

# 遗忘症患者外显与内隐记忆实验研究： 语义性启动效应任务

王常生

耿昌明

(中国科学院心理研究所,100101) (解放军上海警备区第85医院神经内科)

**摘要** 采用 WMS—CR 和 MMSE 对临床脑损伤患者进行了认知功能与记忆功能两方面的筛选,获得 9 名遗忘症患者。然后采用偏好和自由联想两项语义性启动效应任务进行测验,发现遗忘症患者在外部记忆受损情况下,的确存在语义性启动效应,且与正常对照相近。推论语义性启动效应任务与遗忘症患者损伤的颞叶或间脑结构无关。同时还讨论了启动效应任务,认为偏好任务采用言语性材料不是理想的方法。

**关键词:** 遗忘症患者 筛选 WMS—CR MMSE 语义性启动效应 偏好 自由联想

## 1 问题的提出

内隐记忆(Implicit memory)是指被试在操作某项任务时,存贮在大脑中先前所学相关信息的信息不需有意识地回忆,而是在操作中自动表现作用的现象<sup>[1]</sup>。即被试在操作任务时对先前所学相关信息的提取是在无意识中进行的。内隐记忆包括启动效应(Priming)、习惯化(Habits)、条件化(Conditioning)、技能学习(Skill-learning)等形式<sup>[2]</sup>。

先前已有多项研究报道遗忘症患者存在内隐记忆,其中也有采用汉字为材料观察脑损伤患者内隐记忆的研究<sup>[3-4]</sup>。这些研究主要采用间接测量方法如残字或字干补笔、残图辨认、词汇确定、拼同音字等等,发现尽管遗忘症患者对传统记忆任务如再认和自由回忆等操作障碍,却对这些间接测量任务操作正常或接近正常。由于这些研究采用的主要是知觉性启动效应任务,即被试在编码与提取过程中涉及的主要是知觉性加工,因此 Tulving 等<sup>[5]</sup>认为启动效应或内隐记忆是一种知觉性表征系统(Perceptual representation system,PRS),他们把启动效应定义为“人类一种非意识性记忆形式,主要是对字或物的知觉辨认”。

但随后的一些研究发现不仅知觉性任务能够引发启动效应,而且语义性任务也能引发启动效应。这些研究采用一般知识、偏好、相关线索自由联想、新异联系补笔等任务,发现正常人或遗忘症患者均存在语义性启动效应。因此,Roediger<sup>[6]</sup>、Weldon<sup>[7]</sup>等人提出存在两种性质不同的启动效应,一种为知觉性启动效应,为知觉性任务提取;另一种为语义性(或概念性)启动效应,为语义性(或概念性)任务提取。

然而,上述一些研究存在一个重要问题,即未能对被试进行记忆功能和其它认知功能的筛选,只是简单地把脑损伤病人当作遗忘症患者。我们先前曾讨论多数脑损伤患者外显记忆并不表现明显障碍<sup>[8]</sup>,他们对语义性启动效应任务可能采用外显记忆策略操作,即对语义性启动效应任务不是无意识地操作,而是通过有意识的回忆完成的。因此,可能存在夸大遗忘症患者语义性启动效应保留的现象,所观察到的遗忘症患者语义性启动效应现象不能肯定。

为此,我们进行了本次系列实验研究。本文为系列实验研究之二。首先采用 WMS—CR 和 MMSE 对脑损伤患者进行筛选,选择了 9 名记忆功能明显受损,但无其它认知功能障碍的脑损伤患者作为本次研究遗忘症患者被试。然后采用偏好(Preference)和自由联想(Free Association)两项任务观察被试的语义性启动效应,以反映遗忘症患者内隐记忆的语义性特征。我们预料如果遗忘症患者对该两项任务的目标字(词)击中率或偏好程度与干扰字(词)差异达显著性,则表明该两项任务对遗忘症患者提取出语义性启动效应,反之则未提取出启动效应;如果遗忘症患者对该两项任

