

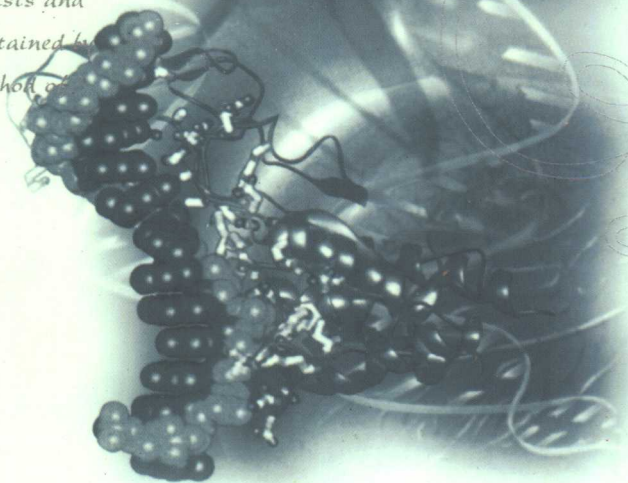
一个生理学家对心理学家们的答复

Reply of a Physiologist to Psychologists

伊万·巴甫洛夫 著

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英汉对照世界著名科学家代表作选读

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河北科学技术出版社

图书在版编目 (CIP) 数据

一个生理学家对心理学家们的答复/ (俄) 伊万·巴甫洛夫著; 王丽娟, 邢静义译. —石家庄: 河北科学技术出版社, 2000

(英汉对照世界著名科学家代表作选读/陈叔敏, 黄德海主编)

ISBN 7-5375-2336-3

I. 一… I. ①伊…②王…③邢 III. 英语—对照读物, 生理心理学 IV. H319. 4; B

中国版本图书馆 CIP 数据核字 (2000) 第 81517 号

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河北科学技术出版社出版发行 (石家庄市和平西路新文里 8 号)
保定市第二印刷厂印刷 新华书店经销

787×1092 1/32 5 印张 104000 字 2001 年 8 月第 1 版
2001 年 8 月第 1 次印刷 印数: 1—2000 定价: 9.50 元

序

科学技术的发展不是一蹴而就的，它是人类经验的长期累积和修正的结果，是人类理性思维的不断探索和提高。或者说，任何新科学、新技术都是踩在前人的肩膀上向新高峰的攀登。因此，我们在关注当前新科学、新技术的发展动向的同时，了解世界上伟大思想家、科学家和经济学家们的学术思想和成就甚为必要。我们还要了解这些先哲的治学方法和人格情操，如伽利略对亚里士多德权威理论的挑战，达尔文对唯心主义神造论的否定，爱因斯坦除相对论外，对社会和政治问题所表现出的极大兴趣。

对广大中国读者来说，要找到不同时期著名科学家和经济学家经典著作的中文译本有一定困难，有些译文在内容译述和文体表达方式上有待完善，这便呼唤学术界和出版社翻译和出版这方面的高质量的经典著作。如今，由河北经贸大学副校长陈叔敏先生领衔主编《英汉对照世界著名科学家代表作选读》和《英汉对照世界著名经济学家代表作选读》两套系列丛书，并由河北科学技术出版社出版，正是为了满足现代读者的需要。这两套丛书将陆续翻译有关牛顿、伽利略、爱因斯坦、巴甫洛夫、亚当·斯密、马歇尔、凯恩斯、萨缪尔森等名家的代表作。因此，这是一项具有战略意义的

出版工程，是令人无比激动的喜讯。

参加翻译的有该校和兄弟院校的资深英语教授和有关专业的专家，以确保译文的忠实性和可读性。我读了部分译稿后，感到译文达意，表述流畅，爱不释手，时有与先哲们对话之感。愿与读者们共享个中乐趣。

胡壮麟

北京大学/清华大学教授

2000年11月16日

译者前言

伊万·巴甫洛夫 (Ivan Petrovich Pavlov, 1849 - 1936), 俄国生理学家。他的科学贡献分三个领域, 即: 心脏生理、消化生理和高级神经活动生理。在研究消化生理的过程中形成了条件反射的概念, 从而开辟了高级神经活动生理学研究的一条途径。从 1903 年起, 他连续 30 余年致力于这个新领域的发展。他的高级神经活动学说对于医学、心理学, 以至于哲学等方面都有影响。于 1904 年获诺贝尔生理或医学奖。主要著作有《消化腺机能讲义》、《动物高级神经活动 (行为) 客观研究 20 年经验》及《大脑两半球机能讲义》等。

