

As a **culminating assessment** you might try a less elaborate version of the above by asking students or student teams to write a paper outlining their design of a research study. You might choose a topic and have all the students or teams generate a hypothesis about it, then set up a simple two group experiment to test it. Alternatively, you could supply the students with a general topic or a more specific hypothesis and have one group write how they would study it experimentally, while a second group would describe a naturalistic observation or field study, a third might formulate a survey exploring the issue, and so on. Each team would later briefly describe their approach to the class. You might be hesitant to try any of these research design ideas out of fear of losing valuable “teaching” time, and that is an understandable concern, since the AP Exam date is not likely to move anywhere and it’s difficult under the best circumstances to do all you need to do in the time you have. Still, I would argue the investment of time pays off in the long term, both in terms of exam performance and in deepening genuine student mastery.

Trouble Spots

Students often have trouble **differentiating between the independent variable and the dependent variable** in an experiment. A good short hand way to remember this is to re-frame any experimental set-up in this way: “they are testing the effect of _____ on _____”. The first blank is the IV, the second blank is the DV (some students have been taught in their science classes to formulate hypotheses in an “if/then” format, which works just as well). Another way to help students remember this is to think of the independent variable as an IV at the hospital – it is what you as the experimenter are “putting in” to see what impact it has on the patient’s condition. I also sometimes simply ask the students to remember “cause and effect – IV and DV”

Many students see **confounding variables** as anything that happened that the researcher didn’t count on, but a confound is only a confound if it accounts for a *difference between* the groups or conditions in your experiment. If one group was exposed to the IV in a very hot and noisy room while a second group was not, then *that* is a confounding variable.

It is important for students to know that correlational research examines relationships between variables but that one cannot assume that if two variables are related that one therefore causes the other. Often in everyday reasoning people do make **the mistake of inferring causation from simple correlation**, so it is understandable that high school students tend to do the same. The AP Psychology teacher is in a great position to help students become better thinkers outside the classroom by highlighting this distinction.

Finally, a frequent problem area is that of **skewed distributions**. If data is plotted and the curve is pushed to the left (that is, the preponderance of scores is on the low end of the scale), this is called a positive skew, because “skewedness” is identified by the outlying or rare scores. If the curve is skewed to the right, or high end of the distribution, then it is a negative skew, since the unusual scores are on the low end of the distribution. Many students intuitively label these in exactly the opposite way. One of my students once pointed out that a positively skewed curve looks much like a “p” lying on its back; the students often come up with such useful mnemonic devices, if invited to do so!

Some students have trouble with **sympathetic nervous system** function vs. **parasympathetic nervous system activity**. It's easy to find or create visuals to help with this distinction, but you may need to take special care in this area.

Finally, you may be concerned with just how many **brain structures** your students will have to “know”. The graphic organizer supplied for the students gives you a reasonable idea, but it is always useful to consult more than one textbook (not to mention journals and online references) to see what you might like to add or subtract from your list.

Mnemonics

One way to help students remember the difference between the two branches of the autonomic nervous system mentioned above is to have them think of the parasympathetic system as a *PARA*chute, gently bringing you back “down” after the “flight” initiated by the sympathetic system.

To remember the major parts of a neuron, a standard mnemonic device is D.S.A.T., for dendrites, soma, axon, terminal buttons. A human hand, with fingers outstretched, is also a pretty good facsimile of a neuron, with the fingers as the dendrites (“dendrites detect” is a useful shorthand way to remember their basic function), the palm as the soma, the arm as the axon and the shoulder area as the terminal.

Many people remember the difference between afferent and efferent neurons this way: “A” for afferent, “A” for *approaching* the central nervous system, “E” for efferent, “E” for *exiting* the central nervous system.

Inhibitory neurotransmitters and receptors can reasonably be referred to as the brakes in the car, while excitatory neurotransmitters and receptors are analogous to the accelerator.

To recall that G.A.B.A. is the leading inhibitory neurotransmitter in the brain one of my students suggested converting the acronym into “**Get A Brake Adjustment**”.