务提取的启动效应与对照组差异未达显著性,则表明遗忘症患者对该两项任务的启动效应正常,反之则受损。

“遗忘症患者”定义见实验研究一;“语义性启动效应”(Semantic Priming)是指先前语义加工使得随后的语义性任务操作的反应正确性增加或反应时减少。

## 2 材料和方法

2.1 实验设计 采用 $2 \times 2 \times 2$ 混合因子设计。(1)A因素为分组因素。分为实验组和对照组。(2)B因素为任务因素。为两项语义性启动效应任务,即偏好和自由联想任务。(3)C因素为刺激因素。分为目标字(词)和干扰字(词)两种形式。A因素为组间变量,B因素和C因素为组内变量。测验软件编制材料和方法同研究一。

2.2 被试 同研究一。

2.3 材料 以汉字为实验材料。汉字来源同研究一,但所采用的汉字与研究一不重复。共选择汉字80个,随机分配到两项任务中,每项任务40个汉字,一半为目标字,另一半为干扰字。分配时考虑到尽量使目标字与干扰字笔划量相近。偏好任务选择字时未考虑任何附加条件,完全为随机选择。自由联想任务选择的汉字在中小学课本中有关该汉字的常用两字词组至少有4种以上,即该汉字在中小学课本中至少有4种以上组成常用两字词的可能。从每个汉字4种以上可能的两字词中随机选择一个,共计40个词。将这40个词随机分为两组,一组为目标词,另一组为干扰词。

2.4 仪器 同研究一。

2.5 方法和实验程序 分学习和测验两阶段进行。学习阶段处理同研究一。

测验阶段:偏好任务指导语要求被试根据自己的喜好判断是否喜欢所呈现的字。自由联想任务把学习阶段呈现过的20对两字词(目标词)中的第一个字与20对未呈现过的词(干扰词)的第一个字混合在一起,随机逐一呈现,指导语要求被试根据呈现的汉字组成一个任意两字词,并把头脑中最先想到的一个词写在测验纸上。两项任务均要求被试反应速度既快又准。在每项任务正式测验前,先进行5~10次练习。

## 3 结果与分析

偏好任务计算目标字和干扰字的偏好程度,自由联想任务计算目标词和干扰词的击中率。根据目标字(词)的偏好程度或击中率与干扰字(词)的偏好程度或击中率计算启动效应。结果采用SPSS6.0处理。

### 3.1 两项任务差异分析

本次实验结果见表1。方差分析发现:分组(A因素)主效应未达显著性水平, $F(1,18)=1.28, p > 0.05$ ;任务(B因素)主效应达高度显著性, $F(1,18)=59.77, p < 0.01$ ;分组 $\times$ 任务交互作用效应达显著性水平, $F(1,18)=5.97, p < 0.05$ 。表明遗忘症患者与对照组组间差异不明显,测验任务间的差异取决于分组。

刺激(C因素)主效应达高度显著性水平, $F(1,18)=52.32, p < 0.01$ ;分组 $\times$ 刺激的交互作用未达显著性水平, $F(1,18)=0.02, p > 0.05$ ;任务 $\times$ 刺激的交互作用达显著性水平, $F(1,18)=6.91, p < 0.05$ ;分组 $\times$ 任务 $\times$ 刺激的交互作用未达显著性水平, $F=1.04, p > 0.05$ 。表明不论遗忘症组或对照组对目标字(词)的击中率或偏好程度与干扰字差异明显,对目标字的击中率或偏好程度大于对干扰字的击中率或偏好程度,即存在启动效应现象,但因与测验任务存在交互作用,故是否存在启动效应,视测验任务而定。

### 3.2 是否存在启动效应分析

比较偏好任务目标字与干扰字的偏好程度,发现两组被试目标字与干扰字的偏好程度差异均

未达显著性水平( $t_1=1.46, p_1>0.05; t_2=1.65, p_2>0.05$ )。表明两组被试对偏好任务的目标字与干扰字的偏好程度相近,提示该项任务对两组被试都未探测出明显的语义性启动效应。

