, Contoreggi y London, 2000; Mazas, Finn y Steinmetz, 2000; Mogedas y Alameda, 2011; Shannon, Mathias, Dougherty y Liguori, 2010; Vélez, Borja y Ostrosky-Solís, 2010; Verdejo, Aguilar y Pérez-García, 2004; Whitlow et al., 2004). No obstante los drogodependientes si pueden llegar a ser capaces de realizar la IGT de forma adecuada, ya que como muestra el trabajo de Verdejo-García, Benbrook, Funderbruk, David, Cadet y Bolla (2007) mejoran notablemente cuando la realizan por segunda vez, no tanto como los sujetos controles, y más que los consumidores de cocaína.” (Alameda Bailén et al., p.163)

“Tanto en los consumidores de cannabis como en el grupo control existen diferencias estadísticamente significativas entre las elecciones del mazo A y B, seleccionando con mayor frecuencia el mazo B, lo que indica que no es percibido como desfavorable. Varios autores (Lin et al., 2009; Lin et al., 2007) han intentado explicar este fenómeno, determinando que la preferencia de los mazos puede estar asociada a la frecuencia de ganancias y pérdidas, y no a los resultados obtenidos a largo plazo.” (Alameda Bailén et al., p.169-170)

“Teniendo en cuenta lo dicho anteriormente, consideramos necesario abordar en futuras investigaciones otras cuestiones, como analizar el tiempo de consumo, incrementar la muestra para poder analizar mejor el papel de la edad de inicio usando grupos extremos en la misma, y controlar los períodos de abstinencia y número de recaídas. Además, siguiendo a Contreras, Catena, Cándido, Perales y Maldonado (2008), sería necesario buscar medidas más fiables y solucionar los problemas de previsibilidad, la programación de los mazos, especialmente en B y C (Lin et al., 2009; Lin et al., 2007; Mogedas y Alameda, 2011; van den Bos, Houx y Spruijt, 2006), buscar presentaciones de estímulos más intuitivas o informativas (Gordillo et al., 2010), o analizar el tipo de instrucciones (Balodis et al., 2006; DeDonno y Demaree, 2008; Fernie y Tunney, 2006).” (Alameda Bailén et al., p. 170)

引用本團隊論文
Another plausible explanation for the preference for decks B and D in the BPD group is the “frequency of gain” (FOG) model (e.g., Chiu, Lin, Huang, Lin, Lee, & Hsieh, 2008; Lin, Chiu, Lee, & Hsieh, 2007). Applied to the IGT, the FOG model suggests that participants base their decisions on an analysis of the number of wins associated with each deck relative to the number of losses for that same deck. According to this model, decks B and D are considered high FOG decks as only one random loss is incurred every 10 card sections; decks A and C are considered low FOG decks because losses are incurred 50% of the time. Using the FOG model, selections from decks B and D would be considered advantageous. Thus, individuals end up choosing more cards that frequently return gains despite their long-term outcome.” (Smolewska, p.137-138)

Another plausible explanation for the preference for decks B and D in the BPD group is the “frequency of gain” (FOG) model (e.g., Chiu et al., 2008; Lin, Chiu, Lee, & Hsieh, 2007). Applied to the IGT, the FOG model suggests that participants base their decisions on an analysis of the number of wins associated with each deck relative to the number of losses for that same deck. According to this model, decks B and D are considered high FOG decks as only one random loss is incurred every 10 card sections; decks A and C are considered low FOG decks because losses are incurred 50% of the time. Using the FOG model, selections from decks B and D would be considered advantageous. Thus, individuals end up choosing more cards that frequently return gains despite their long-term outcome. The preference for the disadvantageous deck with infrequent punishment (i.e., Deck B) could also be associated with the tendency of the BPD participants to discount the value of punishment more quickly. Although they may experience the punishment as aversive, it is possible that they ‘forget’ the negative consequences more quickly when punishment is infrequent and switch back to making disadvantageous choices. This explanation suggests that they may have problems learning from their mistakes.” (Smolewska, p.156-157)


