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Midterm - INTD262

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1 Unit 3

1. Recall the fascinating story about psychological research, in which the author shares that 67 percent of psychologists who were asked to share their data did not share it. (a) Were the rates of error higher or lower in the studies for which the authors did not share data? (b) In whose favor were the errors?

A) The study found that the rates of errors or reproducibility challenges were higher in studies where data was not shared. This aligns with the broader argument that transparency, including data sharing, is crucial for ensuring the reliability of research findings.
B) Errors were more likely to favor the original author's hypotheses. This means that studies with inaccessible data were more likely to report findings that supported their predicted outcomes, raising concerns about selective reporting or potential biases when data is withheld. These findings highlight the importance of data sharing in creating reproducibility and reducing biases in psychological science as a whole.

2. "Recent research in behavioral economics has shown that groups are often better than individuals at finding errors in reasoning." (a) Why do you think this is the case? (b) Can you give an example of the wisdom of crowds thus far in our study of Latin American science?

A) I think that in behavioral economic, groups are often better than individuals at finding errors in reasoning because with more people comes more unique ways of looking for errors in reasoning. I believe that having more people involved reduces the likelihood of biases, as the diversity of perspectives increases the chances that at least some individuals in the group will approach the situation without the same biases.
B) One example of the wisdom of crowds in latin American science can be found in collaborative conservation efforts in the Amazon region, where multidisciplinary teams, such as ecologists, sociologists, and economists, work across national borders to tackle environmental challenges. Thus, by combining diverse expertise and perspectives, these groups are able to generate more accurate and practical strategies than those developed by individuals or isolated organizations. This collective approach enhances the quality and effectiveness of environmental solutions across the region.

3. Recall the story of cold fusion. (a) List three facets of the peer review process that went wrong in this episode. (b) How long, from start to finish, did it take for the scientific community to sort out the errors in the cold fusion research?

A) The cold fusion research by Martin Fleischmann and Stanley Pons faced many issues in the peer review process. Firstly, the research was published with insufficient scrutiny, as the results were rushed into publication without adequate time for independent replication or critical review, which then allowed errors to go unchecked. Second, the excitement surrounding the potential breakthrough of cold fusion led to premature acceptance of the findings. The scientific community was eager to believe in the possibility of a revolutionary energy source, which led to some overlooking the need for skepticism in evaluating the claims. Finally, after the initial publication, numerous attempts to replicate the results failed, yet some journals and researchers did not retract their support for some time, allowing misinformation to spread and delay a proper response from the broader scientific community.
B) It took a couple years for the scientific community to fully reject cold fusion as a valid discovery. The original claims were made in March of 1989, and by the early 1990s, replication attempts had been

overwhelmingly unsuccessful, which led most of the scientific community to discredit the findings. By around 1994, the cold fusion phenomenon was widely dismissed, although some groups continued research for several more years.

4. Note that we encountered several examples of viceregal engineers becoming Latin American leaders. (a) What are some examples of professions that involved modern technical skill in R´ıo de la Plata and Per´u? (b) What is the primary profession of modern US leaders, for example, elected to The United States Congress?

A) In the Río de la Plata and Peru, some prominent professions involving modern technical skill included engineering, specifically civil engineering, as well as natural sciences. Engineers like Ernesto Malinowski and Eduardo de Habich played key roles in the modernization of Peru by contributing to the development of infrastructure projects such as railways and public works. Additionally, the training and professionalization of engineers in these regions, influenced by European models, helped drive state-sponsored technical innovations.

B) In the modern United States, a common profession among leaders, especially in Congress, is law. Many U.S. elected officials have backgrounds in law and have served as attorneys before their career in politics. This legal background provides a good foundation for crafting legislation and navigating the complexities of governance. However, other professionals, such as business leaders and military veterans, also have a strong presence in U.S. politics.

5. Jos´e Mariano Moci˜no and others were ordered by the Mexican viceroy on an expedition to Nootka Island. What was the purpose of the expedition? (Take INTD255 to learn more!)