比较自由联想任务目标词与干扰词的击中率,发现两组被试目标词与干扰词击中率差异均达高度显著性水平( $t_1=6.55, p_1<0.01; t_2=12.39, p_2<0.01$ )。提示该项任务对两组被试都探测出明显的语义性启动效应。

表1 两组被试两项内隐记忆任务测验结果

	偏好(%)		自由联想(%)	
	目标字	干扰字	目标词	干扰词
实验组	82.22	67.22	40.0	15.0
对照组	61.82	53.18	48.64	17.27

### 3.3 启动效应比较

两组被试的两项任务语义性启动效应见图1。比较两组两项任务的启动效应,发现两组被试组间差异均未达显著性水平( $t_1=0.58, p_1>0.05; t_2=1.43, p_2>0.05$ )。表明遗忘症组与对照组两项任务的语义性启动效应均相近。

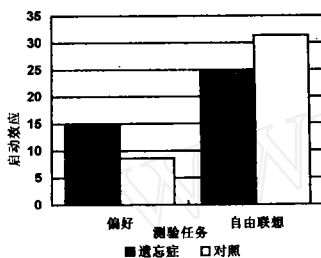


图1 两组被试两项任务启动效应

表2 两组被试偏好任务辨别力和反应倾向

	辨别力( $d'$ ) <sup>*</sup>	反应倾向( $B''$ ) <sup>**</sup>
实验组	0.5870	0.2457
对照组	0.3261	0.2523

$$* d' = Z_{击中} - Z_{虚报}$$

$$** B'' = (击中率 \times 漏报率 - 虚报率 \times 正确拒斥率) / (击中率 \times 漏报率 + 虚报率 \times 正确拒斥率)$$

### 3.4 偏好任务辨别力( $d'$ )和反应倾向( $B''$ )

二组被试偏好任务辨别力和反应倾向见表2。分别比较二组被试辨别力和反应倾向,发现二组差异均未达显著性水平( $t_1=0.59, p_1>0.05; t_2=0.05, p_2>0.05$ )。提示二组被试辨别力和反应倾向一致。

## 4 讨论

### 4.1 关于遗忘症患者语义性启动效应的讨论

本次研究我们采用 WMS—CR 和 MMSE 对 82 名脑损伤患者进行了认知状态与记忆功能两方面的筛选,选择了 9 名其它认知功能状态良好,而记忆功能明显受损的遗忘症患者。然后采用偏好和自由联想两项语义性启动效应任务进行测验。结果表明自由联想任务对两组被试均诱发了明显的语义性启动效应,被试对目标词的击中率大于对干扰词的击中率,表明均存在“先前的语义性暴露”对随后的类似操作产生“易化”现象。两组被试虽然对偏好任务的目标字偏好程度与对干扰字的偏好程度差异未达显著性水平,但对目标字的偏好程度的绝对值仍大于干扰字,表明两组被试对偏好任务虽未产生明显的启动效应,但仍存在“易化”现象。此结果提示这两项间接任务对遗忘症患者均不同程度地提取出先前所学语义性信息。遗忘症患者对信息的语义性成份确实存在一定的学习和记忆能力。结果无疑是对 Tulving 等人理论的挑战,支持 Roediger 等人提出的存在语义性启动效应的观点。

与实验研究一的结果进行比较,发现遗忘症患者对自由回忆和再认任务均不同程度损伤,而对语义性启动效应任务正常。据此,可以推论实验研究一的二项任务与本次实验的二项任务可能分别

触及了不同的记忆系统。我们根据临床CT,发现本次研究9名遗忘症患者大脑损伤的部位主要在两侧颞叶和间脑结构。因此我们可进一步推论被试对实验研究一的两项任务表现障碍与上述脑组织损伤有关,而本次实验的两项任务与之无关或关系不大,即语义性启动效应任务可能与颞叶或间脑结构以外的其它脑结构有关。

