**Designing a Good Introduction**

You need to start off with simple language, particularly in the first minute. Use general, everyday English to give the context of the research in the first minute. *Introduce technical terms in simple ways* as needed, using pictures and analogies. At the beginning, be sure the field and area of research are clear, then focus on the *question* that your paper considers and give what *definitions* are needed for the audience to get the right idea. **Be sure to clearly state, in the simplest language possible, what question your research is answering!** By the second minute of the introduction, you can start using technical terms that a typical researcher in the area would know. (See the second example below.)

**When you get to the front, put your title slide up immediately.** Then arrange your notes and get your timer ready while the audience reads the title slide. Once you start, spend no more than 20s on the title slide since they have read it already. Do not read a long title – it is a waste of time. Get quickly to an interesting slide to grab their attention (not a boring outline slide).

Here is a general outline for an Introduction. Consider this as a starting point and change it as needed for your paper. Carefully choose what to say to use your time well; that is a skill you need to demonstrate.

1. Some sentence(s) to **attract attention** and identify the **general context** (field of science).
2. Comment sentence specifying **more** **context**: the research area of this paper.
3. Sentence(s) clearly identifying the **topic** of this paper and the ***question* this research answers**.
4. **Motivation**: Even if all listeners are experts, you need to **relate this research to something in real life** that everybody knows about – cars, smartphones, email, pollution, disease, food, money/cost, etc. How will this research result affect the typical person? In the first example at the bottom of this sheet, the motivation is correcting a mistake. In the second, it is that frequently required things are found very quickly, yet no search takes too long. Even if you must use technical terms the audience doesn’t know, you can still motivate by connecting the research to things they DO know, as the following examples illustrate:
   * Bad: ~~This paper reveals how snorglings wimble~~.
   * Bad: ~~It is of interest to scientists to know how snorglings wimble~~.
   * Good: Learning how snorglings wimble may help us develop more fuel-efficient cars and trucks.
5. Give **key definitions** in simple terms so they understand the problem. Use pictures and analogies to help unfamiliar listeners get the right idea quickly, even if their idea is not perfectly accurate.
6. **If** it is important, talk briefly about the history of the problem, previous solutions, and why they are not good enough. [Do not spend more than 30 seconds on this in your AC exam presentation.]
7. Give key definitions needed to understand your solution. Some of these may be in the body.
8. **Preview the most important result** (central idea) and, if useful, the order of points in the body of the talk.

**Example 1**: For the zircon sample talk (This is a short version, in need of more detail to bring it to >2:00 long.)

“What if you were guessing when something happened and missed… **by 400 million years**? This paper proves that previous theories about early Earth history were off by more than that much. The planet Earth is 4.5 billion years old. The first geological age of the Earth is called the Hadean age, where the surface was molten rock, like the inside of a volcano. The word “Hades” means “hell” and it certainly was a hellish environment in which nothing could live. The question is, when did the Hadean age end, that is, when did the Earth first have a solid surface on which life could form? In this paper, we consider evidence that the Earth’s surface solidified 400 million years earlier than previous theory said. Previous theory, based on the oldest reliably-dated solid rock, said that the first solid Earth surface appeared 4.0 billion years ago. In our research, we analyzed some tiny crystals called zircons and found that some zircons are 4.4 billion years old. We also found evidence that there was liquid water on Earth before these zircons formed. This evidence proves that there was a solid surface 4.4 billion years ago, 400 million years earlier than previously thought.”

**Example 2**: The start of an Introduction section for a talk on computer data structures:

“Computers have become a vital part of our modern world. No computer? No modern life! A tremendous amount of information is stored in computers, and how we store the information has a great effect on the cost and speed of using the information. In this research, we introduce a new self-adjusting data structure called a deep-splay tree, which can adjust itself to ensure that frequently required data is easy to find, yet make sure no search takes too long. The deep-splay tree is an extension of the splay tree data structure introduced by Sleator and Tarjan in 1986.

Think of a situation in which a computer is storing *n* items, where *n* is some large number like a million, and a user asks for specific items one at a time, waiting for the item to be found before asking for the next one. This is called an on-line sequence of requests. Sleator & Tarjan gave good evidence that the splay tree is the best of all possible data structures for long on-line sequences, but it is easy to prove that some individual searches in a splay tree could take time proportional to *n*, that is Theta(*n*). This is very bad compared to a standard data structure such as a balanced binary search tree in which the worst-case time for a single request is O(log*n*).

The question is, can we improve the worst-case single operation time while keeping the good on-line properties of splay trees? We define the deep-splay tree and show that it seems to perform as well as the splay tree, yet every single operation is done in time O(sqrt(*n*)log*n*).”