

Midterm 2 - INTD255

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

1.1 Chapter 21 - Scott Sails On

- 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?

They find out about the farm expedition because of a telegram that was for Scott in Melbourne that was sent by Roald himself. The message was worded ambiguously but it still made it clear that Amundsen was proceeding south. The reaction that Scott had was that he was caught off guard and a bit distressed because he had thought that he was the only group trying to reach the Pole from the south.

- The *Terra Nova* expedition had settled on ponies for transport. Where were they obtained? Describe how Meares had to transport them to New Zealand.

The ponies were purchased in Britain. Apsley Cherry-Garrard and Meares tasked with getting the ponies overseas to New Zealand. The ponies were loaded into special stalls on the ship for the long trip to New Zealand. The ponies were not accustomed to sea travel so Meares had to work hard to ensure their safety, adequate feed, water, and minimize stress for the ponies.

1.2 Chapter 22 - The Base at Framheim

- List the advantages and disadvantages of setting the main Norwegian base, *Framheim*, at the Bay of Whales, as opposed to Cape Evans (Ross Island).

The advantages of the setting of the Norwegian base compared to the Cape Evans (Ross Island) was that it was 60 nautical miles closer to the South Pole than Cape Evans. Also the Bay of Whales had a relatively stable and flat surface for sledging so was easier to travel on. The disadvantage of the Framheim at the Bay of Whales was that there was a risk of ice calving because of being on the edge of the Ross Ice Shelf. Also it was very isolated more than Cape Evans was so communication was difficult.

- 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?

The Norwegians created things like sledge improvements like they shaved down the frames and runners to make them lighter to pull. They also did clothing and gear tailoring to have things like reindeer-skin suits and water proof stockings. Also created black tents to absorb solar heat and so that they were very easy to see in all the snow.

- 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?

Some of the safety margins they used when it comes to food and supplies is that they were doubling supplies for the return journey. They also established themselves frequently and had well-marked depots. They also were very aware and would ensure redundancy in navigation aids.

1.3 Chapter 23 - Sledging with the Owner

- 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?

The British team tried to move their supplies across McMurdo sound on the sea ice. However, this didn't work out because they realized that the ice was too unstable and dangerous. So then they had to reload the supplies onto the *Terra Nova* and then sail it across.

- 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?

The advantages of chain of command is that it keeps orders and keep respect among crew and everyone knows their role and who they report to. The disadvantages are that it has the potential for conflicting actions because there are no clear orders. The difference from the Norwegian leadership style was that the Norwegian's were flexible and operated with greater autonomy, encouraging practical adjustment and shared decision making.

1.4 Chapter 24 - The Pole Seeker Prepares

- 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.

The significance of a single point of failure in a complex system is shown a valuable weak spot that can collapse an entire system. For example, for the British expedition was that use ponies for travel but they weren't suitable for Antarctic conditions. Also the rigid leadership so there was no flexibility allowed lastly, the depot placement was poorly spaced and there was no backup if one was missed.

- (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) The effect that Cook, Lindstrom had higher the morale of the crew with good food, humor, and emotional steadiness. B) The other leadership tricks Amundsen used was routines, celebrations, shared duties, and intellectual stimulation to keep spirits high.

1.5 Chapter 25 - Wintering at Cape Evans

- 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?

The forms of polar travel Captain Scott selected for travel is motor sledges, ponies, and man-hauling. Man-hauling was the only method used to reach the South Pole the other methods failed. The significance of this decision was that this choice was inefficient and exhausting and was one of the reason for the failure and deaths of Scott's team.

- 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?

My impression of the leadership structure at Cape Evans because of Navy officers and enlisted Navy sailors. There was a strict naval hierarchy that created division and suppressed initiative. I would have had a more flexible, team-oriented approach instead of the Cape Evans approach. Framheim promoted shared responsibility and morale.

1.6 Chapter 26 - False Start

- 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?

Amundsen's major error was launching too early and misjudging his team's readiness especially Johansen's. After the failed attempt, Johansen was cut from the final team due to performance and incoordination.

1.7 Chapter 27 - Scott's Caravan

- 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). The early signs of leadership errors included overconfidence, rigid thinking, and dismissing feedback. Addressing these errors are difficult because of hierarchy, pride, and delayed consequences. For example, Scott's failure to adjust course even after all the setbacks which then led to tragedy even though the initial success of reaching the pole.

1.8 Chapter 28 - The Devil's Ballroom

- 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?

The impressions of the Trans Antarctic mountains were inspiring but dangerous with crevasses, steep glaciers, and low visibility. They overcame these challenges through careful planning, teamwork, sled dogs, and flexible decisions, allowing safe and efficient progress toward the pole.

- What made fixing the latitude and longitude difficult this close to the pole? Was calculating the longitude worthwhile?

Near the South Pole, fixing latitude was still possible by looking at the elevation of the sun, but longitude became nearly impossible to determine accurately because of meridians converge at the pole. Yet it was worthwhile because it proved their exact accuracy and avoid controversy like the uncertainty surrounding Cook and Peary at the North Pole.

