There are three general ways to know something and/or learn something new:

1. *Authority* – get the answer from a recognized expert. Note that the so-called "expert" can be a single person, the consensus of the entire field, a textbook, or, I'm sorry to say, the internet (e.g., *Wikipedia*). Example: you want to know how many bones are in the human body; ask a biologist, look it up in a biology textbook, or, if you insist, just Google "bones in human."
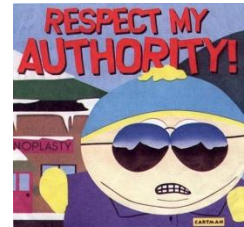
2. *Rationalism* – deduce the answer, using logic, from previous known facts or "first principles." Note that there is no guess-work in deduction; if the premises are true and the logic is valid, then the conclusion must also be true. Example: you want to know the sum of the two acute angles in a right triangle; given that the sum of all three angles must be 180° [by a known property of all triangles] and the one non-acute angle must be 90° [by definition – since we said it was a right triangle], then the sum of the two acute angles must be 90° [by subtracting 90 from 180].

3. *Empiricism* – infer the answer from previous experience. Note that because this almost always involves going beyond what you have actually experienced, it could, by bad luck or insufficient data, be wrong. Example #1: you want to know the number of bones in human body; every time that you actually counted them, it was always 206, so, you conclude, this must be the answer for everyone. Example #2: you want the sum of the two non-acute angles in a right triangle; every time that you have measured them, the sum was 90°, so, you conclude, that must be the answer.

So, which of the above is the way that psychologists attempt to learn things about human behavior and thought? [That wasn't rhetorical: before continuing, please stop and think about this for a while.]

Psychology is an empirical science. It's a science because it meets the two requirements for being a science. First, psychologists propose explanations – i.e., theories – for why things happen. (Yes, psychologists usually start by documenting what happens under what conditions, but we rarely stop there; we usually go on to generate ideas about *why* those things happen when they do, which is the first requirement for being a scientist.) Second, the theories that psychologists propose can be shown to be wrong. (Other people – i.e., non-scientists – also proposed explanatory theories, but their theories often cannot be disproven, which is why they are "non-scientific.") If you have the idea that becoming a scientist is a great way to avoid ever being wrong, then please let go of this now. What it means to be scientist is that you try to explain things, but you can be (and, probably, at some point, will be) shown to be wrong. To be a scientist is to open yourself up to the possibility of being wrong.

Psychology is an empirical science in particular because psychologists test their theories by comparing the predictions from theories to actual data. We do not ask experts if we are correct (although we often get useful ideas and suggestions from experts). We do not deductively prove that our theories are right or wrong (although we try to be logical). Instead, we collect data in order to test our theories, often by running experiments. And data are a type of experience; hence, psychology is an empirical science.

The goal here is not to have a complete discussion of what philosophers call epistemology; the point of all this is to explain why data are so important to psychologists. (The first part of the course is all about psychological data.) Before the first lecture, however, let me leave you with a general rule that applies to

all empirical sciences, including psychology: while it is fine to disagree about what the data mean, we must all agree on what the data are. In other words, we can argue all we want about which theory is best supported by existing data – in fact, such arguments are to be encouraged, as long as they are polite arguments – but we must always agree on the underlying facts. If there is any disagreement on the data, then all discussion of theory should cease until the discrepancies are taken care of. A failure to have complete agreement on the underlying facts will doom an empirical science. It would be like trying to shoot at a moving target. How can you generate a theory about *why* certain things happen under certain conditions if we aren't sure *what* happens under those conditions?

In one sentence: our data must be objective and replicable. They must be objective in the sense that the raw data do not require any specialized interpretation; they need to be what they are at face value. They must be replicable in the sense that anyone who doubts your data should be able to re-run your experiment or study for him- or herself and verify that your data are accurate.