F.P.O.T. is a commonly used mnemonic to remember the four lobes of the brain: frontal, parietal, occipital, temporal.

It's pretty silly, but to cue them on the basic function of the hippocampus I tell my students to picture a hippopotamus wandering around a college campus, confused, seemingly because he's forgotten where his classroom is; they make fun of me, but it seems to help!

You will have to be careful using this, but some recall the basic functions of limbic system structures by thinking of it as the system in the brain responsible for “the four F's”: feeding, fighting, fleeing and fornication. Obviously, you may decide not to use this with your students, but it may help *you* in your recall.

Many students still know enough about how telegraph machines used to work to easily remember that telegraphic speech refers to 2 or 3 word sentences (some experts will say it is actually a two-words-only phase, but any examples on the AP Exam would avoid this fine distinction), but may struggle with the one word holophrastic stage. A possible mnemonic for it: picture a baby, six months old or so, sitting at dinner pounding his spoon on the table saying the single word ‘holophrastic!’, as if demanding something to eat – absolutely ridiculous, but possibly effective!

Links to Other Units

In your study of thinking and problem solving there is a clear link to your earlier look at frontal lobe function in the **Biological Bases of Behavior**. The frontal lobe seems to be the “executive” part of the brain, engaged in higher level thinking and planning. When you begin talking about language acquisition you may also remind your students of Broca’s and Wernicke’s areas in the left hemisphere of the brain. This they’ll recall from their work on BioPsych and **Sensation and Perception**.

As we’ve seen, the “Genie” and “Wild Child” case studies overlap with **Developmental Psychology** and can serve as a very useful introduction to that unit. In the context of those cases you might also reexamine the **Learning Theories** of B.F. Skinner (operant conditioning) and Albert Bandura (social/observational learning), looking at how they would likely argue we acquire language and other skills.

Your work on thinking and problem solving foreshadows much of what you will explore in the later chapter on **Intelligence, Assessment and Individual Differences**. To specifically hint at topics from that area, you might ask your students to begin formulating a working definition of ‘intelligence’, connecting it specifically to concepts from this unit: how much does intelligence include divergent thinking? is intelligence the ability to solve novel problems or to get “right answers”? how much is memory a part of intelligence? and so on. Your students might also see a link between metacognition and Howard Gardner’s *intrapersonal intelligence*; in essence, one is engaging in metacognition when reflecting upon one’s own internal experience.

The representativeness heuristic and confirmation bias can be utilized to lay a foundation for study of prejudice which you will do in the unit on **Social Psychology**. Each in part helps to account for stereotypical judgments we make and to which we then adhere.

Chapter XI

Testing and Individual Differences

You can introduce many relevant concepts with **open ended discussion** on the issue “What is ‘smart’?” Students go lots of different places with this simple question, and almost all of what they typically say is directly related to one or the other of the theories of intelligence you’ll cover in the unit. In the course of the discussion, you might complicate the picture by asking if a savant is ‘smart’? how about a high functioning but cognitively handicapped individual? how about a child prodigy?

Or you might ask: “What is school *for*? What is grading *for*?” After you sift through the students’ animated assaults on the institution of public education, you will likely see many direct links to your teaching of reliability, validity, achievement, aptitude, performance vs. paper and pencil assessments, and so on. Other suggested topics for **introductory opinion papers with peer review and follow-up discussion** follow:

- How much does *speed* play a role in ‘intelligence’? If two people solve a novel problem successfully, one taking five minutes and the other taking fifteen minutes, what does the speed of their processing tell us, if anything?
- Regarding dogs, horses, sports teams, etc.: to what extent are the differences *within* the groups less than, greater than or equal to the differences *between* groups?
- Should you know your own IQ score? Who else, if anyone, should have access to that score? Parents? Teachers? Guidance Counselors?
- To what extent is test performance and evaluation in general influenced by self fulfilling prophecies? For example: do “aptitude tests” *predict* or actually *influence* later performance?
- Are assessments inherently biased? To what extent is it possible to design a test of any type that has no racial, gender, generational or scoring bias?