#### 4.2 关于偏好任务和自由联想任务的讨论

本研究我们采用了偏好和自由联想二项语义性启动效应任务。从测验结果来看,自由联想任务对正常对照和遗忘症患者均获得了明显的启动效应,而偏好任务不论对正常被试,还是对遗忘症患者均未获得明显的启动效应。与先前一些对正常被试的研究结果不一致<sup>[9]</sup>。

分析二组偏好任务的辨别力( $d'$ )和反应倾向( $B''$ ),发现均无明显差异。表明遗忘症患者组和正常对照组在测验过程中均心理状态稳定,无明显的情绪波动;而且两组的报告标准一致。与实验研究一的再认任务的辨别力和反应倾向进行比较,发现偏好任务的 $d'$ 和 $B''$ 均较低。这表明被试对偏好任务掌握的报告标准较宽松,随机性较大。这点从分析实验原始数据可得到证明,偏好任务方差比其它任务的方差都大。

我们分析认为偏好任务的一个基本假设是被试对再次呈现的刺激较偏好。但是,此假设在我们实验过程未明显观察到。在本次研究的预实验阶段,我们采用了二种测验指导语。一是告诉被试在呈现的字(目标定+干扰字)中,他有一半喜欢,一半不喜欢,请他将喜欢的选出来;另一是只要求被试对呈现的字选出喜欢的。对前一种指导语,由于刺激是单个呈现的,被试无法前后比较,而难以分配喜欢与不喜欢;对第二种指导语,被试选择随意性较大。

本次研究正式实验我们采用了第二种指导语。实验结果表明被试对偏好分配的规律性不明显,尽管被试对目标字的偏好程度仍大于干扰字,但不论正常人或遗忘患者都未能诱发明显的启动效应。其原因可能是被试对言语性材料再次呈现所引起的偏好程度较小,不足以表现出规律性。因此,我们认为采用言语性材料测验启动效应,偏好任务不是好的选择。

## 5 结论

一、遗忘症患者在外观记忆受损的情况下,的确存在语义性启动效应,且与正常相近。

二、与研究一结果比较,推论遗忘症患者外观记忆任务操作障碍可能与颞叶或间脑结构损伤有关,而两项语义性启动效应任务与之无关。

三、认为偏好任务采用言语性材料不是理想的方法。

## 6 参考文献

- 1 杨治良主编. 记忆心理学. 华东师范大学出版社. 1994
- 2 王常生,杨治良. 遗忘症内隐记忆研究述评. 心理科学,1996;28(4):231-236
- 3 贺晓生等. 脑外伤患者记忆功能的双重特征:损伤与保存. 心理学报,1994;26(1):106-111
- 4 刁利华. 脑梗塞、脑出血病人外显与内隐记忆的实验研究. 心理科学,1996;28(2)
- 5 Tulving E, Schacter DL. Priming and human memory. Science. 1990;247:301-306
- 6 Roediger HL. Implicit memory retention without remembering. American Psychologist. 1990;45:1043-1056
- 7 Weldon MS. Mechanisms underlying priming on perceptual test. Journal of Experimental Psychology: Learning, Memory, and Cognition. 1991;17:526-541
- 8 王常生,杨治良,耿昌明遗忘症患者外显与内隐记忆实验研究(I):自由回忆与再认任务. 心理科学,1998
- 9 杨治良,叶阔蔚. 汉字内隐记忆的实验研究(II):任务分离和反应倾向. 心理学报,1995;1:1-8

## ENGLISH ABSTRACTS

### COMPOSITE INTELLIGENCE: THE CONCEPTUAL SYNTHESIS OF INTELLIGENCE

*Wang Lei, Li Lin*

(Department of Psychology, Beijing University)

*Kwok Leung*

(Department of Psychology, The Chinese University of Hong Kong)

