Later in the course you will learn about Thinking Fast and Slow as described by Dr. Kahneman which has direct application to heuristics and how people make decisions. Below is a primer on Heuristics, their impact on cognitive bias and their contributions to diagnostic and medical errors.

Excerpts from Croskerry P. Achieving quality in clinical decision making: cognitive strategies and detection of bias. *Acad Emerg Med*. 2002;9(11):1184-1204.

The heuristic method of learning refers to a system in which learners are encouraged to explore, investigate, and discover things for themselves. It results in experiential learning and the development of "rules learned on the job." Thus, carpenters developed "rules of thumb" to provide a crude estimate of the length of an object when a ruler might not be immediately at hand. Clearly, the method is less precise but it is practical, faster, and adequate for the majority of cases. Heuristics, then, provide short cuts in problem solving and clinical decision making, which, for the majority of cases, work well. When they succeed, we describe them as economical, resourceful, and effective, and when they fail, we refer to them as cognitive biases.

Importantly, cognitive error underlies delayed or missed diagnoses, a frequent cause of medical error and, perhaps, the most costly of all medical errors.

[Below are some descriptions of common biases encountered in medicine and strategies on how to prevent them.]

Anchoring: the tendency to fixate on specific features of a presentation too early in the diagnostic process, and to base the likelihood of a particular event on information available at the outset (i.e., the first impression gained on first exposure, the initial approximate judgment). This initial impression exerts an overly powerful effect in some people and they fail to adjust it sufficiently in the light of later information.

Prevention of Anchoring: Awareness of the anchoring tendency is important. Early guesses should be avoided. Where possible, delay forming an impression until more complete information is in.

Availability Bias: the tendency for things to be judged more frequent if they come readily to mind. The heuristic is driven by the assumption that the evidence that is most available is the most relevant.
Non-availability (out of sight out of mind), occurs when insufficient attention is paid to that which is not immediately present (zebras). Novices tend to be driven by availability, as they are

more likely to bring common prototypes to mind, whereas experienced clinicians are more able to raise the possibility of the atypical variant or zebra.

Prevention of Availability Bias: Objective information should be gathered and used systematically to estimate the true base rate of a diagnosis, and clear clinical evidence is needed to support a particular diagnosis for the patient being seen. Physicians should be aware of the tendency to pay too much attention to the most readily available information, or be unduly influenced by high profile, vivid, or recent cases. They should routinely question the soundness of their estimates or judgments—do they rely excessively on easily available evidence?

Fundamental Attribution Error: the tendency to blame people when things go wrong rather than circumstances. Thus, someone's behavior may be explained by attributing it to the dispositional qualities of a person rather than to situational circumstances. We hold [patients] responsible for their behavior, imagining they have as much control over it as we do, and attributing insufficient consideration to their social or other circumstances.

Generally we tend to be less judgmental about ourselves than others (actor-observer bias), and are more inclined to take the credit for success than accept responsibility for failure (self-serving attributional bias); this may lead to overconfidence. There also exists a self-punishing attribution bias, reflected in the often harsh reaction we have toward ourselves when we make an error; i.e., there appears to be a strong tendency in some physicians to attribute blame to themselves rather than look for systemic or circumstantial explanations. The biases described here are distinct from the illusion of control that underlies attribution bias, the tendency to attribute outcomes to unrelated events, e.g., rain dances.

Prevention of Fundamental Attribution Error: Physicians should avoid being judgmental about the behavior of others. It is impossible to be aware of all the circumstances that contribute to a person's behavior. They should try to imagine a relative or themselves in the same position. Care should be consistent across all groups of patients, especially for minorities and the marginalized. It is very important to remember that for psychiatric patients, the behavior is often the only manifestation of the underlying disease.

Hindsight Bias: When we know the outcome, it profoundly influences how we perceive past events. After an event has occurred, there is a tendency to exaggerate the likelihood that would have been assessed for the event before it occurred. Thus, when events are viewed in hindsight, there is a strong tendency to attach a coherence, causality, and deterministic logic to them such that no other outcome could possibly have occurred. Hindsight bias may distort the perception of previous decision making, such as occurs at morbidity and mortality rounds. Many decision errors appear transparent in hindsight. Usually, hindsight does not take into

account the prevailing conditions at the time the decision was made. The clarity of vision that appears to emerge in hindsight can influence future decision making in that we may tend to overestimate our ability to perform better. We have a tendency to misremember what we knew in foresight. This ‘‘hindsight wisdom’’ gives us an unrealistic assessment of our decision-making abilities and we develop an illusion of control. It may contribute to a misplaced confidence in our abilities.

Prevention of Hindsight Bias: Physicians should be aware of how readily things seem to fit together, and are explained in hindsight. They should be careful of being made to feel bad about decisions that were made, and of losing confidence in their decision making capabilities. This usually occurs because the outcome is known and ambient conditions are not usually taken into account. They should beware of an overconfidence that might result from the clarity of vision that the retroscope offers.

Overconfidence bias: Is described as self-serving attribution bias. In general, we usually think we know more than we do, often without having gathered sufficient information, and generally place too much faith in our own opinions. Those who are overconfident tend to spend insufficient time accumulating evidence and synthesizing it before action. They are more inclined to act on incomplete information and hunches. Overconfidence can potentiate badly with anchoring and availability, leading to an overreliance on readily available (rather than valuable) information.

Prevention of overconfidence bias: Efforts should be made to answer the following:

- Has intelligence gathering been systematic?
- How much is really known?
- Has evidence been gathered in a logical and thorough fashion, and does it support our estimates and judgment?
- Has too much reliance been placed on anchors, or too readily available information?