

Olive Ausness

INTD255, Safe Return Doubtful

Midterm 1

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## 1 Early Antarctic and Oceanographic Exploration

1. Who was Captain James Cook? List several notable achievements of his three main expeditions.
  - a. Captain James Cook was a British explorer who circumnavigated the globe twice, during which he was the first to sail across the Antarctic circle. In 1773, as part of the second circumnavigation, he had travelled the furthest South of anyone at that time; although he never saw Antarctica, he got closer to discovering it than anyone before him. Cook was the first Englishman to 'discover' Hawaii, where he was eventually killed in a battle with the natives.
2. What was the significance of the venus transit on one of the Cook expeditions? What other, more secret, mission did Capt. Cook have in the Southern Ocean?
  - a. The transit of Venus was an important astronomical event that enabled early astronomers to determine the distance to Venus. Gathering data from multiple vantage points was essential, and Captain Cook was tasked with transporting a group of astronomers to Tahiti to view the transit. While there, Cook was encouraged by the English leaders to explore further south, as the arctic was still largely undiscovered.

3. Kepler's Laws: If the units of orbital radius  $r$  are AU, and the units of orbital period  $T$  are years, then  $T^2 = r^3$ .

(a) If the orbital radius of Uranus is 19.22 AU, what is its orbital period in years?

84.26 years

(b) If the orbital period of Mars is 1.88 years, what is its orbital radius?

1.5 AU

(c) What parameter in orbital mechanics was fixed by the observations of the venus transit in the late 18th Century by scientists who accompanied the Cook expedition?

This expedition allowed for the parallax to be used to calculate the distance between Venus and the sun.

4. List some of the achievements in early polar exploration attained on the following expeditions: • The Belgica • The Fram, with Nansen • The Gjoa • The Discovery, with Scott

- a. The Belgica: This is the ship on which Amundsen traveled with De Gerlache to the Antarctic archipelago. The crew had spent an entire winter stuck in the ice around the 71st parallel, and was the first to survive doing so. From this, the *Belgica* and its crew gathered a wealth of scientific information, including meteorological and climate records, as well as collections of ocean life from the area.

- b. The Fram: Nansen and a single companion, Johansen, set out in the *Fram* with the goal of reaching the North Pole. They did not succeed in reaching it, but got the farthest north ever reached by humans, at around 170 miles south from the Pole. They used skis and snow dogs to achieve this goal, showing that more indigenous influenced tactics were beneficial in traversing this climate. This expedition sparked Amundsen's interest in polar exploration, as well as encouraged Norwegian nationalism.
- c. The Gjoa: This was the ship that Amundsen purchased with the intent of sailing to Greenland to improve polar exploration and captaining skills. He led this expedition through the Northwest passage, towards the magnetic pole. While on this expedition, Amundsen and his crew interacted with the indigenous peoples (Eskimos), trading with them and learning how to survive in the arctic from them. In the end, this expedition proved that the magnetic pole does move overtime, as Amundsen reached the point where James Clark Ross had marked it, but it had shifted to the north.
- d. The Discovery: Scott, who was a ranking officer for the British navy, was captain of the *Discovery*, which he sailed to Antarctica. There, he and his crew were the first to view major parts of the continent, including McMurdo sound. They had the goal of reaching the south pole, and made it closer than anyone before, at 82°17'. Scott also had rejected indigenous practices that had proven beneficial to Nansen and Amundsen, which resulted in poor health and difficulty traversing the landscape.

5. Who were the Dorset and the Thule? How did they survive in their environment?
  - a. The Dorset and the Thule were different bands of 'Eskimo', or Inuit. They survived by working with their landscape, rather than against it. They typically fished for their food in holes in the ice, and gathered the nutrients they needed to survive from the seals and fish they caught. They learned how to use sled dogs to travel efficiently and knew their snowy terrain very well.
6. Who are the Chinook? Where did Capt. Cook approach their territory?
  - a. The Chinook are a group of indigenous people native to the coast of Oregon. Captain Cook first encountered them in Cape Foulweather.
7. Discuss the risks and rewards of cultural exchange, in light of the writings of Barry Lopez in Horizon. As examples, consider the stories of Ranald MacDonald, Captain James Cook, Captain Amundsen and the Netsilik.
  - a. Cultural exchange can be enriching, in that it provides one with a new outlook or ideas. Examples of this can be seen in Amundsen gaining knowledge from the Netsilik on how to survive in the Arctic. Yet, these exchanges can often be harmful to the often less willing native groups. They risk exposing themselves to more advanced societies, which could decide to do them harm.