While several studies of IGT performance in healthy young adults have found a high preference for Deck B (e.g. Lin, Chiu, Lee, & Hsieh, 2007; Dunn, Dagleish, & Lawrence, 2006; Toplak, Jain, & Tannock, 2005), this preference is characterized as a determinant of poor performance in the task (Ahn et al., 2008). To examine how each model fit the data for high and low performers we performed a median split on the proportion of selections from the Good decks, Decks C and D (treating the lower and upper halves as low and high performers respectively).” (Worthy et al., p.10)


We now consider two explanations for IGT choices to determine if the conditions align with the differences in strategies they suggest. One hypothesis is based on expected utility theory and the other is based on the idea that participants develop preferences for decks with lower frequency of losses. If participants behaved as expected utility theory predicts, the proportion of good deck selections should increase regardless of loss frequency (i.e. we should see increases in the proportion of choices in the bottom two panels and decreases in the top two panels). Alternatively, participants can develop deck preferences on the basis of loss frequency (Lin, Chiu, Lee, & Hsieh, 2007; Lin, Chiu, & Huang, 2009). In this case, proportion of low loss frequency deck choices (two right panels) should increase and those for high loss frequency decks (two left panels) should decrease. Thus, both hypotheses predict that choices should decrease for the high loss frequency bad deck (top left) and increases for the low loss frequency good deck (bottom right). Both conditions were consistent with those predictions. The hypotheses make different predictions for the low loss frequency bad deck (top right) and high loss frequency good deck (bottom left).” (Noguchi and Hillis, p.5)
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**引用本團隊論文**

Márquez AM & Bailén JRA. (2012). Demencia tipo Alzheimer y toma de decisiones. Área de Psicología básica, de la universidad de Huelva.

引用本團隊論文

**引用內容**

Es interesante conocer la actuación del grupo control y cómo operan las personas sin deterioro, pues apreciamos que ellos sí que diferencian entre cartas.

El orden de preferencia para los controles fue de D>B>C>A. Sin embargo, aparecen datos contradictorios para este grupo, ya que no se esperarían diferencias entre A y B, y sí entre B-C y B-D, lo que denota la percepción de B como un mazo favorable, un efecto encontrado en otras investigaciones; en este caso los sujetos podrían estar aplicando una estrategia de «ganancia-permanencia» o «pérdida-cambio», ya que B no es lo suficientemente informativo.

(Márquez and Bailén, p.17)
Thompson等人引用本團隊發現壞牌B異於壞牌A的現象

"The overall expected outcome value, the variable thought to lead to successful performance on the IGT, was identical for the frequency and magnitude decks; thus our findings in the control group suggest that expected outcome value was not the only contributing factor to task performance. This finding is consistent with previous studies that explored individual deck selection in the original IGT reporting that controls differed in their selection of one bad deck over the other (Dunn et al., 2006; Lin et al., 2007)." (Thompson et al., 2011, p. 5)

引用本團隊論文

參考

網址

Alameda在其文章中引用本團隊之發現—「壞牌B被偏好的現象」

"En cuanto a la frecuencia de elección (Tabla 4), los sujetos con demencia eligen indistintamente cualquier montón. Observando la Tabla 5, hablaríamos también de que los pacientes DTA hacen elecciones al azar. El orden de preferencia para los controles fue de D>B>C>A. Sin embargo, aparecen datos contradictorios para el grupo control, ya que no se esperarían diferencias entre A y B, y si entre B-C y B-D (Tabla 5), lo que denota la percepción de B como un mazo favorable. Esta última afirmación, está en consonancia con el hallazgo de Lin, Chiu, Lee y Hsieh (2007) sobre que el mazo B es ocasionalmente tan preferido como los C y D, a pesar de ser un mazo que implica pérdidas a largo plazo, en este caso los sujetos podrían estar aplicando una estrategia de "ganancia-permanencia", "pérdida-cambio". La pérdida a largo plazo del mazo B no aporta la información necesaria a los jugadores para evitar dicho mazo." (Aurora Moreno y José R, 2011, p.25)