There have long been controversies and doubts about the concept and effect of intelligence. Moreover, studies have revealed that the traditional concept of intelligence explains and predicts individuals' success very well. Gardner proposed the Theory of Multiple Intelligence that different jobs need different intelligence. Salovey and Mayer proposed Emotional Intelligence, and Goleman argued that not intelligence but emotional intelligence was really important to a person's success. However, neither the concept of Multiple Intelligence nor Emotional Intelligence is matured, and both lack enough experimental proof. The authors hold that traditional intelligence does not include all aspects of intelligence. Comparing traditional intelligence, multiple intelligence, emotional intelligence and other non-cognitive factors, they proposed the concept of Composite Intelligence which, composed of traditional cognitive factors, personality, motivational and emotional factors, can represent intelligence in an all-round way.

Key words: intelligence, emotional intelligence, Composite Intelligence.

### AN EXPERIMENTAL STUDY OF LOCUS OF CATEGORY CLUSTERING IN STM

*Ding Xianfeng, Wang Su*

(Department of Psychology, Beijing University)

This study explored the locus of category clustering process by means of the manipulation levels of attention at the encoding or retrieval period in short-term memory. College students were the subjects. The memory performance under divided attention condition with dual tasks was tested in comparison with that under focused attention condition with a single task. Studied lists consisted of words of two semantic categories. The results showed that divided attention at either the encoding or the retrieval periods significantly decreased the degree of category clustering. The result didn't support the hypothesis that category clustering process occurred only at a certain information processing period of short-term memory, but confirmed the dual process theory that category clustering was related to both encoding and the retrieval periods of short-term memory.

Key words: short-term memory, category clustering, focused attention, divided attention.

### AN EXPERIMENTAL STUDY OF "RECIPROCITY" IN ELEMENTARY SCHOOL STUDENTS

*Wu Guohong, Li Qiwei*

(Psychology Department, East China Normal University)

The author utilized componential analysis to study the classical Piaget theory on "reciprocity" of children. The experiment improved Piaget's theory of the cognitive developmental stages by setting up the model of Limited Three-Term Serial Problems. The two important components of reciprocity are transitive integration and conversion operation. It seemed that the subjects developed transitive integration first, then they would have the ability to finish the conversion operation.

Key words: reciprocity, component, componential analysis, cognitive development.

### A STUDY OF TWO REPRESENTATIONS OF WORKING MEMORY IN PROCESSING SYNTACTIC AMBIGUITY

*Li Boyue, Huang Xiting*

(Psychology Department, Southwest China Normal University)

Two experiments were conducted to examine whether the high reading span readers of both Chinese and English would have two representations in working memory when answering questions of syntactically ambiguous sentences, and whether the different difficulties of the questions would affect the maintenance of the two representations. The results of the research indicated: 1) The high reading span readers of Chinese had two representations of coordinate ambiguous structures of Chinese sentences; 2) The Chinese high reading span readers of English had two representations of ambiguous Ved structures; 3) These two representations can be maintained in case of difficult tasks.

Key words: sentence processing, syntactic ambiguity, working memory, representation.

### STUDY OF EXPLICIT AND IMPLICIT MEMORY STUDIES IN AMNESIC PATIENTS (II); SEMANTIC PRIMING TASKS

*Wang Changsheng*

(Institute of Psychology, Chinese Academy of Science)

*Geng Changming*

(The 85th Hospital of P. L. A., Shanghai)

This study, the second of a series on explicit and implicit memory in amnesic patients, examined the performances on Preference Judgment (PJ) and Free Association (FA) tasks of nine persons with deficit memory but normal cognitive functions who had been screened by WMS-CR and MMSE from 82 multiple

aetiological patients. The results showed that the amnesic patients performed as well as the normal controls in PJ and FA tasks. It was suggested that amnesic patients' semantic priming remained intact despite their impaired explicit memory and that semantic priming memory system was independent of the explicit memory system. Semantic priming tasks were also discussed from a methodological point of view.

