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Midterm 2 - INTD255

Dr. Jordan Hanson - Whittier College Dept. of Physics and Astronomy April 11, 2025

1 Reading: Last Place on Earth, ch. 21-32

1.1 Chapter 21 - Scott Sails On

1. As the *Terra Nova* sailed to New Zealand and on to Antarctica, how did they find out about the *Fram* expedition? How did they react?
    a. Leon Amundsen sent a letter to Scott informing him that Amundsen was also leading an expedition to the Pole. At first, they didn't realize that it would result in a race to the Pole. Scott was later interviewed by a reporter who made the challenge clear; it upset him.
2. The *Terra Nova* expedition had settled on ponies for transport. Where were they obtained? Describe how Meares had to transport them to New Zealand.
    a. The ponies were sourced from Manchuria, where they were used to cold and harsh environments. Meares had to travel upwards of 660 miles, by train and then by horse, to reach the village where the horses could be purchased. He bought 33 dogs and some ponies, and was expected to transport them 660+ miles back to New Zealand single handedly. He eventually hired a Russian dog driver to help him.

1.2 Chapter 22 - The Base at Framheim

1. List the advantages and disadvantages of setting the main Norwegian base, *Framheim*, at the Bay of Whales, as opposed to Cape Evans (Ross Island).
    a. At the Bay of Whales, the Norwegian team situated themselves slightly closer to the South Pole than the British did at Cape Evans. There was access to seals and penguins for food. However, Framheim was not on solid land, and movement in the ice shelf could not be predicted. Cape Evans was on solid land, but it was a further trek. The British didn't consume seals like the Norwegians did, so this aspect of the camp doesn't seem to have been impactful.
2. What are some innovations the Norwegians created at Framheim? For example, their boots had to be altered *four times.* What else did they make or build?
    a. The Norwegians worked on improving their living conditions at Framheim. They dug rooms underneath the snow and stemming from the central hut, so that the members of the crew could have space away from the others. This also allowed for workshops, in which rations were packaged and sledges were lightened.
3. On the depot-laying journey, the Norwegians were creating future stores of food for the return journey from the South Pole during the next season. What sort of safety margins did they assume when deciding how much food and supplies to move to the depots?
    a. Amundsen was working with safety margins between 100-200%.

1.3 Chapter 23 - Sledging with the Owner

1. To lay depots, the British team had to get across McMurdo Sound (sea ice). Having constructed their winter hut further South than the *Terra Nova*, they had to move several tonnes of gear across sea ice. In the end, however, they had to *put it all back on the ship, and sail it across.* Why?
    a. They had to reload the ship because the sea ice was not stable enough to support transport across it; instead they had to sail around.
2. Discuss the advantages and disadvantages of having a chain of command. For example, when Scott issued orders, they were to be followed literally. Without orders, his men knew not to change plans without consulting the Captain. How did this differ from the Norwegian leadership style?
    a. Scott's style of leadership did not inspire innovation or individual thought. As he was the leader of the expedition, all those below him were expected to follow his orders blindly. This type of leadership could be beneficial in a situation where the controls are well established- more like a routine expedition- but in harsh and quickly changing situations it could be dangerous. The Norwegians, on the other hand, recognized Amundsen as their leader but open communication and adaptability remained very important. They could voice their opinions or concerns and Amundsen would work with them to solve the issues. This promotes a healthier, more close knit dynamic.

1.4 Chapter 24 - The Pole Seeker Prepares

1. Explain the significance of a *single point of failure* in a complex system. Name several examples from the Norwegian and British expeditions that represented single points of failure.
    a. A single point of failure refers to an aspect of an expedition that, if it goes wrong, the whole expedition fails. For the Norwegians, this was manifested in them bringing the 1911 Almanac

but forgetting to bring the 1912 Almanac, which could have made navigation impossible without calculations from the 1911 edition being conducted. Another example is their ski boots. If they were unable to create a more comfortable model that didn't give the crew blisters, travel via skis would have been slow and painful.

   b. For the British, their single point of failure was the markers they set up around their depots. Instead of placing multiple markers, spread out over a great distance, they placed only a few. This made it difficult to spot the depots, and could have led to starvation.