The Mexican viceroy ordered José Mariano Mociño and others on an expedition to Nootka Island to conduct scientific exploration, focusing on the natural history and geography of the region. The goal was to document botanical specimens, indigenous cultures, and environmental features, adding to Spain’s understanding of the Pacific coast. This effort was part of Spain’s broader strategy to assert territorial claims and expand scientific knowledge during the late 18th century.

6. In Per´u, we must take note of the work of Hip´olito Un´anue. (a) What are some of his other scientific contributions? (b) In Nueva Granada, we must take note of the work of Jos´e Celestino Mutis. What are some of his main contributions?

A) Hipólito Unanue made key contributions to environmental health by studying the effects of climate, air, and water on public health. He founded Peru's first medical school and published works like Observaciones sobre el clima de Lima, which linked Lima's climate to disease patterns. His efforts helped shape medical practice and environmental health policies in Peru.

B) José Celestino Mutis is renowned for leading the Royal Botanical Expedition to Nueva Granada, where he documented many previously unknown plant species. His botanical studies contributed significantly to the understanding of local flora and resources, advancing natural science in Latin America.

7. (a) When did Latin American wars of independence begin, approximately? (b) Give some examples of scientists and engineers who fought and died for their countries.

A) The Latin American wars of independence began in the early 19th century, with major movements starting around 1808. This was largely due to the Napoleonic Wars, which led to the displacement of Spain's royal family and the weakening of colonial governance. The most significant uprisings began between 1810 and 1820 across various regions, including Mexico, Venezuela, Argentina, and Peru.

B) Many scientists and engineers played important roles in the struggle for independence. In South America, Francisco de Miranda, a Venezuelan military leader and revolutionary, who was also a scholar with expertise in engineering and cartography, played an important role in the fight for independence and was involved in scientific discussions related to governance and social reform. Another notable figure is Juan José Castelli, an Argentine lawyer and revolutionary who also had a strong background in science. His contributions were vital to the cause, blending intellectual and revolutionary efforts.

2 Unit 4

1. How long after Semmelweis's solution to childbed fever was germ theory introduced?

Semmelweis introduced his hand washing solution to childbed fever in 1847, while germ theory was not fully developed until the 1850s, with Pasteur's work leading to its acceptance in the 1860s and 1870s. This means there was a gap of about 20 to 30 years between Semmelweis's discovery and the formal introduction of germ theory

2. Where did the practice of autopsies begin? In what way does performing an autopsy fit with the scientific attitude?

In Latin America, the practice of autopsies became important during the colonial period, with a focus on medical and legal purposes. In the 18th century, figures like the Peruvian physician Hipólito Unanue used autopsies to study the causes of diseases, contributing to the development of medical science in the region. Autopsies in South America were often performed in order to further the understanding of diseases that affected the local populations, aligning with the growing interest in scientific investigation during the Enlightenment era.

3. (a) Do you think the discovery of penicillin was an accident? Why or why not? (b) Louis Pasteur is quoted as saying “chance favors the prepared mind.” What did he mean by this? (c) In light of (a) and (b) do you regard the discovery of cinchona as accidental or scientific?

A) I would consider the discovery of penicillin to be an accident because, Alexander Fleming first noticed its antibacterial properties while observing a mold that was growing on a petri dish. However, this was not completely accidental, Fleming had been studying bacterial cultures and actively looking for substances that could inhibit bacterial growth.
B) Alexander Flemming’s prior knowledge and preparation in microbiology played a crucial role in his ability to recognize the significance of his observation. Which is why Pasteur's quote, “chance favors the prepared mind,” means that while unexpected events or discoveries may seem accidental, they are only meaningful when a person has the knowledge and curiosity to recognize their potential and put themselves in the right position to make such discoveries.
C) The discovery of cinchona, the source of quinine which is used for treating malaria, was not purely accidental but was rooted in scientific inquiry. While European explorers first learned of its medicinal properties from the indigenous people in South America, scientists like the Spanish botanist José Celestino Mutis further studied and classified the plant. This aligns with Pasteur’s view, as the discovery was made possible by a prepared mind, capable of recognizing and investigating the plant’s medicinal value .