引用本團隊論文

參考
Aurora Moreno y José R. Alameda (2011) Demencia tipo Alzheimer, deterioro cognitivo y toma de

北卡羅萊納團隊在對 IGT 的變異提出解釋的文章中，引用『Deck B 與 SGT』的相關結果

“During the past 16 years, the Iowa Gambling Task (IGT) has been used in over 100 empirical studies to measure decision-making [1]. Versions of the IGT have been administered to children [2], adolescents [3], young adults in cross-cultural populations [4–7], and elderly adults [5]. Given the widespread use of this decision-making task, it is important to understand the nuances of task performances such as gender differences and whether performance is subject to alteration by the cognitive and environmental contexts in which the task is given.” (Overman et al, 2011, p. 64)

“Numerous other studies have reported similar choice patterns on the IGT. These studies reveal that subjects display a dual selection process during the IGT: (1) selection of advantageous cards from Decks C (green cards) and D (red cards) as well as (2) selection of cards that have a high pay-off frequency, i.e. cards from disadvantageous Deck B (yellow cards) and sometimes from advantageous Deck D (red cards) (see [16,17], for reviews).” (Overman et al, 2011, p. 65)

“Previous studies have shown that participants often allocate their choices on the IGT based upon two distinctly different strategies [16,3,7,17]. Some subjects select cards that pay off in the long run, i.e., advantageous cards from Decks C and D (green and red). In contrast, other subjects appear to select cards according to their reward frequency, i.e., Decks B and D (yellow and red cards).” (Overman et al, 2011, p. 68)

“These data agree, in general, with several recent conceptual frameworks according to which behavior on the IGT reflects two dissociable processes: one that tracks each option’s long term outcome and one that is sensitive to frequency and magnitude of rewards and punishers [4,17,23]. Our gender analysis further refines this dual-process hypothesis and suggests that the long-term-gain process occurs more often in males and that the frequency-of-reward process occurs more often in females. The present data agree with those of Stout et al. [14] that suggest females, unlike men, fail to show attentional disparity to wins vs. losses.” (Overman et al, 2011, p. 68)

“The IGT is thought to involve both processes: an affective or “hot” process based on magnitude of reward and a punishment and cognitive or “cool” evaluation of long-term gain or losses. These data are in agreement with behavioral studies that indicate individuals pattern of card selection may reflect multiple decision-making processes [4,23].” (Overman et al, 2011, p. 71)
Numerous versions of this task have been employed. Some follow the original paradigms [8], some follow revised versions in which rewards and punishers escalate through out the task [40], some use “in house” versions [16,41], and some published studies do not specify the detailed procedures of the task. Also, many published IGT studies employ only 100 trials, despite evidence that subjects continue to learn and improve through at least 200 trials.” (Overman et al, 2011, p.71)

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參考文獻出處

網址聯站

大陸西南大學團隊引用本團隊『SGT及DeckB』在頻率效應上之結果

引用內容
"比如4次损失1元比一次损失4元更糟糕，虽然两种情况都是损失4元。Chiu和Lin等人的系列研究发现，IGT中的决策行为受“得失频率”的影响(Chiu et al., 2008; Lin, Chiu, Lee, & Hsieh, 2007);"(罗禹等，2011，页32)

“选择之间相互独立的假设可以使该模型的适用性更高，可用于分析除IGT以外的有许多选择的赌博任务；如东吴赌博任务Soochow Gambling Task, SGT)。SGT是对IGT的一种变形，反映IGT中的“得失频率”对决策行为的影响(Chiu et al. 2008)。”(罗禹等，2011，页34)

“Chiu等人(2008)指出，IGT中的“得失频率”是影响决策行为的一个重要因素。正常人更偏好损失频率低的牌；Bechara团队后期的研究中也出现了这种效应。在一项关于精神分裂症患者的研究中(Sevy et al., 2007)，患者对牌2的选择显著高于牌1，约为牌1的1.6倍。”(罗禹等，2011，页37)

