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唐 钺

(1891.1.7—1987.2.5)

# 杭州大學

先生之風 質直謙和  
先生治學 文理兼精  
實习求思 又評傳統  
思進思源 一代宗師  
陳立敬助

# 杭州大學

北大蔡元培校長曾稱司鴻德是我國現代心理學的  
先驅。后長中央研究院心理學部選聘學黃先生為心理  
所所長。后因國都南遷，學黃先生乃擬註註執照不  
為所長，以后仍從事心理學的研究與寫作，以數十年  
成果累之。這種蒼老與品德，令我衷心敬佩。長次注  
陪又內近柳城我和學黃先生而求合居一處，唐錫鼎接  
上他家一團和氣令人絕美。若干年后，我曾在北京  
拜訪學黃先生，他家人還深嘆我老到也老到也。  
後來，如今已是辭于黃先生百週年慶典，懷念  
文宗，謹綴便句數言，敬表贊忱。

陈立先生题词

唐钺先生是我国心理学的奠基人之一，他长期从事心理学的教学和研究，培养了一批心理学方面的学者，为我国心理学的发展做出了贡献。我们今天纪念唐钺先生，不仅是缅怀先贤，也是激励后人更好地继承先驱者的事业，推动我国科学和文化、教育的发展。

丁石孙

丁石孙先生题词

## 序

# 张岱年

唐钺先生字肇黄，是当代中国著名学者，是著名的心理学家，对于哲学与哲学史亦有湛深的研究。

在二十世纪二十年代，唐先生参加了“科学与人生观”的讨论，著有《唐钺文存》。在三十年代，发表了关于哲学史的论文多篇，编为《国故新探》。八十年代，著有《西方近代心理学史》。直到九十多岁，仍努力钻研学术，笔耕不辍。唐先生的治学精神是令人钦佩的。

唐钺先生多年在清华大学与北京大学讲授心理学课程，同时对于中华国学也有湛深的研究。唐先生的国学研究达到很高的水平。试举一例：《庄子·天下篇》论墨家，曾讲墨家有许多派别，彼此不同，“相谓别墨”。胡适先生在《中国哲学史大纲》中有论“别墨”的章节，认为先秦诸子中有“别墨”一派。唐先生撰写《论先秦诸子无别墨》一文，指出“别墨”是墨家不同派别相互攻击之词，并无别墨一个学派，驳正了胡适之的误解。这是有重要意义的。

唐钺先生努力治学，老而弥笃。九十高龄还发表了学术论文。现在北京大学心理学系同仁收集唐老遗著，编为《唐钺文集》，这是有重要意义的。欣闻唐老文集编成，于是略述唐老的学术贡献，向读者推荐。

2000年11月

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# ON THE DEVELOPMENT OF DIFFERENT PLACING REACTIONS IN THE ALBINO RAT<sup>①</sup>

In recent years various aspects of placing reactions ("Stehbereitschaft") have been studied in several species of animals. Rademaker, [1931] the discoverer of these reactions, first described them in dogs. Bard and Brooks [1931, 1932] showed the localized cortical control of these reactions in cats and rats. They observed that a normal mature rat shows the following placing reactions:

1. If the rat held in the air be moved toward a table (or some similar solid object), both forefeet are raised and placed on the table as soon as the chin comes in contact with the edge of the table.

2. If the rat held in the same way be moved toward a table, both forefeet are placed on the table as soon as the tips of the vibrissae touch the table.

3. If the rat held in the air be moved toward a table, the slightest contact of the backs of the feet with the table leads to a prompt placing of the feet on the table.

4. If the forelegs or hindlegs of a rat standing on a table be thrust over the table edge, they are immediately lifted so that the

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① Read before the 8th Annual Meeting of the Chinese Physiological Society, held at Peiping, April 3~5, 1935.

whole body is on the table again.

5. If any leg of a standing rat be abducted, but not held, it is at once restored to its normal standing position.

According to Rademaker [1931], reactions 1, 3 and 4 are tactile responses; Bard and Brooks [1932] consider it possible that a proprioceptive factor may enter into reactions 3 and 4. The last two investigators regard reactions 2 and 5 as tactile and proprioceptive responses respectively.

It is the purpose of this study to ascertain at what age each of these placing reactions first appears in the albino rat and indirectly to throw some light on the question as to how far advanced the development of the rat's cerebral cortex must be for these reactions to appear. Similar experiments on other species of animals such as cats and guinea-pigs are contemplated.