1.9 Chapter 29 - Man-Hauling Begins

- 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? Scott's men found that man-hauling up the mountains was exhausting and demoralizing especially compared to the sled dogs. Many also privately doubtful about the method. But didn't say anything because of Scott's strict authority, so it was left unspoken.

- What were the advantages of going up the Beardmore Glacier, as opposed to the Axel Heilberg and Devil's Glacier for the Norwegians?

The Beardmore Glacier offered a gradual, continuous ascent with fewer crevasses and more stable route compared to Axel Heilberg and Devil's Glacier. While longer the Beardmore was safer for man-hauling and had been used already, giving Scott's team a known path.

1.10 Chapter 30 - The Race Won

- 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.

Amundsen's team made precise latitude and longitude observations using sextants and chronometers, taking many readings over several days to confirm their position. Making every 10 mile radius. This careful approach was meant to avoid the controversy around Cook and Peary's disputed North Pole claims. Proving that Amundsen's party had undoubtedly reached the geographic South Pole.

1.11 Chapter 31 - The Race Lost

- 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?

The Norwegians arrived at the South Pole on Dec 14 1911 while the British team arrived on Jan 17 1912. A difference of 34 days. Even though different routes and planning styles, the Norwegians reached the pole over a month before Scott's team did.

- How did scurvy begin to play a role in the trip home for the British? What vitamins did they lack?

Scurvy played a role in the trip home for the British team because it began affecting them on their journey back and caused weakness, joint pain, and poor wound healing. It was caused by their lack of Vitamin C. Their diet lacked fresh food, especially citrus or other sources of Vitamin C, leading to physical decline and compounding the hardships of their return.

2 Reading: Deep Survival, ch. 5-8

2.1 Chapter 5 - The Anatomy of an Act of God

- 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? It began to go wrong as the weather conditions to go bad. It started to rain and there was lightning. Even though clear signs of danger may continued due to commitment to the plan, group pressure, and their inability to mentally shift from their original goal. This shows a common survival failure by ignoring changing conditions because of over confidence and emotional investment in finishing the goal.

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 holds moisture and loses insulation when wet. That increases the risk of hypothermia that can lead to death.
B) St. Elmo's fire is blue or violet glow seen around pointed objects like the tent poles during lighting storms.

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 power-law effect describes how small inputs can lead to unpredictable and sometimes massive outcomes in complex systems. The sand pile will collapse because the system reaches a critical point where where it becomes highly sensitive to small changes.

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?

"normal accidents" are failures that are inevitable in complex systems. That even with good planning unpredictable interactions cause accidents. The sand pile explains this by showing that as a system grows, tiny additions can suddenly trigger something catastrophic collapse, like the Mt. Hood, layers of small rocks gather till a tipping point was reached.

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?

The accidents show that people hesitate to challenge authority, even in life threatening situations. This parallels Scott's expedition was that men followed flawed orders without question because of military hierarchy. In this chapter it illustrates how group dynamics and obedience can either endanger or protect lives.

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 interacts with the author.

The Surf Society, one needs deep, hands-on experience, environmental awareness, and the ability to read subtle ocean cues. The Hawaiian

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?

The CEO survived because he showed calm thinking, adaptability, and perseverance, however lack in situational awareness and preparedness seen in the Hawaiian lifeguard. The CEO should have avoided the ordeal with better planning.

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?

The discovery is striking because life was found in complete darkness under thick ice where it was believed nothing could survive. It was discovered using the remote operated submersible and drilling equipment.

2. What hunting techniques do Antarctic orcas display that demonstrate teamwork and social organization?

Antarctic orcas exhibit highly coordinated hunting strategies like wave washing where they create waves to knock seals off ice floes. They also work in synchronized groups, showing their communication, role assignments, and planning. These behaviors show complex social organization where they learn from each other.

3. Neutrino Physics in Antarctica and Greenland

4. List some of the astrophysics experiments located in Antarctica and Greenland. Why are they located there, and for what are they searching?

Some of the astrophysics experiment are Ice Cube Neutrino Observatory, ANITA, Spider, and SPT. They are located there because of clear skies, dry air, and thick ice. They are searching for black holes and supernovas.

5. What achievements are attributed to the IceCube Neutrino Observatory in the last 10 years?

Achievements are detected high energy cosmic neutrinos. Identified a blazar, helped launch multi-messenger astronomy, combining neutrino data with light. Improved our understanding of dark matter, black holes, and cosmic rays.

6. Paleo-climatology with Antarctic Ice Cores

7. 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?

Global average temp is measured by extracting ice cores from deep Antarctic boreholes. The cores have air bubbles that preserve ancient gases. By analyzing the concentration of the gases, with isotopes of oxygen and hydrogen, they are able to estimate past temps. To calibrate data they compare it with modern temp records and instrumental data.

4 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?