“Chiu等人以及Mitropoulos等人的研究表明，正常被试在不确定性决策中可能采用这种策略(Chiu et al., 2008; Mitropoulos, 2003)。张锋等人(2008)研究发现，海洛因戒除组和控制组对纯单收益的选项(没有损失的选项)的反应模式一致。在遭受损失的选项上使用不同的策略，控制组倾向于通过变换选择来回避惩罚，而戒除组被试仍维持先前的决策策略。因此，“赢则留、输则走”的选择策略可能导致控制组在牌之间不停的转换，从而表现出较低的选择一致性。”(罗禹等，
引用本團隊論文

参考文獻出處
羅禹、冯廷勇、唐向东、黄好、李红 (2011) 不同类型罪犯在爱荷华赌博任务中的决策功能缺陷。心理学报 Vol. 43, No.1, 30−41.

網址聯結
http://journal.psych.ac.cn/xuebao/qikan/manage/wenzhang/110104.pdf

Visagan等人在其IGT的相關研究引用本團隊「Deck C與Deck B」的發現

引用內容
“For example, a series of studies described the tendency for individuals to choose from Deck B compared with any other deck (Dunn, Dalgleish, & Lawrence, 2006; Lin, Chiu, Lee, & Hsieh, 2007). Thus, healthy control participants appeared unable to inhibit their preference for the high-frequency gains of this deck despite its bad final outcomes (the prominent Deck B phenomenon). In contrast, other investigators describe a sunken Deck C phenomenon in which healthy control participants no longer favor Deck C as an advantageous deck when the gain–loss frequency of this deck is experimentally altered to be similar to that of other decks (e.g., Deck A; Chiu & Lin, 2007). Although few reports corroborate these findings (Maia & McClelland, 2004) and modifications to the IGT may contribute to particular decision-making strategies in healthy adults, these studies emphasized the impact of gain–loss frequency in contrast to overall gain–loss outcome on individual deck preferences during the IGT; they did not, however, emphasize cognitive or motivational processing.”(Visagan et al., 2011, p.456)

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“Perhaps the most intriguing findings of this study came from examining the changes that took place within the course of playing the IGT. Lin, Chiu, Lee and Hsieh (2007) noted that studies using the IGT typically use an advantageous-disadvantageous comparison that may be masking some important dynamics that occur as participants proceed through the task. Indeed, research has found that, contrary to expectation, deck B (disadvantageous) is chosen most often (Lin et al., 2007) while deck C (advantageous) is often avoided (Chiu & Lin, 2007). Our results support the “prominent deck B phenomenon” (Lin et al., 2007, p.23.) but are inconsistent with the “sunken deck C phenomenon” (Chiu & Lin, 2007, p.42). In the present study, participants did choose deck B more often than any other deck, but deck C (advantageous) was also frequently chosen. Additionally, deck A (disadvantageous) was the sunken deck. However, these results also indicate that to fully understand the nature of IGT performance, the patterns of choices within the task need to be more carefully studied. (Hawthorne et al., 2011, p.12)

In summary, this study examined the effects of both a cognitive prime and variation in the level of detail given in the instructions on IGT performance. The results indicated that the cognitive manipulations had no impact on the overall IGT performance. Although these findings support the concept of the IGT as a measure of implicit emotional learning, further analysis of learning patterns within the task supported Lin, Chiu, Lee and Hsieh’s (2007) contention that there is more to the IGT story than first believed. Consequently, more research is needed to understand the true nature of IGT performance.” (Hawthorne et al., 2011, p.13)

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http://www2.mcneese.edu/ajpr/vol7/AJPR11-04Tochkov3-11rev4-2.pdf
Previous studies analyzing the high-risk decks revealed a phenomenon related to deck B (called 'prominent deck B') [21]. Some normal subjects preferred deck B to the good final-outcome decks C or D. This preference had not been apparent in studies that used the sum of decks A and B [21]. Consequently, in the present study, we focused on deck B's effect on irrational decision-making and examined the relationship between selection of card decks and impulsivity.” (Takano et al., 2010, p.1)


