

Writing Your Abstract (from the INTEL Website...used for TSF and beyond)

Each student who completes a science fair project must write an abstract to be displayed with the project. An abstract gives the essence of the project in a brief but complete form — it should not exceed 250 words. Judges and the public should have a fairly accurate idea of the project after reading the abstract.

The abstract must focus on the current year's research and give only minimal reference to previous work. Details and discussions should not be included in the abstract, but may be put in the longer, written research paper (if required), or given on the project exhibit board.

Sample Abstract

- **Blue** (Purpose of the Experiment)
- **Green** (Procedures used)
- **Red** (Observations/Data/Results)
- **Pink** (Conclusions)

Sample Abstract Effects of Marine Engine Exhaust Water on Algae

Mary E. Jones Hometown High School, Hometown, PA

Blue ↓
(This project in its present form is the result of bioassay experimentation on the effects of two-cycle marine engine exhaust water on certain green algae. The initial idea was to determine the toxicity of outboard engine lubricant. Some success with lubricants eventually led to the formulation of "synthetic" exhaust water which, in turn, led to the use of actual two-cycle engine exhaust water as the test substance.) ← pink

Green ↓
(Toxicity was determined by means of the standard bottle or "batch" bioassay technique. *Scenedesmus quadricauda* and *Ankistrodesmus* sp. were used as the test organisms. Toxicity was measured in terms of a decrease in the maximum standing crop. The effective concentration - 50% (EC 50) for *Scenedesmus quadricauda* was found to be 3.75% exhaust water; for *Ankistrodesmus* sp. 3.1% exhaust water using the bottle technique.) ← red

Green ↓
(Anomalies in growth curves raised the suspicion that evaporation was affecting the results; therefore, a flow-through system was improvised utilizing the characteristic of a device called a Biomonitor. Use of the Biomonitor lessened the influence of evaporation, and the EC 50 was found to be 1.4% exhaust water using *Ankistrodesmus* sp. as the test organism. Mixed populations of various algae gave an EC 50 of 1.28% exhaust water.) ← red

(The contributions of this project are twofold. First, the toxicity of two-cycle marine engine exhaust was found to be considerably greater than reported in the literature (1.4% vs. 4.2%). Secondly, the benefits of a flow-through bioassay technique utilizing the Biomonitor was demonstrated.) ← pink

Purpose of the Experiment

- An introductory statement of the reason for investigating the topic of the project.
- A statement of the problem or hypothesis being studied.

Procedures Used

- A summarization of the key points and an overview of how the investigation was conducted.
- An abstract does not give details about the materials used unless it greatly influenced the procedure or had to be developed to do the investigation.
- An abstract should only include procedures done by the student. Work done by a mentor (such as surgical procedures) or work done prior to student involvement must not be included.

Observation/Data/Results

- This section should provide key results that lead directly to the conclusions you have drawn.
- It should not give too many details about the results nor include tables or graphs.

Conclusions

- Conclusions from the investigation should be described briefly.
- The summary paragraph should reflect on the process and possibly state some applications and extensions of the investigation.

An abstract does not include a bibliography unless specifically required by your competition.

How To Write an Abstract (from UNLV)

An abstract usually acts as a summary of work already completed and is used by prospective readers to decide whether or not to read the entire text. Abstracts are usually found immediately preceding a research document (such as a thesis or dissertation), and/or in professional journals and abstract indexes (both online and in hard copy). An abstract should represent as much as is possible the quantitative and qualitative information in the document, and also reflect its reasoning. Social science disciplines that use APA (American Psychological Association) style require abstracts to precede the larger paper whereas humanities disciplines often do not require abstracts.

It is important that you spend some time thinking and drafting your abstract. Your abstract is literally a "first impression" to your reader/audience, one that you want to make positively. Thus, you should consider writing more than one draft and beginning your drafting process early.