## EXPERIMENTAL

### **Material and methods.**

For this study we used nineteen albino rats from three different litters (litter 83, seven rats; litter 84, five rats; litter 86, seven rats). Each of these rats was tested from birth to the age at which all the reactions were well developed. Besides, there were five other litters of rats tested; two of these litters (of two and eight rats respectively) were tested for all the placing reactions except reaction 5 of the forelegs and all the hindleg reactions until they were one month old; the remaining sixteen rats, unfortunately, died at five or seven days of age.

Throughout the investigation, the rats were handled as gently as possible, since holding a rat too tight often results in

the inhibition of its placing reactions. It is obvious that a rat by mere restlessness may accidentally get its feet placed on the table; so care was taken to wait until the rat was quiet before it was tested for any one of the reactions. Since the rats have no visual placing reactions, their eyes were not covered during the tests even when the eyes had already opened. Through preliminary experimentation we learned that reaction 1 always appears before reaction 2, so in testing for reaction 1, the rat's vibrissae were not cut beforehand. Two extra rats having their vibrissae cut previously were found to show reaction 1 as usual once this reaction had appeared. In testing for reaction 3 of the fore-feet, the rat's head was gently held up so that none of the vibrissae touched the table.

## Results

The results from testing litters 83, 84 and 86 are shown in table 1. The testing of the other litters of rats gave essentially the same results.

**Table 1 Age of first appearance of different placing reactions in the rat**

Kind of reaction	Age of first appearance (in days)			
	Average	Earliest	Latest	Range of variation
1	12	11	12	2
2	16	12	20	9
3 (forefeet)	14	12	17	6
3 (hindfeet)	18	16	19	4
4 (forelegs)	11	8	16	9
4 (hindlegs)	15	12	18	7
5 (forelegs)	14	8	18	11
5 (hindlegs)	18	15	22	8
Average=7				

In all the forty-two rats tested until they were one week old, none of these reactions was elicited.

By the middle of the fourth week after birth, all the placing reactions here studied are in full functioning.

The age of first appearance of each reaction varies from individual to individual. The range of variation is on the average seven days.

In all the twenty-nine rats tested, reaction 1 appears almost at a constant age (twelve days). These rats belonged to five different litters.

In general, reactions 3, 4 and 5 of the forelegs appear before the corresponding reactions of the hindlegs respectively.

## **Discussion**

Sugita [1917, 1918a] named three phases of cortical growth in the albino rat: (i) from birth to the tenth day, (ii) from the tenth to the twentieth day, and (iii) from the twentieth to the thirtieth day. He found (1918b) that "the thickness of the cortex, the total number of the cortical nerve cells, and the size of the cortical cells all have reached nearly their maximum at the same age of twenty days, which is the weaning time of the rat." Increase and differentiation in the cytoplasm and the nucleus chromatin and growth of dendrites are not completed until long after this stage. Sugita [1917] also found that myelination in the cortex of the rat is very slight in the second phase; rapid myelination of the cortical fibers first appears at the beginning of the third phase. It is interesting to note that practically all the placing reactions are developed during this second phase of cortical development, before the advanced development of

structures other than the cell bodies, such as the myelin sheaths of the cortical fibers.

After studying cerebral vascularity, Craigie [1925] reached the conclusions, "that the richness of capillary supply is directly related to functional activity, and that the metabolism involved in the latter requires a greater blood supply than does the metabolism of growth." He found that "between the tenth and the twenty-first days the vascularity of all parts studied rises rapidly", much more so than at any time before or after this period. It is noteworthy that the first appearance of all the placing reactions we studied falls within this period of exceedingly rapid increase of cerebral vascularity.

In the light of Bard and Brooks' [1932] finding that only the somesthetic and motor areas are involved in the arousal of the placing reactions, it seems superfluous to say that the development of the reactions means a definite degree of maturation of these particular cortical regions. Besides, from the facts cited in the last two paragraphs, it appears that the development of the placing reactions corresponds to a definite stage of general cerebral maturation of the animal in question. This indication is supported by other facts. Thus, while the placing reaction to chin contact (reaction 1) does not appear in the dog until three weeks of age or later according to Rademaker [1931], it appears in the rat at twelve days of age. We have also tested two new-born guinea-pigs one hour after birth and found that they already showed this reaction. (Unfortunately, these two guinea-pigs died five and seven days after birth respectively; the one that survived longer, showed all the placing reactions on the fifth day). This is in accord with Sugita's [1918c]

