

WHERE **SCIENCE****HISTORY****AND****ART** CONNECT

To: Raven Hill friends

From: Cheri

Date: February 24, 2024

Re: *I wish I could navigate like a turtle!*

While turtles are known for their calm, steady pace and their ability to adapt to different environments, it is their ability to *navigate* that I admire the most. Both freshwater and sea turtles seem to be able to detect the Earth's magnetic field and use magnetic cues for *navigation*. I am the first to admit that I do not have that kind of *navigational* talent. I have no “sense of direction,” but I sure wish that I did!! Some of our visitors to Raven Hill might wish that they were more like turtles too. Raven Hill finally added compass roses at strategic locations around campus. Now, guests can re-orient themselves to the north and find their way again.

Research shows that humans do not have that innate ability to detect Earth’s magnetic field, so we use a compass. This *navigational* tool has been around for over two thousand years. It was invented in ancient China around the second century BCE. To begin with, it was a piece of lodestone, a natural magnetic mineral on a piece of wood free-floating in water or free hanging, where it could orient to the north. Over time, the design evolved to the compasses that we recognize and depend on today.



*Turtles have an ability to detect Earth's magnetic field, an ongoing area of study in animal behavior and navigation. Freshwater turtles like the red-eared slider and the painted turtle have been studied for their ability to *navigate* using magnetic cues. This snapping turtle ended up in Raven Hill's Watershed exhibit. Maybe it used its *navigational* skills to check out the Center?!*

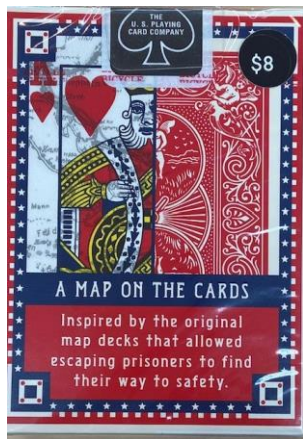


*(Left) Raven Hill's compass roses feature a raven feather pointing to north, helping visitors *navigate* around the Center's campus. This one is found attached to the Schoolhouse deck!*

(Right) Magnetic compasses were used to explore and chart the earth. Interestingly, the compass eventually led to the inventions of the telegraph and the electric motor.

—Raven Hill Collection





During the world wars, playing cards had parts of maps hidden under the images on the cards. Pieced together, the map helped the prisoners make their way to safety after escaping.

—Raven Hill Collection

Another method of navigation was the map, which has also been around for over two thousand years. The oldest known maps date back to ancient Babylonians, Egyptians, and Greeks in the sixth century BCE. These early maps were simple. They included local areas, trade routes and sometimes celestial bodies. As maps became more sophisticated, they became even more accurate and detailed.

Maps were smuggled to prisoners of war in a variety of ways. One common method involved hiding maps within innocent items, like playing cards or board games. The maps were often printed on silk or other thin, durable materials that could be easily concealed. Additionally, maps could be hidden within hollowed-out books or within personal belongings that were sent to prisoners through care packages. These maps helped prisoners to navigate after their escape.

For centuries maps were used to create puzzles. Sometimes map makers or cartographers would add intentional mistakes or misleading information to their maps. That way, they could catch anyone who copied their work without permission. These inconsistencies were called "trap streets" or "phantom settlements" and served as a form of puzzle or challenge for map readers to spot and decipher. Maps are still used as the basis for several types of geographic puzzles, such as treasure hunts or navigational challenges.



Most of us can remember these map puzzles from our childhood. What a fun way to learn geography. —Raven Hill Collection



Silk was used for hidden navigational maps during both world wars, because it was more durable than paper. —Raven Hill Collection

The first jigsaw puzzle was created by John Spilsbury, a British mapmaker and engraver, around 1760. He mounted a map onto a sheet of wood and then cut it into small pieces, creating the prototype for the jigsaw puzzle. These early versions were used for educational purposes, helping children learn geography. Puzzles themselves have been around for centuries with some of the earliest dating back to ancient civilizations like the Greeks and Egyptians.

Compasses, maps and puzzles connect via their use in *navigation*, exploration, and the challenge of solving some kinds of problems. In *navigation*, compasses are used to determine direction, while maps provide spatial information. Solving challenges, like treasure hunts, often involves using both compasses and maps as tools to decipher clues and reach a destination. Turtles are lucky enough to be able to *navigate* without compasses or maps. They solve their directional “dilemma” using special magnetic cues. So, *navigation* connects compasses, maps, puzzles **AND** turtles!

Next time you visit, take some extra time and get to know our special magnetic detectors—the turtles—and if you want to be the turtles’ forever friend, bring them some fruits or veggies. They love strawberries, watermelon, apples, kale, romaine, broccoli and corn on the cob. Guaranteed, the turtles will be so happy to see you! **And**, if you find navigation interesting, ask for a tour of the ET Building and check out the compasses, maps and puzzles on display there!



*Sheldon escaped one Sunday afternoon, when a door did not shut tight. Lucky for him (and us), his *navigation* system led him around the building and I found him in front of my car.*



*Today, cell phones are indispensable to most of us. Not only do they keep us connected to each other, but they also provide us with *navigational* tools, like Google maps and compasses, so we do not lose our way!*



*In 1995, mobile phones were known as bag phones. They had an external battery and a bag to carry everything around—no compass nor Google maps for *navigation* however! –Raven Hill Collection*

Raven Hill is open to the public noon to 4pm on Saturdays and 2pm to 4pm on Sundays, plus any other time by appointment. You can email info@miravenhill.org or call 231.536.3369 for reservations.

Take care and stay safe, **Cheri**

PS: Astronaut Kaplana Chawla said, “The path from dreams to success does exist. May you have the vision to find it, the courage to get on to it, and the perseverance to follow it.” One might ask, “Is there a different kind of *navigational* talent needed to find your way that supersedes compasses and maps?”

“Kalpana Chawla became the first Indian-born woman to go to space in 1997. Six years later, on February 1, 2003, Chawla died when the space shuttle Columbia broke up on re-entry into Earth's atmosphere, killing all seven astronauts on board. Chawla's legacy has lived on, however. In particular, her talent and hard work have inspired young people in India and around Earth to consider careers in spaceflight.” Wikipedia