2. (a) Describe the effect that the cook, Lindstrom, had on the company morale. (b) What other leadership tricks did Roald Amundsen use to boost morale during the Antarctic night?
   a. Lindstrom ensured that the crew had all the nutrients they needed, but also that they were satisfied and happy. He made "hot cakes", which the crew looked forward to enjoying.
   b. Amundsen implemented special festivities that were held on the weekends, after working the rest of the week. On Saturdays, as well as Sundays, holidays, and birthdays, the crew was allowed to drink; they were not allowed to drink otherwise. He also held sauna nights on Saturday. This worked to boost morale, as it gave the crew something to look forward to.

1.5 Chapter 25 - Wintering at Cape Evans

1. What forms of polar travel had Captain Scott selected for the journey South? Which was to be the one used ultimately to arrive at the South Pole? What is the significance of this decision?
   a. Scott had taken dogs, ponies, motor sledges, and skis on the expedition as options for travel. He ended up utilizing man-hauling rather than the traditional dog-driving. This is partly because he wasn't confident in the dog's ability to drive in harsh conditions, which stemmed

from his eurocentric belief that the British way of doing things was the only civilized/correct way to do things. He would rather have his men haul for hundreds of miles than admit that dogs are better equipped to do so, or to learn how to properly direct dogs. This decision resulted in extreme physical strain being placed on his men.

2. What is your impression of the leadership structure at Cape Evans, given the presence of Navy officers and enlisted Navy sailors? What would you have done differently? What winter tensions existed at Framheim?
    a. I think that this leadership structure is very counterproductive. It encourages division which is not ideal for situations that require teamwork and living in close quarters. I would have adopted a less ranked social structure; I wouldn't have pushed the "common" people to the side in order to benefit the ranking officers.
    b. Winter tensions did exist at Framheim, but they were more so due to being in close proximity to others and less due to the social structure chosen by Amundsen.

1.6 Chapter 26 - False Start

1. What major error on the part of Roald Amundsen gives this chapter its title? As a result of this error, who had to forgo the South Pole trek, and why?
    a. Amundsen was eager to start the expedition as soon in the season as possible. This resulted in the group leaving the base too early and getting caught in a storm (-56 degrees celsius!). Johansen had to forgo the trek to the Pole, instead going to King Edward VII Land, because he had an outburst and criticized Amundsen in front of the rest of the crew. Amundsen could not forgive him.

1.7 Chapter 27 - Scott's Caravan

1. During this chapter, there are signs of self-delusion in the leadership of Captain Scott. However, in the end, his party does reach the South Pole and travels almost all the way back. How does one recognize the early signs of leadership error? What makes addressing such errors difficult? (Give examples as necessary from the chapter).
    a. I think overconfidence in one's plans and the unwillingness to alter those plans is indicative of leadership error. Scott was stubborn throughout the entire expedition; he refused to learn how to work with the landscape and instead worked against it. He chose man-hauling over dog sledges because he deemed the use of dogs as primitive and therefore inferior, despite the fact that it is the ideal way to traverse the landscape. He held tight to the English naval social structure, even when the situation his crew was being exposed to was vastly different from a naval experience. He was unwilling to adapt, in a way that put him and his crew in harm's way. For Scott, these errors were difficult to address because doing so would show weakness. He would have had to admit that he was wrong, and perhaps sacrifice some of his English ways, in order to remedy the errors. If he had done so, the expedition could have been a lot less physically taxing and divisive than it turned out to be.

1.8 Chapter 28 - The Devil's Ballroom

1. What impressions of the Trans-Antarctic mountains do you recall from this part of the Norwegian journey? What kinds of terrain did they face, and how did they overcome it?
    a. From what I can tell, Amundsen and his crew were not very happy to encounter them, as it meant that their journey would be complicated and more strenuous. The mountains were like

a dam, holding a wall of sea ice back. Rather than scaling these 12-15,000 foot mountains, Amundsen decided to pivot and go slightly off course so that less climbing was necessary. He had to decide between losing time or going off track, and he couldn't afford to lose time. He also placed another depot along this route, so that supplies could be available throughout the journey. The crew still encountered steep, snowy mountain sides, however.

2. What made fixing the latitude and longitude difficult this close to the pole? Was calculating the longitude worthwhile?
    a. The magnetic field began to interfere with Amundsen's compass, and as he had no maps to go off of, he followed the faulty compass. This resulted in them going eastward. Calculating the longitude by hand allowed the team to successfully make it to the true south pole, rather than the skewed location Amundsen's compass would have taken them.