4. What event catelyzed the formation of the Establecimiento de Ciencias de M´edicas in 1833?

The Establecimiento de Ciencias Médicas was formed in 1833 after the closure of the National and Pontifical University of Mexico, driven by political instability and the desire for reform in medical education. The establishment aimed to modernize medical training, incorporating European scientific advancements and creating a more specialized institution for medical studies.

5. (a) List some reasons the authors give to explain why medical reforms were slow to materialize in Nueva Granada, relative to the struggle for reform in Nueva Espa˜na. (b) Who led the medical reform process in Nueva Granada in the 18th century? (c) When and where was the Facultad de Medicina reestablished in Nueva Granada, and what happened next?

A) The medical reforms in Nueva Granada were slower than those in Nueva España for several reasons. One major factor was the strong influence of colonial elites who resisted changes that could challenge their established status. Furthermore, the region faced difficulties in implementing reforms due to limited resources, a lack of institutional support, and political instability following the colonial period.
B) In the 18th century, the medical reform process in Nueva Granada was largely led by José Celestino Mutis who was a prominent figure in the region's scientific and medical communities.
C) The Facultad de Medicina in Nueva Granada was reestablished in 1827 at the Universidad del Rosario in Bogotá. This development was a significant step forward, with the faculty playing a key role in shaping the

region's medical education, though it was later impacted by political and social change.

6. (a) How many medical schools were there in Brazil in the eighteenth century? (b) What happened to the Portuguese Crown in 1807? What influence did this have on medical reform?

A) In the eighteenth century, Brazil had only a few medical schools, including the important ones established in Rio de Janeiro and Bahia. These institutions were instrumental in providing medical education in Brazil during this period
B) In 1807, the Portuguese Crown fled to Brazil in order to escape the Napoleonic invasion of Portugal. This event significantly impacted medical reform by creating the conditions for the establishment of more formal educational and scientific institutions in Brazil, as the royal court's presence led to reforms in various sectors, including healthcare.

7. As the generation of doctors in Columbia returned from France in the late 19th century, what three cultural institutions did they establish to enhance medical practice?

In the late 19th century, Colombian doctors who returned from studying in France helped shape the country's medical field by establishing several key cultural institutions. They founded Colombia's first medical journals, created the Sociedad de Medicina y Ciencias Naturales de Bogotá in 1873, and established the Universidad Nacional de Colombia's medical school in 1868. These institutions played vital roles in formalizing medical education and advancing the field in the country.

8. Triangulation Suppose you observe a distant mountain from a flat plain. Suppose you walk a baseline of 1 km, perpendicular to the direction towards the mountain. The difference between the compass headings to the mountain at either end of the baseline is 5 degrees. How far away is the mountain?

The mountain is approximately 22.9 kilometers away, based on the triangulation method. This calculation uses a 1 km baseline and an angle difference of 5 degrees between two observation points.

9. Latitude and Longitude (a) Suppose two cities lie along a constant line of longitude. If we measure a change of 30 minutes (0.5 degree latitude) between them, how far apart are they, in km? (b) Suppose two cities lie along a constant latitude of 45 degrees North. If they are 600 km apart, what is the change in longitude between them?

A) The two cities are 55.5 kilometers apart, based on a 0.5-degree latitude difference (30 minutes). This is because each degree of latitude corresponds to approximately 111 kilometers.
B) The change in longitude between two cities 600 km apart at 45° North is approximately 7.7°. This is calculated by adjusting for the cosine of the latitude, as the Earth's circumference decreases towards the poles.

3 Unit 5

1. (a) When were the first medical journals published in Columbia? (Give a few examples). (b) Compare this time frame to the publication of the first mining, chemistry, and physics journals in Mexico. (c) How, or through whom, were these journals connected to medical schools in Columbia?

A) The first medical journals in Colombia were published in the late 18th and early 19th centuries. Some examples include Revista Médica in 1882, which was a pioneering publication in the country, and Revista de Ciencias Médicas in 1868, contributing significantly to the medical discourse in the region
B) In contrast, Mexico's first journals in fields like mining, chemistry, and physics were published earlier, with some dating back to the late 18th century. For instance, Revista Mexicana de Minería began in 1811, and journals on chemistry and physics followed later.
C) These journals in Colombia were often linked to medical schools, with professors and researchers contributing articles and findings. The Universidad de Bogotá and other medical institutions played a key role in their establishment, fostering connections between academic research and clinical practice.