Some investigations have indicated confounding factors affecting the performance of different cultural groups on the task, but still unclear is whether these differences are related to cultural variables. For example, one study found that normal Taiwanese subjects prefer cards from deck “B” and dislike cards from deck “C” of the IGT (Chiu & Lin, 2007; Lin, Chiu, Lee, & Hsieh, 2007). Therefore, more research needs to be conducted to investigate the influence of cultural and sociodemographic factors on individuals’ performance on this task.” (Bakos et al., 2010, p.102)

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<th>“Several articles have critiqued the methods, theory, and mechanisms that underlie IGT performance, and other methods have been developed in order to balance gain–loss frequency in the IGT (Chiu &amp; Lin, 2007; Chiu et al., 2008; Lin, Chiu, Lee, &amp; Hsieh, 2007).” (Toplak et al, 2010, p.564)</th>
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<th>“Independent of IGT performance, GAD analogues chose less often decks with infrequent large losses (i.e. decks B and D) than control participants. On average, control participants selected 15 out of 20 cards from large infrequent loss decks, which is consistent with prior reports that healthy participants fail to recognize the infrequent loss deck B as disadvantageous (Lin, Chiu, Lee, &amp; Hsieh, 2007).” (Mueller et al, 2010, p.5)</th>
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An alternative explanatory framework, the FOG model suggests that computational cognitive processes rather than “gut feelings” may account for healthy individual’s performance during the IGT (Chiu & Lin, 2007; Chiu et al., 2008; Lin, Chiu, Lee, & Hsieh, 2007).” (Casey et al, 2010, p. 47)

Numerous studies have observed the frequency effect under the gambling condition (Fernie & Tunney, 2006; Ritter, Meador-Woodruff, & Dalack, 2004; Wilder, Weinberger, & Goldberg, 1998); however, Chiu et al. (2008) and Ahn, Busemeyer, Wagenmakers, and Stout (2008) may be the first to empirically evaluate the SMH and FOG models directly in a gamble structure. Therefore, research has indicated that individuals pattern of card selection may be in line with both the SMH and the FOG model.” (Casey et al, 2010, p. 47)


http://psycnet.apa.org/journals/npe/3/1/

Activations have been identified in the AI during decision making (Lin, Chiu, Cheng, & Hsieh, 2008) and for bad decisions compared with good decisions (Lawrence, Jol-lant, O’Daly, Zelaya, & Phillips, 2009), and AI activation has correlated with predicted risk and the error in those predictions (Preuschoff et al., 2008).” (Krawitz et al, 2010, p. 392-393)

“In the ACC, as in the AI, activations have been identified during decision making (Lin et al., 2008) and for bad decisions compared with good decisions (Fukui et al., 2005; Lawrence et al., 2009).” (Krawitz et al, 2010, p. 393)

“The IGT is a model of real-world decision making under uncertainty (Bechara, Damasio, Tranel, & Damasio, 1997). Despite being criticized on various counts (Chiu & Lin, 2007; Chiu et al., 2008;
The IGT decks vary along multiple dimensions of both probability and magnitude of reward and punishment (Chiu et al., 2008; Dunn et al., 2006). In particular, the bad decks are riskier whether risk is defined as the possibility of adverse outcomes or as variance.” (Krawitz et al., 2010, p. 394)

“We have ruled out a number of alternative explanations for the risk effects and heightened-risk effects. We list them here, with details in the supplemental text. (1) There is no “prominent deck B” phenomenon (Lin et al., 2007) hiding a preference for the net-loss/rare-loss deck, so we are justified in grouping the good decks and bad decks together to increase statistical power and simplify the analysis.” (Krawitz et al., 2010, p. 401)
of one deck which results in small frequent losses and one deck which results in high but infrequent losses. Recent studies have reported that these differences in frequency of punishment may be more important for choice behaviour in healthy subjects than the focus on long-term profits as suggested by Bechara and colleagues (Chiu and Lin, 2007; Lin et al., 2007).” (van Holst et al, 2010, p.100)