本书选取了巴甫洛夫提交国际科学大会的两篇最优秀演讲论文, 是巴甫洛夫高级神经活动学说的最精辟阐述。

本书旨在激发学生的阅读兴趣。通过阅读, 读者可以更深刻地理解他的科学思想和成就, 开阔眼界, 感受科学发展的律动, 同时对提高读者的英语水平也有很大帮助。所选作品文笔洗练, 深入浅出, 堪称英语语言的经典。

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REPLY OF A PHYSIOLOGIST TO PSYCHOLOGISTS

1

The article by Edwin R. Guthrie "Conditioning as a Principle of Learning," it seems to me, is of special interest because of its fundamental tendency – in my opinion fully justified – of basing the phenomena of psychical activity on physiological facts, i. e., of uniting, identifying the physiological with the psychological, the subjective with the objective, which, I am convinced, is the most important scientific task of our time. The author analyses the problem of learning from the general aspect and characterizes this process by enumerating^① its fundamental features; in this he utilizes without distinction both the material of psychologists and the physiological facts obtained by us on animals by the method of conditioned reflexes. Thus the psychologist and the physiologist marched side by side. But beyond this point profound differences arose between them. The psychologist regards conditioning as the principle of learning; he considers that this principle is not subject to any further de-

一个生理学家 对心理学家们的答复

1

我认为埃德温·阿·加思瑞的论文“作为认知原理的条件适应”是非常值得注意的，因为其基本的倾向——我认为是完全正确的——在于把精神活动现象建立在生理学事实之上，即把生理学和心理学融合统一，把主客观统一起来。我确信这是我们这个时代最重要的科学任务。作者从总的方面分析了认知问题并通过列举其基本特点描述出这一过程的特征。在这里，他无差别地使用了心理学家的资料和我们用条件反射的方法在动物身上获得的生理学诸事实。这样，心理学家和生理学家就并肩前进了。但是除了这一点之外，二者之间存在着天壤之别。心理学家把条件制约性作为认知原理，他认为这一原理不可再进一步分解，也就是说，不需要再进一步

①enumerate *v.* 列举，枚举。

composition^②, i. e., does not require further investigation, and he endeavours, therefore, to base everything on it, to represent all the separate sides of learning as one and the same process. For this purpose he takes a physiological fact and in a definite way attaches to it certain significance in interpreting particular facts relating to the process of learning, without seeking actual confirmation^③ of this significance. Hence, the physiologist tends, willy-nilly, to think that the psychologist, who only recently departed from the philosopher, has not yet fully renounced^④ his inclination for the philosophical method of deduction^⑤, for pure logical activity which does not verify every step of thought by agreement with reality. The way of the physiologist is the reverse of this. At every moment of his investigation he endeavours to analyse the phenomena separately and concretely, to determine as much as possible the conditions for their existence, without relying on mere deductions or mere hypotheses^⑥. This I shall try to prove on the basis of certain points in which the author opposes me.

Although conditioning, association by simultaneity^⑦, conditioned reflexes serve as the factual point of departure in our research, they are, nevertheless, subjected to further analysis by us. We have before us the following important question: what elementary properties of the brain mass underlie this fact? This question has not yet been finally solved by us, but certain data for its solution are afforded by the following experiments. With our experimental animal (the dog) it was observed that when

研究,因此,他力图把一切都基于这一原理之上,主张把与认知所有不相关的方面都归于同一个过程。为了达到这个目的,他摘录一个生理学事实并在解释和认知过程有关的特定客观事实时,用一定的方式赋予这一客观事实以特定意义而不去探求这一意义的实际证实。因此,生理学家会不由自主地认为刚刚与哲学家分离的心理学家还没有完全放弃对哲学演绎方法的偏爱,对纯粹逻辑推理的偏爱。这种哲学推理不是用是否与现实一致这一原则来检验思想的每个步骤。生理学家所用的方法与此相反。在研究中,每时每刻他都致力于个别地、具体地分析现象,尽可能地确定其存在的条件,而不是仅仅依赖于推理或假设。关于这个,我将尽力就作者反对我的几点加以证明。