## 2 Survival Skills: Work, Energy, Food, and Physics

1. How many kcal of energy is stored in 2 kg of pemmican? (Treat this as a fatty food, not a protein).

- a. 18000 kcal
2. How many kg of wheat biscuits are required for 500 kcal of energy? (Treat this as mostly carbohydrates).
  - a. 0.125 kg
3. How many Joules of energy are required to pull 1000 kg across 5 km of snowy tundra, if the relevant coefficient of friction is 0.1?
  - a.  $w=0.1(1000)(9.81)(5000)$
  - b. 4,905,000 Joules
4. Take your result from the previous exercise, and divide the energy among 10 sled dogs. How much energy is required of each dog? Now feed each dog that much pemmican. How many kg of food, per dog, is required?
  - a. 490,500 Joules per dog
  - b.  $490,500/4184= 117$  kcal per dog, each dog would need 13 grams of pemmican
5. What food related health risk is associated with spending long durations at sea and in polar regions?
  - a. Scurvy, from a lack of vitamin C was a common illness for polar explorers who didn't have access to fresh, nutrient rich fruits and vegetables.

### 3 Navigation: Distance, Time, Speed, Longitude and Latitude

1. How many nautical miles correspond to travelling 2.5 degrees directly South?
  - a. 1 degree= 60 minutes, so 2.5 degrees= 150 minutes
  - b. 1 minute = 1 nautical mile, so 150 minutes = 150 nautical miles
  - c. 150 nautical miles

2. If we travel due North by 400 km, what is our change in latitude?
  - a. 1 degree= around 111km
  - b.  $400/111 = 3.604$  degrees
3. If we are travelling due West at a latitude of 60 deg North, what distance corresponds to a change of 1.5 degrees longitude?
  - a.  $s = 1.5(6378.1)\cos 60$
  - b. I can't figure this one out
4. If a ship sails East at 10 knots, how many nautical miles are travelled in 48 hours?
  - a. 480 nautical miles

#### 4 The British, The Norwegians, and Cultural Exchanges

1. Having read the first part of the story of the race for the South Pole, describe the differences in style between the Norwegian/Scandinavian expeditions and the British ones. Bonus: Connect your ideas to indigenous cultural exchange, or our reading in Deep Survival.
  - a. British explorers tended to be members of the royal navy, who were sailing on orders from the king or queen and were well funded. They had experience sailing but not necessarily in polar exploration. They were unwilling to stray from what they had been trained to do. The Norwegian explorers, on the other hand, were passionate about polar exploration; they were driven by their desire to know more about the landscape. They were less well-funded and experienced in sailing, but they were more willing to adopt the practices of indigenous peoples near arctic areas. This allowed them to be better equipped to handle the conditions.

2. List five technologies for polar survival that the Norwegians learned from the Netsilik.
  - a. The Norwegians learned how to properly guide sled dogs, sledge in any snow conditions, travel in the cold, dress for the cold, build igloos, and parts of the Eskimo language.
3. What was the primary role of the Royal Geographic Society in British Antarctic exploration?
  - a. The Royal Geographic Society acted as the financier for the majority of British exploration. The society funded R. F. Scott's exploration on the *Discovery*, amongst others. They also acted as benefactors to non-Englishmen explorers.
4. (a) How did the British travel and move gear in the polar regions, before motorized craft were developed?
  - a. The British would ideally have relied on sled dogs, but they had difficulty getting the dogs to follow orders and pull their weight. In *The Last Place on Earth* it states that the dogs lost respect for R.F. Scott and thus refused to pull. This meant that the men themselves were tasked with holding the gear.

(b) How did this differ from the Norwegians?

The Norwegians were less set in their ways, and consequently adopted indigenous practices of sledding with sled dogs. Some men trained with the Eskimos to become better at leading the dogs, which meant that Norwegian explorers were typically better at transporting their gear before motorized craft were developed.