observation that "the new-born guinea-pig corresponds to the albino rats of about ten days in cortical thickness, but seems to be older when judged by the myelination of the cortex" . Langworthy [1929] also observed that the guinea-pig "shows at birth a well-developed medullation of cerebral ..... tracts". Thus, the difference between the rat and the guinea-pig in the age of first appearance of this placing reaction seems to be due in part to the fact that the guinea-pig is born with a more mature cerebral cortex than that of a new-born rat. Hand in hand with the greater maturity of the cerebral cortex very probably goes the greater maturity of other parts of the neuromuscular system. It is not unlikely that the rat is, in turn, born with a cortex more mature in some respects than that of a newborn dog. It seems possible that the first appearance of some or all of these placing reactions may serve as an indicator of the stage of cerebral maturation.

According to Rademaker [1931], in the case of dogs, reaction 3 is a conditioned reflex in the Pavlovian sense. Bard and Brooks [1932] reported that "it has been possible to confirm in the cat the evidence with which he [Rademaker] supports this view". We have shown that in the rat one of the placing reactions appears almost at a constant age and that all the placing reactions are developed within a definite stage of cerebral maturation. It seems possible that the first appearance of some of these reactions is the result of mere maturation, and not of conditioning. However, we agree with Bard and Brooks [1932] in the opinion that "a final decision on this point should await further experimental evidence".

Bard and Brooks [1931, 1932] found that the cortical area

responsible for the placing reactions in the rat is definitely localized. It appears, on the other hand, that the paths leading from this area are not so well-defined. Marshall [1934] observed that when the pyramidal tracts alone have been transected in the cat, the contact placing reactions of Rademaker (reaction 2) reappear, although impaired, after a few days. This led him to conclude that "remaining cortico-fugal pathways must be capable of mediating these reflexes to some extent". We have already referred to the fact that in the albino rat all the placing reactions appear when myelination in the cortex is still very slight. All these data seem to indicate that corticofugal paths for the contact placing reactions may also be rather diffuse in the case of albino rats.

## SUMMARY

This study was undertaken to ascertain at what age different placing reactions first appear in the albino rat. Young rats were tested from birth to the age at which all the placing reactions were in full functioning.

The results show that all the reactions make their first appearance practically between the tenth and twenty-first days of post-natal life, that is, practically within Sugita's second phase of cerebral maturation and Craigie's period of exceedingly rapid increase of cerebral vascularity.

In general, the placing reactions of the forelegs appear before the corresponding placing reactions of the hindlegs.

The relationships between the results of this study and the findings of previous investigators relevant to the problem have

been discussed.

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## 白鼠的各种位足反应的发展

健康的长大的白鼠有下列各种位足反应：

1. 倘若将白鼠提在空中，四脚向下，并将他挪近桌子，那末，白鼠的下颏一碰着桌子边，他的前脚就立刻举起来，放在桌子上。
2. 倘若将白鼠提在空中，四脚向下，并将他凑近桌子，那末，他的胡须的末尖一碰着桌子，他的前脚就立刻放在桌上。
3. 倘若将提在空中四脚向下的白鼠凑近桌子，那末，他的前脚或后脚的前边(脚背)一碰着桌子，那双脚就立刻放在桌子上。
4. 倘若站在桌子上的白鼠的前腿或后腿从桌子边溜下去，那末，他就将这只腿立刻提起来，使全身仍在桌子上。
5. 倘若将站着的白鼠任何一只腿向外侧移动，但不把他握住，那末，这只腿就立刻回复他原来站立的位置。

我们想要知道上列各种反应在什么年龄第一次出现，用了四十五个白鼠(共计八胎)作试验，试验由初生起到各项反应完全发展的时候为止，但其中有些白鼠只试验过一部分的反应，试验的结果如下：

### 1. 各种位足反应初现的平均年龄如下表

位足反应的种类	初现的平均年龄	初现的最小年龄	初现的最大年龄
1	十二天	十一天	十二天
2	十六天	十二天	二十天
3(前脚)	十四天	十二天	十七天
3(后脚)	十八天	十六天	十九天
4(前腿)	十一天	八天	十六天
4(后腿)	十五天	十二天	十八天
5(前腿)	十四天	八天	十八天
5(后腿)	十八天	十五天	二十二天

### 2. 各种反应的初现年龄，各个白鼠间有差异，这种差异的范