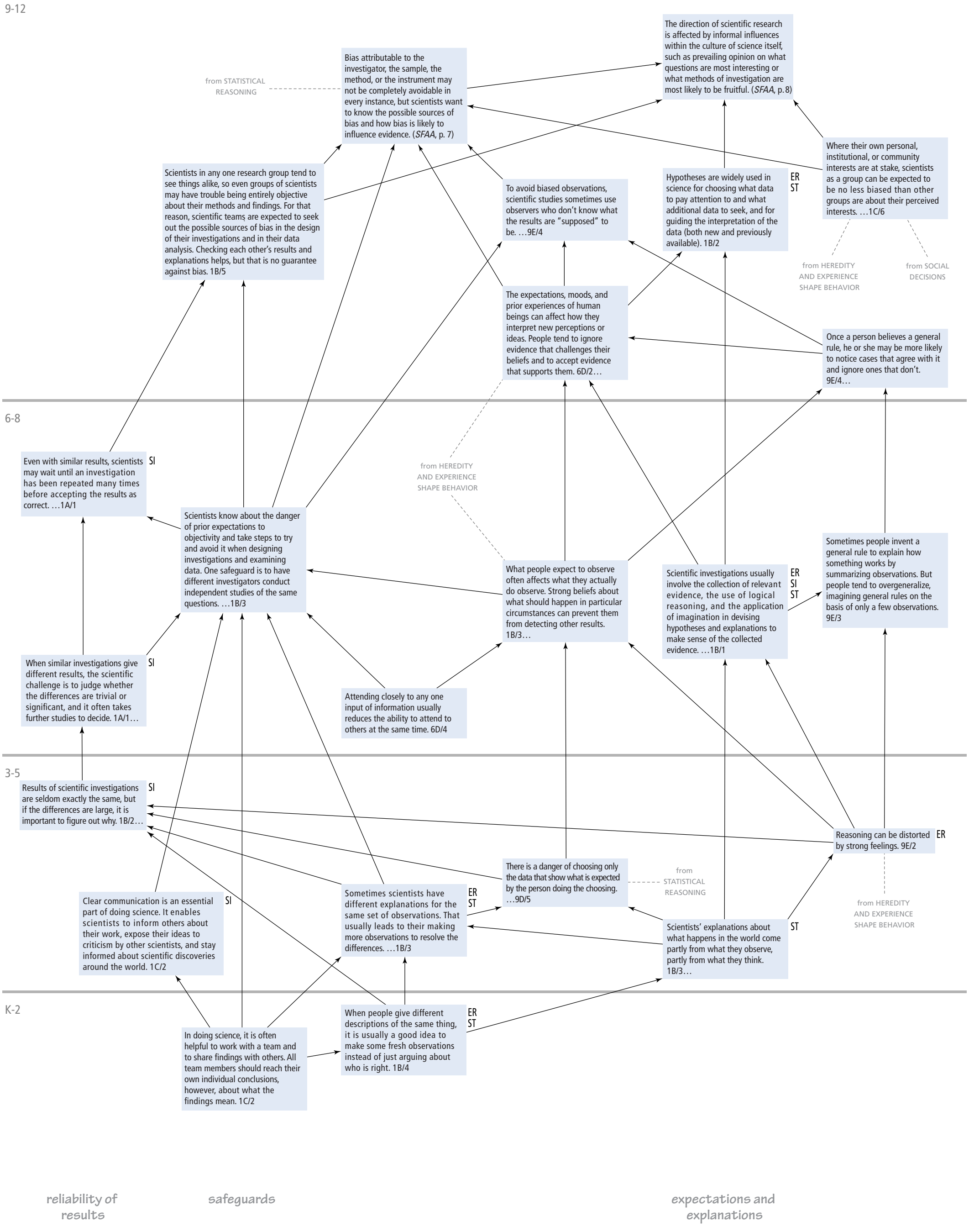
9-12
The direction of scientific research is affected by informal influences within the culture of science itself, such as prevailing opinion on what questions are most interesting or what methods of investigation are most likely to be fruitful. (SFAA, p. 8)
from STATISTICAL REASONING
Bias attributable to the investigator, the sample, the method, or the instrument may not be completely avoidable in every instance, but scientists want to know the possible sources of bias and how bias is likely to influence evidence. (SFAA, p. 7)
Where their own personal, institutional, or community interests are at stake, scientists as a group can be expected to be no less biased than other groups are about their perceived interests. …1C/6
Scientists in any one research group tend to see things alike, so even groups of scientists may have trouble being entirely objective about their methods and findings. For that reason, scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis. Checking each other's results and explanations helps, but that is no guarantee against bias. 1B/5
To avoid biased observations, scientific studies sometimes use observers who don't know what the results are "supposed" to be. …9E/4
Hypotheses are widely used in science for choosing what data to pay attention to and what additional data to seek, and for guiding the interpretation of the data (both new and previously available). 1B/2
ER
ST
from HEREDITY AND EXPERIENCE SHAPE BEHAVIOR
from SOCIAL DECISIONS
The expectations, moods, and prior experiences of human beings can affect how they interpret new perceptions or ideas. People tend to ignore evidence that challenges their beliefs and to accept evidence that supports them. 6D/2…
Once a person believes a general rule, he or she may be more likely to notice cases that agree with it and ignore ones that don't. 9E/4…
6-8
Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as correct. …1A/1
SI
from HEREDITY AND EXPERIENCE SHAPE BEHAVIOR
Scientists know about the danger of prior expectations to objectivity and take steps to try and avoid it when designing investigations and examining data. One safeguard is to have different investigators conduct independent studies of the same questions. …1B/3
What people expect to observe often affects what they actually do observe. Strong beliefs about what should happen in particular circumstances can prevent them from detecting other results. 1B/3…
Scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence. …1B/1
ER
SI
ST
Sometimes people invent a general rule to explain how something works by summarizing observations. But people tend to overgeneralize, imagining general rules on the basis of only a few observations. 9E/3
When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and it often takes further studies to decide. 1A/1…
SI
Attending closely to any one input of information usually reduces the ability to attend to others at the same time. 6D/4
3-5
Results of scientific investigations are seldom exactly the same, but if the differences are large, it is important to figure out why. 1B/2…
SI
Reasoning can be distorted by strong feelings. 9E/2
ER
There is a danger of choosing only the data that show what is expected by the person doing the choosing. …9D/5
from STATISTICAL REASONING
Clear communication is an essential part of doing science. It enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world. 1C/2
SI
Sometimes scientists have different explanations for the same set of observations. That usually leads to their making more observations to resolve the differences. …1B/3
ER
ST
Scientists' explanations about what happens in the world come partly from what they observe, partly from what they think. 1B/3…
ST
from HEREDITY AND EXPERIENCE SHAPE BEHAVIOR
K-2
In doing science, it is often helpful to work with a team and to share findings with others. All team members should reach their own individual conclusions, however, about what the findings mean. 1C/2
When people give different descriptions of the same thing, it is usually a good idea to make some fresh observations instead of just arguing about who is right. 1B/4
ER
ST
reliability of results
safeguards
expectations and explanations