Key words: amnesic patients, WMS — CR, MMSE, screened, semantic priming, preference judgment, free association.

### THE DEVELOPMENT OF CHILDREN'S SOCIAL PERSPECTIVE TAKING AND THE DIFFERENCES BETWEEN SUBTYPES

Zhang Wenxin, Zheng Jinxiang

(Department of Education, Shandong Teachers' University)

Measures of both cognitive and affective perspective taking were administered on 425 children respectively from the top grade of kindergarten and grade 2, 4, 6 of elementary school, in an effort to explore the general developmental tendencies of children's social perspective taking and the possible developmental differences between these two subtypes. It was found that the 6-year olds still had difficulties in making correct inference of others' perspectives, while the 10-year olds were able to do so. Children's cognitive perspective taking developed in a way that basically paralleled affective perspective taking, but the development of children's ability of the later significantly lagged behind the former.

Key words: social perspective taking cognitive perspective taking affective perspective taking development

### EFFECTS OF A SMALL SELF — CONTROL ALCOHOL DOSE ON SKILLED DRIVING PERFORMANCE

Le Jinghong

(East China Normal University)

Katsuya Matsunaga

(Kyushu University)

Yoshimi Egami, Takashi Ohta, Fumitad Kitamura

(Minami Fukuoka Driver's School)

This research used reaction time, estimation time and a standard driving test to assess the performance of driving instructions under the influence of alcohol. Ten subjects participated in the study. Their driving performance was assessed before consuming alcohol, and 30, 110 and 170 minutes after drinking (0.4 — 24 ml% BAL)

The driving performance was significantly worse 30 min after consuming alcohol, compared with the baseline and the 110 min and 170 min scores. The reaction times and estimation times were the greatest at 110 minutes after drinking, and were also delayed 30 min-

utes and 170 minutes after drinking. This study demonstrated that even small amounts of alcohol would impair the performance of skilled drivers, who themselves did not expect to be affected by so small a quantity of alcohol.

Key words: alcohol, blood alcohol level (BAL), cognitive reaction, driving skills.

### THE PSYCHOLOGICAL RESEARCH OF DURATION PERCEPTION

Wang Enlie, Zhang Kan

(Institute of Psychology, Chinese Academy of Sciences)

Based on duration judgement experimental studies in the last 50 years, this article reviews different theoretical models, experimental paradigms, experimental methods and main laws of duration perception. It also discusses the development of duration perception in the near future.

Key words: time perception, model, prospective paradigm, retrospective paradigm.

### A STUDY OF THE WEIGHT OF ATTENTIONAL RESOURCES ALLOCATED IN THE EARLY PERCEPTUAL PROCESS

Li Jian, Zhu Zuxiang, Wang Jian

(Psychological Department, Hangzhou University)

In the research weight was considered the proportion of attentional resources allocated in the early perceptual process. The study used a central precue technique to explore the weight of attentional resources in terms of four features, namely, letter, digit, figure and color. The main results showed: 1) Color was not affected by the cue while the others, especially digit, were affected greatly by the cue. 2) Compared with letter and figure, digit was more difficult to be identified in the location of invalid cues, while the difficulty in identifying digit turned out to be the same in the location of valid cues. These results indicated that attentional weight in these four features was different in the early perceptual process. Such difference came as a result of the interaction between stimulus properties and attentional resource allocation.

Key words: early perceptual process, attentional resource, weight.

### MENTAL TESTS IN ANCIENT CHINA AND THEIR FEATURES AND VALUE

Yan Liangshi

(Department of Psychology, Faculty of Education, Hunan Normal University)

In this article the author makes some reflections on ancient mental tests of China and holds that time-honored and rich in contents, the tests were theoretically based on the possibility of knowing one's nature and some of them were similar to modern Western simple situational mental tests, or even similar to multiple situational mental tests, to which due attention hasn't been paid. Then the author illustrates some concrete features of the tests: 1) The tests were car-