2. In 1833, two Enlightenment period institutions were merged into the beginnings of a modern medical school in Mexico. What were the three institutions?

In 1833, three key Enlightenment institutions were merged to form the basis of modern medical education in Mexico. These were the Royal and Pontifical University of Mexico, the Royal Medical and Chirurgical Academy of Mexico, and the Royal College of Surgery. This consolidation marked the beginning of formalized medical training in the country.

3. Consider our major in kinesiology and nutrition science (KNS). To what extent would we consider this medicine, in the absence of modern germ theory? That is, are there other holistic forms of medical development we encountered in Latin American history besides vaccines and drugs that fight bacteria and viruses?

A) Without modern germ theory, kinesiology and nutrition science (KNS) could still be considered a form of medicine, focusing on holistic health and prevention. In Latin America, alongside vaccines and antibiotics, traditional medical practices emphasized balance through physical activity, nutrition, and medicinal plants. Indigenous healing systems, such as curanderismo in Mexico or the use of ayahuasca in the Amazon, combined physical health with spiritual elements to treat illness. These holistic approaches contributed to health in ways beyond fighting bacteria and viruses, focusing on the body's balance and the connection to nature and community.

4. (a) What historical event in 1808 led to the creation of the first medical and surgical schools in Brazil (b) When did Brazil declare independence from Portugal? (c) How long after independence did the Brazilians introduce modern reforms into the medical schools in Bahia and Rio de Janeiro?

A) The creation of the first medical and surgical schools in Brazil was prompted by the arrival of the Portuguese royal family in 1808. This event led to the establishment of the Royal Medical School of Bahia and the Royal Academy of Surgery in Rio de Janeiro, both aimed at addressing the need for modern medical education in Brazil.
B) Brazil claimed its independence from Portugal on September 7, 1822.
C) After Brazil's independence, modern reforms in the medical schools of Bahia and Rio de Janeiro began to take shape around the late 19th century. These reforms included significant curriculum updates and professional modernization, with greater focus on European medical practices and teaching methods. Notably, it took about 40 years after independence before these changes were implemented, reflecting a gradual transition toward modern medical education influenced by advancements in European science and technology.

5. In Columbia, the Escuela de Medicina was founded in 1865. It was centered on hospital-based anatomy and physiology. Consider the following quote from the text: “The second phase is notable for the slow progress of laboratory-based medicine, especially etiopathological procedures. Its final stage, staring in the 1950s, is defined by the introduction of Flexnerian reforms from North American technological medicine.” What does quote mean by Flexnerian? Think back to our reading in The Scientific Attitude.

The term "Flexnerian" refers to the medical education reforms introduced by Abraham Flexner in the early 20th century. His 1910 report recommended a more scientific, standardized approach to medical training, emphasizing laboratory work, clinical experience, and research. These reforms reshaped medical schools by focusing on evidence-based medicine and integrating scientific principles into the curriculum. In Colombia, the introduction of these Flexnerian reforms in the 1950s signified a shift toward modern, research driven

medical education, aligning with North American medical practices.

6. (a) What was a major driver of modern epidemiology in 19th Century Brazil? (b) What was the purpose of the Tropicalist School of medicine? (c) When did the bubonic plague enter Brazil, and how did the Brazilians respond?

A) A major driver of modern epidemiology in 19th century Brazil was the frequent outbreaks of infectious diseases like yellow fever, malaria, and smallpox, which led to the development of public health measures and the establishment of institutions like the Oswaldo Cruz Institute to study and combat these diseases.
B) The Tropicalist School of medicine aimed to address Brazil's unique tropical diseases by combining European medical knowledge with local practices, focusing on diseases common in tropical environments and developing region-specific treatment methods.
C) The bubonic plague entered Brazil in 1900 via the port city of Santos. In response, Brazil implemented quarantine measures, sanitary reforms, and public health campaigns led by Oswaldo Cruz, targeting the rats that spread the disease.