1.9 Chapter 29 - Man-Hauling Begins

1. How did Scott's men feel about man-hauling gear up the mountains? Were they able to be honest with the Captain about the risks?
    a. Scotts men were not overly excited about hauling the gear themselves, partly as they were expected to pull 200 pounds each over 120 miles. Some of them, like Scott and Wilson accepted this challenge but others believed that it was the type of work assigned to dogs or horses. He wouldn't hear the concerns of his men, as he had been secretly looking forward to pulling their gear. His leadership style didn't allow for concerns to be voiced.
2. What were the advantages of going up the Beardmore Glacier, as opposed to the Axel Heilberg and Devil's Glacier for the Norwegians?
    a. The Beardmore Glacier is less high and less steep than the Axel Heilberg and Devil's Glacier

but it was also longer. This meant a longer, though less intense climb for Scott and his team's man-hauling.

1.10 Chapter 30 - The Race Won

1. Describe the meticulous calculations Roald Amundsen and team made to establish the location of the geographic South Pole. For reference, recall the story of Cook and Peary, and the uncertainty of their North Pole navigation.
    a. Amundsen used a sextant to navigate, despite it being less accurate than the navigation tool Scott opted for; it was simpler and thus there was less room for error. He had to use an artificial horizon, which was a pane of glass, as well as a sledgemeter. There were a lot of components needed to reach the true pole. However, Amundsen went through these steps because the previous journey of Cook and Peary had failed to reach the pole with 100% certainty.

1.11 Chapter 31 - The Race Lost

1. After years of planning, 1200 miles of exploration on foot, ski, and sledges, and vastly different start times, what was the final difference in time between the Norwegian and British arrival at the South Pole?
    a. The Norwegians reached the pole only 2 weeks before the British.
2. How did scurvy begin to play a role in the trip home for the British? What vitamins did they lack?

a. The British were surviving on diets devoid of vitamins, specifically vitamin C. This resulted in scurvy impacting the crew, which turned into depression and debilitating disappointment on their journey home.

2 Reading: Deep Survival, ch. 5-8

2.1 Chapter 5 - The Anatomy of an Act of God

1. In this chapter, two brothers and a friend set out to climb a rock face in Yosemite. With regard to the plan, what begins to go wrong? Why is the group unable to act on the information indicating the plan is becoming increasingly dangerous?
    a. The group's food is taken (by a bear?!) which results in them setting out for their climb later. They then rush to the trail and quickly check the weather board, but they fail to notice that the weather being displayed was for the previous day. They were unprepared for the series of events that went against their plan, and were unable to react in enough time, or with enough foresight to adjust their plans. This series of events resulted in them getting nearly struck by lightning and getting put in a serious life or death situation.
2. For example: (a) why is cotton called "death fabric" by park rangers? (b) What is St. Elmo's fire?
    a. Cotton is called "death fabric" because it absorbs liquids fast (sweat, rain, etc.) but does not dry fast. This can lead to hypothermia as temperatures drop.
    b. St. Elmo's fire refers to the conditions surrounding a thunderstorm, when the air becomes charged with electricity.

2.2 Chapter 6 - The Sand Pile Effect

1. In general terms, describe what a power-law effect is in nature. Why does a sand pile with a steady rate of new sand on top collapse regularly, even though basic physics does not predict when it will collapse?
    a. A power law effect is an increase in failure that comes with an increase in complexity. As the sand pile gets more complex, or larger in size, the power law states that it will fail. It becomes too complex, or massive, to be supported by itself.
2. What is meant by the term “normal accidents?” On mountains like Mt. Hood, for example, there are accidents that occur predictable, despite safety preparations. How does the sand pile effect explain this?
    a. Normal accidents are accidents that are somewhat routine and easily remedied. These could be considered the grains of sand placed in the pile when it is not at risk of collapsing in that they are not detrimental to the overall objective. An extraordinary accident would be the final grain that knocks the whole pile over, or makes the objective impossible.

2.3 Chapter 7 - The Rules of Life

1. Consider this quote from the chapter: “It is well documented that co-pilots aren’t likely to challenge pilots in aircraft cockpits and sailors aren’t likely to challenge captains, sometimes with fatal consequences. Experienced climbers may be reluctant to challenge others with experience ... doctors won’t challenge doctors.” How do the documented accidents in this chapter connect to the results of the South Pole expeditions?
    a. This quote connects to the successes that both groups saw at the pole. Although they had

different leadership styles, both Amundsen and Scott maintained their defined leadership and were not challenged by their crews. When this structure is upended, the entire operation can fall apart. Structure is necessary for the success of the expedition/endeavor.

