A Review on Ivan Petrovich Pavlov

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Ivan Pavlov has, in a way, become a household name, as phrases like “Pavlov’s dogs” and “Pavlovian reflex” are still used today and are common examples in psychology classes. It’s interesting that while he had a massive and lasting impact on psychology research, the Nobel Prize he received was actually for the “physiology of digestion”. This might show just how vital his research was for further development in different scientific fields.

The circumstances of his Nobel Prize award in 1904 are interesting, considering his competitors. He seems to have been nominated only 4 times that year, while Elie Metchnikoff was nominated 19 times for notable discoveries in cellular physiology and pathology, especially phagocytosis, which seems much more important than simple digestion. However, previous nominations shed more light on this. In 1901, Pavlov was nominated a whopping 33 times. There were, of course, a lot of other notable nominees for physiology and medicine that year, such as Ramon y Cajal, von Behring, Golgi, and many more. It’s not that Pavlov’s research wasn’t impactful, but that there were so many other important discoveries in medicine early on that his award was delayed. Pavlov did achieve widespread recognition in his home country and had formal laboratory training (Rozo, 2017), which may have given him an edge in technique and opportunities that less formally trained candidates lacked. This relates to the ideas of greatness vs. great discoveries discussed in *Road to Stockholm*. A great discovery may seem relatively small if competition is fierce, and merit alone is not enough to secure an award.

Pavlov’s research most commonly relied on dogs as test subjects, as described in his own Nobel lecture and published work. He studied the activity of digestive glands and the secretion of digestive juice in response to various stimuli and diets. Surgery was performed on the subjects to collect their secretions and measure them. This involved diverting the digestive glands from the stomach canal into external tubes, and cutting the stomach nerves to create an “isolated stomach-wall pouch” (Pavlov, 1904). Various stimuli were then presented to the dogs, focusing on taste, sound, and sight, such as showing them a loaf of bread. The sight of the food would stimulate the salivary glands, but if the dog was not given the bread to eat, this salivation would stop (Pavlov, 1904). Feeding the dog the bread would then reignite the salivation reflex. This demonstrated a conditioned reflex, which later became a major topic in psychological studies known as classical conditioning.

Pavlov expresses sympathy for the dogs during his Nobel lecture and mentions the use of anesthesia during surgery, coupled with sanitation and wound care, but there may be some wonder whether this was done specifically for a public speech and to present a nicer image of the experiments. While the dogs were described as enthusiastic to participate, this still raises a number of ethical concerns that limit the replication of experiments like this today. In other experiments he performed, fistulas were also created in the dog’s stomach and esophagus, leading to an external opening from which digestive juice could be collected during “sham feedings” (Wood, 2004), as the dogs were unable to swallow the food they had eaten. This was used to collect pure gastric juice for other studies. Modern summaries and pop culture often omit the details of Pavlov’s experiments and sometimes describe the dogs only as drooling, failing to mention the operations performed on them. The more gruesome aspects of Pavlov’s legacy were filed down because they might sit poorly with modern audiences. However, these techniques were still used in recent experiments, such as a 2021 study. A study on the effects of the peptides bombesin and neurotensin on gastric secretion included 14 dogs that underwent gastrointestinal surgery and received a “Pavlov pouch” for gastric juice collection (Tsalis et al., 2021). While the methods may appear unpleasant, it seems that Pavlov’s techniques were precise enough to still be used today and carry his name and his legacy.

Just like his surgical procedures, Pavlov’s methods of stimulus and behavior association are still relevant today. Classical conditioning and the conditioned reflex are still very prevalent in psychology teachings, and are even commonly used as therapy for human patients. A conditioned reflex control technique (CRCT) based on classical conditioning can be used to treat behavior addictions, including drug addiction, kleptomania, obsessive-compulsiveness, and many others (Park, 2023). Pavlov’s research pinpointed a mechanism that not only applied to dogs and their digestion but also had effects far outside his initial experiments.

Pavlov’s research and discoveries contributed greatly to both physiology and psychology, and his techniques are still in practice today. While his methods can be considered controversial, the same is true of many early Nobel laureates. Our scientific progress exists on a foundation that can’t be forgotten just because it’s unpleasant, and the same is true of the people responsible for it. However, this begs the question of whether great discoveries would really be possible without these early unethical experiments, and whether Greatness as a scientific achievement really corresponds to the greatness of personal moral character.

References:

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*This author wrote this paper for Biology 485:The Nobel Prizes taught by Dr. Brett Palmero.