**Reference**

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**Reference**

**Website Link** http://www.ncbi.nlm.nih.gov/pubmed/19632269

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**Reference**

**Website Link** http://www.vu-ams.nl/fileadmin/user_upload/publications/Luman_2010.pdf

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**Reference**
van Holst等人在其對病態賭博的相關研究中，同時引用本團隊「奇異 B」和「沉沒 C」的現象

**Content**
“While the IGT provides information on decision making under uncertain reward and loss contingencies, interpretation of task performance is somewhat hindered by the complexity of the task. For example, the decks in the IGT not only differ in terms of long-term outcome (Lin et al., 2007), but also in terms of punishment...”
frequency: each pair of advantageous and disadvantageous decks consists of one deck which results in small frequent losses and one deck which results in high but infrequent losses. Recent studies have reported that these in frequency of punishment may be more important for choice behaviour in healthy subjects than the focus on long term profits as suggested by Bechara and colleagues (Chiu and Lin, 2007; Lin et al., 2007).”

(van Holst et al, 2010, 見網址連結 p.20)

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http://scholar.googleusercontent.com/scholar?q=cache:9F6tEmuCaCQJ:scholar.google.com/+Imaging+studies+in+pathological+gambling:+similarities+and+differences+with+alcohol+dependence&hl=zh-TW&as_sdt=0,5

Furl 在其關於決策議題的碩士論文裡提及本團隊對於「頻率」在正常決策者的影響

引用內容
“Related to this lack of clarity is the increasing evidence that a large portion of seemingly healthy adults show impaired performance on the IGT at levels similar to VM patients (Bechara et al., 2000; Crone & van der Molen, 2004; Lin et al., 2007)” (Furl,2010, p.20)

“As discussed previously, both frequency and magnitude have been shown to influence the perceived value of the IGT decks”(Lin et al.,2007)” (Furl,2010, p.63)

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網址聯結
http://wakespace.lib.wfu.edu/xmlui/bitstream/handle/10339/30430/Furl_wfu_0248M_10022.pdf?sequence=1

義大利的研究團隊與本團隊在頻率的觀點上有一致的結果，引用「Deck B」的相關研究

引用內容
“.... Other studies also consistently show that participants are sensitive to the frequency of losses, and that, when payoff is kept equal, they tend to select from those decks where losses are less frequent [45,
50-52].” (Stocco et al, 2009, p.3)

**Reference**


**Website**

http://ukpmc.ac.uk/backend/ptpmcrender.cgi?accid=PMC2645419&blobtype=pdf

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"The computer program randomly determined which two of the decks were to be "advantageous" and "disadvantageous," respectively, for each participant (Fernie & Tunney, 2005; Lin, Chiu, Lee, & Hsieh, 2007; Pecchinenda, Dretsch, & Chapman, 2006).” (Dymond et al, 2009, p.241)

**Reference**


**Website**


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"Performance on the Iowa Gambling task likely requires many other processes, and there is still debate about which processes are involved in this task (Busemeyer & Stout, 2002; Lin, Chiu, Lee, & Hsieh, 2007).” (Shuster & Toplak, 2009, p.477)

**Reference**

一篇直接探究 IGT 低頻率大輸的 B 牌之文章，引用本團隊在「Deck B 與 Deck C」的結果

| 引用內容 | “…Recently Lin et al. (2007) tested IGT preferences using two simplified versions of the task. ……Prominence of decks B0 and D0 is so robust that it was unaffected by manipulation of instruction (suggestive versus non-suggestive instructions) and reinforcement type (real versus facsimile reinforcement) (Fernie and Tunney 2006). An investigation similar to that of Lin et al. (2007) was undertaken to find out if deck C0 is truly advantageous per SMH (Chiu and Lin 2007)…” (Singh & Khan, 2008, p.51) |
| 網址 | http://www.springerlink.com/content/427268710817x438/ |

