Kuhn Worksheet

(Remember to put answers in your own words)

1. What is ‘normal science’?

Normal Science occurs when there is general and field-wide acceptance of the current paradigm. Results, papers and experiments conducted are all within the scope of the paradigm, and tend to reinforce and promotes the current paradigm.

2. What is a paradigm?

A paradigm is a set of unstated assumptions that forms a view of the ‘truth’ in that particular field (Examples below). These views are held by everyone within that field, and during periods of normal science, the results generally accepted are those which conform and promote the prevalent paradigm.

(Discussion: You should now project the Faculty\_Ondino&paradigms on the screen and discuss that example of a paradigm).

3. How does incommensurability explain why it’s hard to read primary literature?

Incommensurability refers to the fact that the scientific results and discussions held between those who hold the same paradigm are impossible to fully understand by those who do not hold that paradigm. One reason for this is that those who hold the same paradigm literally speak the same language, they have a set of words/terms that they are inherently understand incomprehensible to those who do not hold the paradigm.

So, in the example above, the term Feathered Non Avian Dinosaur requires a full understanding that it refers to dinosaurs that cannot be directly linked to the evolution of birds in the evolutionary tree; that also happen to have feathers.

These terms are not usually described in the literature, as it is assumed that the reader already knows these terms.

(Discussion: Can the class come up with other technical terms that only make sense to those within a paradigm? How about the term gene? What does it mean to a family geneticist compared to a molecular biologist?)

4. Kuhn describes ‘revolutions’ in science. How is a paradigm shift/scientific revolution like a political revolution?

The structure of the world after a revolution is in some ways completely different than before. Groups that were disadvantaged or on the periphery now hold **power,** while previous groups with power are now ignored or persecuted.

In some ways however, it is still exactly the same world. There is a set of beliefs that society is structured around, and it determines who has **power** and who does not.

When we say that a paradigm has power, what do we mean? Well, let’s take another example. (I suggest you chalkboard talk this section, with an arrow first between BMI and CVD, then complicating the picture with each further discussion with more arrows and circles) Body Mass Index was first defined in 1991. It is a measurement of weight over height. BMI has been used as an indicator of an increased risk for cardiovascular diseases, dues mostly to epidemiological studies conducted in the early 1990s. Therefore, when you go to the doctor, they calculate your BMI, and use that to give you advice about weight and health choices (draw on board).

We now know that BMI is a crude measure. We know that where adipose tissue is stored makes a huge difference. Visceral fat is highly linked to CVD, while subcutaneous fat is not. We know that why people gain weight matters too. We have identified alleles associated with satiation after eating. This includes alleles of genes like ADRA2 and UCP2, genes associated with energy metabolism. Then, there are alleles of genes associated with a sense of euphoria that comes from exercise, including BDNF, a brain protein. Therefore, some people don’t feel as satiated after eating, while others don’t get that same sense of euphoria from exercise, but instead feel more pain.

Furthermore, it turns out that the biggest correlation to CVDs is actually pre-diabetes in youth, which is related to BMI. So, the link between BMI is and CVD is probably indirect.

Why does this matter? Well, if the doctor you visit holds the paradigm that BMI is linked to CVD, what advice would they give? To lose weight. It turns out that that is not terribly effective advice. In some studies, about 2% of patients told to lose weight are able to lose a significant amount of weight and keep it off for 7 years. Most told to lose weight are unable to do so. Therefore, that paradigm leads to ineffective health information, as well as a sense of powerlessness among patients, oftentimes due to factors outside their control.

If however your doctor holds a more comprehensive paradigm of links between BMI and CVD, they might recognize that the weight loss advice will probably be ineffective, and there might be more effective advice that they can give (Gastric Bypass, for example), or more closely studying if this patient is in danger of heart attacks.

That is the **power** of a paradigm. It has real world implications of how we, as scientists and health professionals, view the world, and therefore, if and how we can change the world.

5. What are the underlying unstated beliefs, the paradigm that underlies our M&Ms experiment?

Ask for some suggestions, then show video.