条件适应,即,条件的共存联合,或条件反射,虽然在我们的研究中是作为一个事实上的出发点,但仍有待于我们进一步分析。摆在我们面前的是下述重要问题:构成这一事实基础的是大脑质的什么基本属性?这一问题还没有得到圆满解决,但是下列实验为解决方案提供了某些数据。在我们的实验动物(狗)身上可观

② decomposition *n.* 分解。

③ confirmation *n.* 证实,确认。

④ renounce *v.* 放弃,抛弃。

⑤ deduction *n.* 演绎,推论。

⑥ hypothesis *n.* (pl) (单 hypothesis) 假设。

⑦ simultaneity *n.* 同时发生(存在),同时性。

the external agent, which we wish to use as a conditioned stimulus, is applied after the beginning of the unconditioned stimulus, we get a conditioned reflex (according to the latest and most precise experiments carried out by Dr. N. V. Vinogradov), but it is insignificant and temporary, and invariably disappears if the same procedure is prolonged. A stable and durable conditioned reflex, as we have long known, can be obtained only when the external agent constantly precedes the unconditioned stimulus. Thus the first procedure has a double effect: at first it contributes temporarily to the formation of the conditioned reflex, and then abolishes it. This latter effect of the unconditioned stimulus is clearly manifest in the following experiment. A conditioned stimulus, well elaborated by means of the second, usual procedure – if afterwards it is systematically applied following the onset of the unconditioned stimulus, or is covered by it, in our laboratory terminology – gradually loses its positive action (especially when it belongs to the category of weak, conditioned stimuli) and finally is even transformed into an inhibitory stimulus. Obviously in this case the mechanism of negative induction[®] (according to our old terminology, the mechanism of external inhibition) gradually prevails[®], i. e., the corresponding cell of the conditioned stimulus is inhibited, reaches a state of inhibition under the influence of repeated concentration on the part of the unconditioned stimulus – and the conditioned stimulus thus meets in its cell a constant state of inhibition. And it is this which makes the conditioned agent inhibitory, i. e., when ap-

察到，当我们希望用作条件刺激物的外界动因在非条件刺激开始后被应用时，我们就可得到一个条件反射（据维诺格拉道夫博士所做的最新、最精确的实验）。但这一反射是微不足道的、暂时的，而且如果这同一过程延长的话，这一反射必然会消失。正如我们早已熟知的，只有当外界动因不断地先于无条件刺激发生时，才可获得稳定而持续的条件反射。这样，第一个步骤就有了双重作用：首先，它暂时促成了条件反射的形成，进而又废除了它。后一个作用可在后面的实验中清楚地显现出来。通过第二个常见的步骤精心摘出的条件刺激——如果这个步骤后来在非条件刺激开始后得到系统地应用，或者，用我们的实验术语来说，被非条件刺激所掩盖——慢慢地丧失了其积极作用（尤其当它属于弱条件刺激一类时），最后甚至转化为抑制刺激。很明显，在这种情况下，负诱导机制（据旧术语，外部抑制机制）逐渐占了上风。即，条件刺激的相应室受到抑制。在非条件刺激的一部分发生反复集结的影响下达到抑制状态——条件刺激由此在其室中达到恒常抑制状态。正是这样使得条件动因受到抑制，也就是说，当这

⑧induction *n.* 诱导。

⑨prevail *v.* 胜过，占上风。

plied alone it now evokes in its cortical^⑩ cell not an excitatory but an inhibitory process. Consequently, during the usual procedure of elaboration^⑪ of a stable conditioned reflex, the passage of a wave of excitation from the corresponding cortical cell to the centre of concentration of the unconditioned stimulus represents precisely the principal condition for the fixation of the path from one point to another, for a more or less constant union of the two nervous centres.

Let us pass now to other particularities of the conditioned activity where the author proposes his own uniform^⑫ interpretation of the phenomena instead of our diversified^⑬ analysis of concrete facts. The delayed, retarded conditioned effect, according to our experiments, is based on special inhibition of early phases of the conditioned stimulus, which do not coincide closely with the time of the appearance of the unconditioned stimulus. The author alleges for some reason that we attribute this to "mysterious latencies" in the nervous system, and gives his own interpretation of the facts. He admits that when, for example, the sound of a bell plays the role of a conditioned stimulus, the animal responds with a reaction of strenuous^⑭ listening, with a complex motor act, and the centripetal^⑮ impulses of this act are, strictly speaking, the real stimulators of the conditioned effect, in our case of the conditioned alimentary reflex – the salivary secretion.