一篇關於 ADHD 的研究引用本研究「Deck B」研究中對頻率敏感的結果

| 引用內容 | “…since humans may be more sensitive to detecting changes in the frequency than changes in the magnitude of penalty (Lin, Chiu, Lee, & Hsieh, 2007), it is important to separate these two aspects when investigating sensitivity to penalty.” (p.713) (Luman et al, 2008, p.713) |
一篇年會文章指出本團隊直接驗證「奇異 Deck B」的現象

| 引用內容 | “Lin, Chiu, Lee, P., & Hsieh, (2007) explicitly tested the so-called “prominent deck B” phenomenon, i.e., the fact that deck B, a “bad” deck that originates a small number of strong losses, is preferred not only to deck A, which has the same expected value, but it is chosen as frequently as (or even more frequently than) the good decks C and D. The somatic markers system, in this case, would assist the”(Fum et al,2008,p.91) |
| | http://csjarchive.cogsci.rpi.edu/proceedings/2008/pdfs/p89.pdf |

專書

| 引用內容 | Fernie 與 Tunney 在收錄於書籍的文章中，多次引用「Deck B」與輸贏頻率的觀點 |
| 參考文獻出處 | 詳見網址聯結 |
| 網址聯結 | 詳見網址聯結 |

http://books.google.com.tw/books?id=kuD6LHknaLUC&printsec=frontcover&dq=Psychology+of+decision+making+in+legal,+health+care+and+science+settings.&source=bl&ots=rLzbDJKHji&sig=Bl6Bq9WWEZuzziuwszGsto8EiIcW8&hl=zh-TW&ei=yReTZg-hKC-A6WdyNgN&sa=X&oi=book_result&ct=result&resnum=1&ved=0
引用本團隊論文


#### 參考文獻出處


<table>
<thead>
<tr>
<th>引用本團隊論文</th>
<th>“If only 13% of the sample performed within the clinically impaired range, how can we explain the anomalous observation that performance became more disadvantageous as the task progressed? To further disentangle choice patterns and investigate explanations for this anomalous observation, I adopted the recommendations of various authors to analyse performance at the level of deck selections across each block of 20 trials (e.g., Buelow &amp; Suhr, 2009; Hortsmann, Villringer &amp; Neumann, 2012; Lin, Chiu, Lee &amp; Hsieh, 2007). The mean number of selections made from each deck across 5 blocks is presented in Table 6.” (p. 110) “Although preference for low punishment frequency decks is consistent with the choice patterns of neurologically healthy, non-offender participants (e.g., Lin, Song, Chen, Lee &amp; Chiu, 2013; Steingrover, Wetzel, Hortsmann, Neumann &amp; Wagenmakers, 2013), it was not the optimal decision-making strategy as defined by Bechara (Bechara, 2007).” (p. 156)</th>
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<td>引用本團隊論文</td>
<td>Hou, S. S. (2010), <em>Characterization of decision-making deficits among individuals with alcohol dependence. Master Thesis</em>. Department of Psychology, National Taiwan University, Taipei, Taiwan.</td>
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<td>網址聯結</td>
<td><a href="http://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&amp;s=id=%22098NTU05071083%22.&amp;searchmode=basic">http://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&amp;s=id=%22098NTU05071083%22.&amp;searchmode=basic</a></td>
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<td>引用內容</td>
<td>“The present sample resembled Caroselli et al., yet did not display definitive evidence of the “special attraction of deck B” or the “prominent deck B phenomenon” reported by Lin, Chiu, Lee, and Hsieh (2007) and Lin, Chiu, Cheng, and Hsieh (2008).” (Amoss, 2009, p.24)</td>
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<td>網址聯結</td>
<td><a href="http://digitalarchive.gsu.edu/psych_theses/58">http://digitalarchive.gsu.edu/psych_theses/58</a></td>
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</tbody>
</table>

| 引用內容 | “in a variant of the IGT surnamed the Soochow Gambling Task or SGT,(Lin et al. 2007, Chiu et al. 2008), it was demonstrated that the choice of card deck was determined by the frequency of small positive variations in the reinforcement schedule during the performance, resulting in choice that was independent of the expected overall value of the performance outcome.” (Marr, 2008, 見網址聯結) |
| 二度擷取確認時間 | 101/02/17 |