5. In your view, what are the major risks to ships and explorers when exploring the polar regions in this period?
  - a. I think that the diseases and illnesses that arise when the ships were frozen in the ice were a major risk. Because they didn't have a good understanding of the causes of these illnesses, they didn't treat them properly and they often festered. I also think that traveling in an unknown terrain without any technology that allows separated parties to contact each other was a major risk.
6. When American ambassadors first arrived in Japan, after a period of intense isolationism in Japan, they found the Imperial court already knew how to speak English? How did this happen? Who helped them to learn English, and of the desire of Western nations to trade?
  - a. A member of the Chinook, Ranald MacDonald, feared that the Japanese people would be colonized and discriminated against similarly to the native Americans because he believed them to be related. He knew that exploration was thriving, and that America had a grudge against Japan because the people there treated shipwrecked Americans badly. MacDonald was also a capitalist, however, so he encouraged trading within Asia as well as taught some English to the Japanese.
7. Consider the following quote "Whether the change facing a people comes on swiftly ... or slowly ... the responsibility of the wisdom keeper is to recognize the early signs of significant change, to look into the past, and locate, again, a through line to the future."



Apply this idea to a story we have encountered in the course, or a problem facing our community today.

- a. I think this can be compared to the Supreme Court's overturning of Roe v. Wade.

The shift back towards oppressive, pre-suffrage era America is slowly happening right before us, and I think if we just looked back to how things were then, and how much change was called for, we could find a way to proceed now. We need to be reminded of the efforts of women in the past that gave women today their rights, so we do not take these rights for granted or do not allow them to simply be taken from us.

## 5 Exploration Achievements

1. Discuss the cultural significance of Nansen's first crossing of Greenland to the nation of Norway.

- a. Nansen crossing Greenland was huge for the nation of Norway. The country was not yet independent, so the fact that a man from a tiny, relatively insignificant area that wasn't even recognized as its own nation could achieve something so great was very motivating. It inspired national pride, as well as a movement for independence.

2. Was Roald Amundsen the first leader to cross the North-West Passage? On whose progress did he build?

- a. Amundsen was not the first to discover the passage. The Franklin expedition had reached the North-West passage prior, but had not lived to finish navigating the passage or to tell the tale.
- 3. What were the highlights of Robert Falcon Scott's "furthest South" on the Discovery expedition?
  - a. This expedition reached the furthest south thus far. While on the ice, Scott and his companions were exposed to horrible conditions; food rations were short, scurvy was present, the dogs had given up on pulling, and one of the crew collapsed due to hunger and exhaustion.
- 4. Scientifically, why was it important for explorers in the early 20th century to locate the magnetic North and South poles?
  - a. This was important because navigation relied heavily on the magnetic pull of the earth that was observed with compasses. By finding the magnetic poles, map-making and navigation both could be made easier.

## 6 Survival and Psychology

- 1. Using the terminology found in Deep Survival, what is the difference between a primary emotion, and a secondary emotion?
  - a. A primary emotion is one that is innate, or otherwise built into human nature. This includes fear and hunger. A secondary emotion is a learned response that becomes

second nature. Both kinds of emotions are fast to respond to situations and difficult to overcome.

2. Using the terminology of emotional bookmarks, how are secondary emotions formed, and how do they protect you?
  - a. Secondary emotions are formed from experiences. They are learned through repeated events as a way to protect yourself from known stimuli.

## 7 Reflections

1. While on Skraeling Island, the writer Barry Lopez interacts with a research team responsible for finding artifacts from Dorset, Thule, and Norse cultures in Northern Canada. What is the significance of these diverse finds, in your view?
  - a. These finds show the scope and advancement of life before European colonization. It's so interesting and significant to see how these tribes lived before the invasion. They were often viewed as inferior and primitive, but these artifacts suggest otherwise; these societies were advanced and specialized.
2. While reflecting on the Pacific Ocean in Cape Foulweather, Lopez notices that you can never see the entire Pacific, because the Southern Ocean covers more than one hemisphere of area of our planet. What an area of life or academic topic that you wish you understood, but might not ever fully understand?
  - a. On a basic level, I wish I understood the stock market more. But I also wish that I could understand people better. I know that I'm just me, but it would be nice to

understand why some people do the things they do. I know that this may never happen but one can hope for closure.