According to the author, "when the salivary glands begin to secrete, the accompanying stimuli are not furnished by the bell,

一条件刺激单独应用时可在大脑室中引起的不是兴奋，而是抑制过程。所以，在精心设计稳定条件反射的一般过程中，从相应的大脑室到非条件刺激集结中心的兴奋波通道精密地体现了固定从一点到另一点路径的主要条件，和两个神经中枢多少经常联合的主要条件。

现在让我们转到条件活动的其他特征。在此处，作者提出了他自己对于这一现象的一贯解释，而不是我们的对具体事实的多样化分析。被延迟或阻碍了的条件作用，根据我们的实验，是建立在条件刺激早期阶段的特殊抑制之上的。这种特殊抑制并不与非条件刺激出现的时间完全一致。作者不知为什么声称我们把这归于神经系统中的“神秘潜在因素”，而提出了自己对这些事实的解释。他承认，比如，当铃声起条件刺激作用时，动物对它的反应是紧张地听，伴随着复杂的运动动作。而这一动作的向心冲动，就我们的食物条件反射——唾液分泌而言，严格地说是条件作用的真正刺激质。

根据作者所说的“当唾液腺开始分泌时，与之相伴随的刺激并非由铃声而产

⑩ *cortical adj.* 皮质的，皮层的。

⑪ *elaboration n.* 精心制作，详尽阐述。

⑫ *uniform adj.* 一直不变的，一贯的。

⑬ *diversified adj.* 多样化的。

⑭ *strenuous adj.* 紧张的。

⑮ *centripetal adj.* 向心的。
centripetal impulse 向心冲动。

but by these responses to the bell. The direct response to the bell is probably over in a small fraction of a second." And further he states: "The apparent separation in time of a conditioning stimulus and its response is then quite possibly an illusion." The author even says that "Pavlov tends to forget in his explanation of the delay" the existence of the above-mentioned centripetal impulses from the motor apparatus¹⁶. On page 312 of my "Lectures on the Work of the Cerebral Hemispheres" one can see that not only do I take into account the centripetal impulses for the skeletal musculature¹⁷, but I regard it as being more than probable that they exist even for all the tissues¹⁸, to say nothing of the separate organs. In my view, the entire organism with all of its components are able to report about themselves to the cerebral hemispheres.¹⁹ Consequently, this is not the matter of an omission on my part; the matter is that actually we have not the slightest grounds for interpreting the fact in the way the author does.

First of all, if we agree with him that it is not the bell, but the centripetal impulses from the motor act of strenuous listening that is the actual stimulus for the conditioned effect, then why does the effect not manifest itself at once, but is retarded (in the case of a delayed reflex) and, besides, in accordance with the length of the interval between the beginning of the stimulus and the beginning of the unconditioned reflex? For, when the

生,而是由对铃声的反应。对铃声的直接反应可能一秒钟不到就完了”。接着他进一步陈述:“条件刺激和其反应在时间上的明显分离很可能是一种假象。”作者甚至说“巴甫洛夫在他对延迟现象的解释中倾向于忘掉”上面提到的来自运动器官的向心冲动的存在。在我的《大脑两半球功能论文集》第312页可以看到,我不仅考虑了对骨骼肌系统的向心冲动,而且认为这些向心冲动更可能是为所有组织而存在的,更不必说各个器官了。在我看来,整个有机体及它的所有组成部分都有能力向大脑两半球汇报自己的情况。所以,这不是我的疏忽问题,问题是实际上我们没有一丁点儿理由像作者那样解释事实。

首先,如果我们同意他的观点,认为不是铃声而是来自紧张地听这一运动动作的向心冲动是条件作用的实际刺激因素,那么为什么这一作用没有马上显现出来,而是被延迟了(就延迟反射而言),并且除此之外,为什么这一作用还与刺激开始和无条件反射开始之间的时间间隔长度一致?因为,

⑮ apparatus *n.* 器械,仪器,装置。

⑯ skeletal musculature 骨骼肌系统。

⑰ tissue *n.* 组织。

⑱ In my view ... cerebral hemispheres. 巴甫洛夫反复指出过内部分析器的独立存在,而外部分析器把有机体和外部世界联系在一起,内部分析器接受来自动物所有器官和各系统的信号,使和后者“也能分析发生在动物体内的情况”。