

draft

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## STEP 1: CHOOSING A TOPIC

**Choosing a topic can sometimes be the hardest part of doing a Science Fair project.** When I did my last Science Fair project, I can honestly say that I probably changed topics 5 or 6 times. The easiest way to find a topic, is to first **find out what topics you don't like.**

### So how do you do this?

Well the easiest way is to first look at the general topic areas available. The Canadian science fairs have **7 different categories** that you can enter your Science Fair project in. Here are short descriptions of each:

#### ***Automotive:***

Studies dealing with health, safety and injury prevention; societal issues and the Future Automobile; materials and manufacturing; powertrains, fuels and emissions; design processes; intelligent systems and sensors.

#### ***Biotechnology:***

Applying knowledge of biological systems to provide a service, create a product, or solve a problem. Three main subject fields in biotechnology are crop development, animal science and microbial.

#### ***Earth and Environmental Science:***

Projects focusing on geology, mineralogy, physiography, oceanography, limnology, climatology, seismology, geography, or ecology. Projects in this field generally deal with learning how the Earth works and tackling problems in the environment.

#### ***Engineering and Computing Science:***

Projects in this field are based around using and developing innovative technology (e.g. computer hardware and software), often concerning chemical engineering, electrical engineering, industrial engineering, mechanical engineering, metallurgical engineering, materials engineering and hardware/software design.

#### ***Health Science:***

Any study dealing with human science, including the application of scientific knowledge to the health of humans.

#### ***Life Science:***

Using experiments, innovations, or studies to see how living things (non-human) work and function.

## **Physical and Mathematical Science**

Physical science projects focus on the properties and principles of energy and matter and are often in the field of organic/inorganic chemistry, analytical and physical chemistry, astronomy, subatomic physics and space science.

Mathematical science projects generally deal with the study of mathematical theories and the use of mathematical models to simulate biological and physical systems.

**Now that you know the 7 different Science Fair categories, you can figure out which field you want to do a project in by crossing out the ones you don't like.**

As an example, let me show you how I chose my field.

Right away, I knew I didn't want to do a project on Earth and Environmental Science – it was just one of those topics I have never really had an interest in. Physical, mathematical, engineering and computing sciences just don't strike a chord with me. Don't get me wrong, I think technology and mathematics are great, but not something I would consider looking at week after week.

At this point it was down to Health and Life Sciences, or Biotechnology. As someone wanting to go into medicine as a career, I knew that I would enjoy Health Sciences the most. So, now it's your turn. Think about what **you** like. Computers? Numbers? Medicine? Animals? Rocks?

**Once you know what field you want to do your project in, you can move onto narrowing that field, and choosing a topic.**

So for me, I knew I wanted to do a Science Fair project related to health. Throughout the entire process of selecting my topic, I learned three **very important** things:

### **1. Choose a topic you're genuinely interested in.**

In Grade 9, I wanted to study the effects of nicotine on diminishing the symptoms of Tourette's Syndrome. It was something that really interested me, something that genuinely inspired me to learn more! But this wasn't one of those projects I could do on my own – I would need some sort of mentor, with access to a laboratory, and who would be willing to take me on as a student. After weeks and months with no success, reality struck, and I realized that doing such a project was out of my reach at that point. It just wasn't doable! (*More on this later*)

### **I knew I had to change topics.**

I began to panic, thinking *there's almost no time left!* Instead of going back to doing something I like, I began asking people I knew for doable projects, whether or not I liked them.

### **Big mistake.**

Because I wasn't interested in the topics, I couldn't really get into them. I went from studying the effects of nicotine on Tourette's Syndrome, to developing hydrogen fuel cells, to studying effects of acids on the stomach and so on. But even in the presence of doable project ideas, my lack of interest in them slowly brought me back to square one – **I had no project**. Trying to do a project that I **didn't even like** simply wasn't going to work!