Abstracts

Typically, an informative abstract answers these questions in 100-250 words:

- *Why did you do this study or project?*
- *What did you do and how?*
- *What did you find?*
- *What do your findings mean?*

If your paper is about a new method or apparatus, the last two questions might be changed to:

- *What are the advantages (of the method or apparatus)?*
- *How well does it work?*

Some points to keep in mind while writing abstracts:

- While drafting your abstract: look over your subject to see what disciplinary assumptions are challenged; question the significance of your ideas; emphasize the important results and address limitations in a realistic manner.
- An abstract will nearly always be read along with the title, so do not repeat or rephrase your title. It will likely be read without the rest of the document, however, so make it complete enough to stand on its own.
- Your readers expect you to summarize your conclusions in an abstract, as well as your purposes, methods and main findings. Emphasize the different points of your study in proportion to the emphasis they receive in the body of the document.
- *DO NOT refer in the abstract to information that is not in the document.* This is very important and is a little like "truth in advertising." You do not want to give your reader the impression that your study covers information it does not actually contain.
- Avoid using the first person "I" or "we." In addition, whenever possible, choose active verbs instead of passive ones (ex: use "*the study tested*" instead of "*it was tested by the study*" or "*I tested in the study*").
- Avoid, if possible, using trade names, acronyms, abbreviations or symbols in your abstract. You would have to explain these names which would take up valuable room/words.
- Use non-evaluative language in your abstract; *report* instead of *comment* upon your findings.
- Ease your readers/audience into your topic. Or, in other words, be sensitive to the needs and knowledge of your audience. What might seem perfectly obvious to you after working on a longer writing or research project will often be brand-new to your audience.
- Don't procrastinate! It is best to write the abstract immediately after you finish your project while the ideas are still fresh in your mind.

Sample Format of Heading and Body of an Abstract (from UC Irvine)

Title of Project/Presentation* Joe M. Smith** *Mentor:* Mary J. Wilson***

Abstracts must include sufficient information for reviewers to judge the nature and significance of the topic, the adequacy of the investigative strategy, the nature of the results, and the conclusions. The abstract should summarize the substantive results of the work and not merely list topics to be discussed. An abstract is an outline/brief summary of your paper and your whole project. It should have an intro, body and conclusion. It is a well-developed paragraph, should be exact in wording, and must be understandable to a wide audience. Abstracts should be no more than 250 words, formatted in Microsoft Word, and single-spaced, using size 12 Times New Roman font. It highlights major points of the content and answers why your work is important, what was your purpose, how you went about your project, what you learned, and what you concluded.

* If your title includes scientific notation, Greek letters, bold, italics, or other special characters/symbols, make sure they appear correctly here in Microsoft Word.

** Include additional co-authors, if applicable

*** Include additional mentors, if applicable

Examples Follow from Science and Social Science

Persistent Global Activation of the Aplysia Serotonergic System After Sensitizing Stimuli
Kristine Kolkman
Mentor: Dr. Thomas Carew

The marine mollusk *Aplysia* responds to noxious stimulation with a stereotyped arousal reaction that includes escape locomotion, increased heart rate and sensitization of defensive reflexes. Although previous studies have shown that serotonin (5-HT) is important for most of these behavioral responses, it is still unclear how the 5-HT system is activated in response to noxious stimuli. To address this question, I used a specific staining of the 5-HT neurons in the living central nervous system (CNS) that allowed me to (1) systematically record their electrical activity following a noxious stimulus, and (2) trace their projections using the neuronal tracer Neurobiotin. I found that in response to tail-nerve shock, a procedure known to mimic a noxious tail stimulus, the vast majority of 5-HT neurons increased their firing rate for several minutes and became more excitable. 5-HT neurons were found to project toward various peripheral targets such as the gill, heart, body wall, tail, siphon, head, and tentacles as well as to other ganglia in the CNS. This study shows that the *Aplysia* 5-HT system is globally and persistently activated after a noxious stimulus. Such an activation might serve to synchronize the different aspects of the arousal reaction in *Aplysia*.

Stereotype Threat
Stephanie Domzalski
Mentor: Dr. Geoffrey Iverson

The stereotype threat theory (Steele 1992, 1997) examines the underperformance of women in mathematical domains and minorities in academic domains and attempts to explain these trends as being due to situational anxiety. Research indicates that the performance differential between genders and ethnicities can be best understood in terms of stereotype threat activation rather than biological determinants. The anxiety a stereotyped individual feels when confronted with an academic task is compounded by a societal expectation of failure. However, not much research currently exists on the mediating effects of personal belief in the stereotype. The goal of this study was to examine whether anxiety was correlated with a stronger belief in the stereotype among college-aged participants. Individuals from stigmatized groups demonstrated a significantly greater likelihood to experience higher anxiety levels if they believed the negative stereotype and that higher anxiety level correlated with lower test scores. These results provide general support for Steele's stereotype threat hypothesis.