2.4 Chapter 8 - Danger Zones

1. Consider the following paradox: surfing can be a beautiful and joyful experience, but also extremely dangerous, depending on the conditions. What kind of experiences are necessary to do it safely? Recall, for example, how the Hawaiian lifeguard and his family interacted with the author.
    a. You have to have an understanding of the area you're moving in. The lifeguard had so much experience with the quickly changing conditions of the ocean, so he was able to predict where it was safe to surf just based on the look of the waves. It requires trial and error, to an extent, but also just observation and shared knowledge. In this instance, the lifeguard was able to provide the author with some of his knowledge, which gave the author the tools to safely surf.
2. Compare the experience of the lifeguard to that of the CEO who survives winter blizzards for three days in Squaw valley, California. What characteristics helped him survive? How could he have avoided the experience in the first place?
    a. The CEO made several mistakes that led to him being stuck in the blizzard. He wasn't wearing proper gear, went skiing alone, and in an unfamiliar place. He could have avoided the experience by overpreparing, or considering what could go wrong and how he could minimize his risk. However, he didn't panic. He knew what to do in this situation; he slowly melted snow in his mouth as a water supply and kept himself propped up on a tree so he

wouldn't fall asleep. He kept a level head throughout the experience, even if it was scary.

3 Scientific Studies

1. What is so striking about the discovery of life *beneath* the Ross Ice shelf? How far away from the sea ice does life extend? How was this life discovered?
    a. Life, both microscopic and otherwise, has been found over 400 meters beneath the surface of the Ross Ice shelf. This is shocking because it is very harsh, dark, cold, and deep conditions that they are exposed to. This life was discovered by researchers in Antarctica, as they drilled into the ice shelf to document what could be found below.
2. What hunting techniques do Antarctic orcas display that demonstrate teamwork and social organization?
    a. Orcas hunt in packs. They sneak up on prey to procure food for the entire pod. This displays their advanced social organization and skills, as well as their ability to work and live as a team.
3. List some of the astrophysics experiments located in Antarctica and Greenland. Why are they located there, and for what are they searching?
    a. Antarctica and Greenland are ideal for studying the Cosmic Microwave Background, as well as observing dark energy, vast expanses of the galaxy, and neutrinos. These are ideal locations, as they are isolated from light and air pollution and can get very dark at certain points in the year. Many of the researchers are searching for theoretical or newly discovered concepts in astrophysics.
4. What achievements are attributed to the IceCube Neutrino Observatory in the last 10 years?

a. IceCube has captured data on the existence of tiny, weakly interacting neutrinos. This is very important because neutrinos are a relatively new part of our understanding of physics and they cannot be detected under other conditions.

5. Describe the process for measuring global average temperature using ice cores from deep boreholes in Antarctica. What gases or elements are used to make the measurements? How is this temperature measurement calibrated, using contemporary data?
    a. Researchers drill into the ice shelf and pull out cores. These cores have trapped bubbles of air, which captured the levels of CO2 and methane in the atmosphere at the time they were trapped. The bubbles further down are from longer ago, like the rings of a tree stemming from the center.

Bonus: Solitude and Leadership

1. **Reflection on Leadership.** What makes a good leader, according to the essay "Solitude and Leadership?" (a) Reflect on one's ability to *pass exams*, versus *think independently.* (b) How does the example of Gen. David Patreus play a role in this reflection? (c) What advantage to leadership decisions is afforded to those who filter out information

that is ultimately unimportant? What forms of information *do you think* are the most important?

a. A good leader may pass exams AND think independently. A good leader that thinks independently but doesn't pass exams can still be a good leader; it is the independent thinking that is most important.
b. General David Patreus thought independently, even when he knew he was going against the mold. In the army, where structure and rank are so important, going against that takes courage. Leading against the norm, when you know you're right, is important. Not betraying your morals is crucial to leading well.
c. Avoiding confusion and keeping things simple, clear, and concise, is important for leaders. Thus, leaders have to focus on what is essential, and avoid what is just noise. I think

that facts are the most important. In the current political climate, upholding human rights, extending respect to others, understanding others, etc. is the most important to me. Understanding what is at stake and who your decision will impact is important. A good leader should take this all into consideration before acting.