So I sat down and told myself “*go back to your roots! Find something you really like!*” I realized that with time running down, the only way I could really get immersed in a project and finish it in time is if I was truly excited to do it.

So I began looking back, thinking about my interests. Clearly, I was interested in Health Science (specifically neuroscience, via Tourette's Syndrome), but what would I do in this field? I realized that I could study memory, since memory capacity can be measured using simple recall tests. So now I had my basic topic: **memory**.

The key thing to remember is that it's not enough to pick a topic in the category that you like – **you have to like that specific topic itself!** For instance, I wanted to do a project in Health Sciences, but I am not interested in studying human teeth. Just because you are interested in a specific scientific category, does not necessarily mean you love everything about it!

## 2. Aim to be innovative:

One of the goals of a Science Fair project is to explore your creative potential and make discoveries. As I said earlier in the manual, a Science Fair project **isn't** purely a research project – **it is a project about trying to figure something out!** The simplest approach to this concept is to try to do a experiment or study that has not been done before (*to your knowledge*).

Let me explain this by referring to my project on memory. So I knew wanted to do a project on memory, now what? Well, I started thinking about improving or worsening memory, and thought:

**Hey! Maybe I could develop a formula that could help improve memory!**

So I started out by researching how memory works in the brain, and any recent studies that have shown certain drugs to improve memory. I also realized that it's a good idea to find out what worsens memory, because creating an opposite effect, may increase memory.

After further research, I found that the consumption of caffeine & sugar has been found to improve cognition and memory in adults, especially in senior citizens. However, I could not find any study regarding adolescents. So I thought to myself:

**Hey, why not study the effects of caffeine & sugar on teenage memory?**

I mean, caffeine could affect memory in adolescents differently than adults. So now, I had my interesting and **innovative** topic: **the effect of caffeine & sugar on teenage memory!** Had similar

studies already been done in teenagers, then my project would have been pointless: **How can you discover something that's already been discovered? What would be the point?**

As you can see, you **don't** have to be completely original. Instead, try looking at experiments or studies you are interested in, and **try to put a little twist on it!** Like in mine, I saw that no studies testing the effects of caffeine & sugar on memory were being done with teenagers, so I chose to do similar memory studies using teenagers.

**It is important to note that you may not finalize your topic until after you do research. In short, you don't have to know your exact topic right now! (I'll cover more on this later)**

At this point, knowing that you want to do a project on memory (for example) is good enough. **The innovative aspect can be figured out later after doing more research.**

### **3. Choose a topic that is within your ability and resources.**

What do I mean by this? Let's go back to my original topic: the effects of nicotine on Tourette's Syndrome. Now, first off, studying Tourette's Syndrome means having access to patients with the disorder. Secondly, administering nicotine to these patients revolves around legal issues, and studying its effects would undoubtedly require medical supervision and laboratories. I wasn't able to obtain such resources, making the topic unrealistic at the time. In this case, the topic was beyond my resources – possibly even beyond my ability (I have never worked in a lab before, let alone do a study with patients).

For Grade 7 or 8 students like yourselves, I doubt you'll be studying gene expression or tackling methods of destroying cancer cells (although, if you *are* capable, by all means, go for it!). In addition, projects at a higher level may require learning to work in a lab and using the advanced technology within those labs. If you don't have access to such resources, then obviously, you won't be able to conduct that kind of project. To be truly successful you need to do your best, and to do your best, you have to stay within your own abilities and resources available.

That's one of the reasons why my memory project was feasible. Caffeine & sugar was easily accessible in the form of soft drinks, and consumption of it by random subjects was perfectly within rules and regulations.

When choosing your topic, you have to make sure it's something **you** can do. You definitely don't want to start a project, and then realize at the very last minute, that it's impossible for you to do. Sometimes, you have to forgo doing a more advanced project, for a project that's within your resources. However, as you grow older, you will have more opportunities to do more advanced studies and projects.

### **4. Some Example Topics**

Check out YSF Canada's Abstract Booklet.