

# Writing in the Disciplines

Science Interview: Prof. Ron Smith

**W. F. Garrett-Petts:** Welcome to program 9 of our series "Writing yourself into the disciplines." Today's guest is Ron Smith, Professor of Biology.

[The program opens with Professor Smith in discussion with Will Garrett-Petts. Smith and Garrett-Petts are joined in discussion with 20 students from English 309 at UCC.]

**Prof. Ron Smith:** ...No, I've never been that confident about writing; I'm not like those in the Arts. But that's not so uncommon: you look at an engineer versus someone in Arts. An Engineer is very good with numbers and complex, abstract theory--but like some scientists, he or she tends not to be a good writer. If you go into an engineering firm and just look at their memos and things like that, you'll see they're not good writers.

**Garrett-Petts:** Ron, you'd never know from your comments that you're an accomplished writer. I know that because we've worked on a project together, and that's one of the reasons why I asked you to speak with my students here today. I wonder if you could speak about the kind of insecurity that I sense you feel--or other scientists might feel--when it comes to writing. Are writers in the sciences particularly insecure or any more insecure than people in other disciplines?

**Smith:** No. Again, it's knowing that I have to sit there and edit it after the fact. My grades suffered as an undergrad because I wasn't a good writer. It was interesting, though, when I'd type things up and turn them in: there were always these comments about, "well change the sentence structure to this, it's not clear what your point is," and all that. If I went back and edited it, I could fix that up. On a test, my handwriting was so atrocious that for some reason they'd give me the benefit of the doubt and they actually gave me better marks on tests--but not on essays. It's funny...but you really have to edit it, I think, after a little while. I could recognize that it was bad after a week or so. I don't want to suggest that there aren't some very good writers in science, but I wasn't one of them early on.

**Garrett-Petts:** Welcome to part nine of Writing Your "Self" Into the Disciplines. Today's guest is Professor Ron Smith from the Biological Sciences Department, University College of the Cariboo. He'll be speaking on writing in the sciences.

**Student Panelist:** Welcome to English 309's interview series. Thank you for showing up today, and here's our first question.

**Student:** Hi Ron. Can you tell us how you got into studying biology?

**Smith:** I guess it started off as an interest in high school, maybe even before. It just continued from there. I went to high school and then to UVic for my first year and ended up injuring myself in a sport-related injury. I went back to Calgary for three years and graduated. After that, I went and looked around for a place to do a masters and went to Simon Fraser. After that, found a wife, and she wanted to go to Dalhousie and do some studies. I went with her and did my Ph.D. there. From there to here I stopped off at Queen's University in Kingston then found a job here.

**??:** So you were always interested in studying biology?

**Smith:** Always. It's something that you'll notice in a biology class, that half the people are probably interested in Med school and vet school or something similar. I was always the other side, I was interested in just the biology part and continued on in that.

**??:** Did you ever have any difficulties writing for your field at all?

**Smith:** Yes, quite a few. That goes back to high school. I went to high school, and this is dating me in the 70s, and in Alberta, where I went, they didn't do any writing in high school. You analyze plays just verbally, you went to movies, you went to a play, and you actually did no writing. Somehow, when I went to UVic my first year, they had an English test to place you, and for some reason I passed that and that's probably the worst thing I could have done because if you fail you go into English composition and if you pass you go into English lit. I didn't need English lit as much as I needed work on composition. I think my marks probably suffered all through University for that. Finally what happens is you end up doing a Masters and you get your thesis back or you get your essays back and it's just full of red. That's why, that's where we learned to edit. Tina knows that when stuff comes back from me and other faculty, it comes back all red and that's why -- most of us had difficulty writing. You learn eventually and hopefully pass that on to the undergrads that take your courses.

**??:** When you're working on a research paper for the sciences, is there a focus on the work that's been previously done in the subject or is there a focus more on what you're doing and the work that you're experimenting with?

**Smith:** What you have to do is always place your work in context. So in an introduction to a paper you always try and let everyone know what the relevant material was that has been done and also then leads into what your work is. So there's a focus on what has been done in the past and places that in context and makes your work relevant. You always want to make the reader aware of how relevant your work is. So you have to give it the context and then you go on from there. Then you always go back and say well, and my work follows up from this and is now the exciting new stuff on the cutting edge because of that. So you have to do both.

**??:** I was just wondering...you kind on this already but is there any kind of clear differences you can make between writing and the humanities and writing in the science field?

**Smith:** There is: the style is different. Some of the very good writer's that come over from English and take a couple of science courses, English has got them first and they'll write in a different style. It's not something that's hard to overcome for the good writer -- they can adapt their style. I think we like to be very short and concise and to the point...very short sentences but at the same time, very precise as well. We like to keep it simple, stupid, as Top Dickenson(?) would always put on papers. The way we cite is a little different; we'll cite author and the year they published this paper in rather than the author and the page number that you'd take a reference from. So there are some subtle differences but I think if you're writer you can adapt either way.

**??:** Is there a difference to writing a chem paper than to a biology paper?

**Smith:** Same. Again, there would be slightly subtle differences, perhaps, just in the way you reference and it's a preference. What they like doing is putting a footnote or a number one for a reference and they abbreviate the reference and the books(?) cited. They don't give as much information, perhaps, they like to keep their total volume or the total length of the paper shorter. That all relates to publication, what the publisher likes and what the papers...I guess what the companies like. They have page charters so they keep the articles shorter. They can do that by skimping on certain things. There's subtle differences but not great.

**??:** So the structure is more or less the same?

**Smith:** The structures the same.

**??:** What is that structure? I think is quite different from what we do in humanities.

**Smith:** There's the structure of the article but then there's the order in which you write in which is different too, which you might find more interesting. Usually you have an abstract which give you an overview of the whole paper, a sentence of an introduction, a sentence of materials and methods, a sentence of results, and a sentence of conclusion. So just something that a reader can come by and very quickly grasp what you've done but not giving them full details. There's the introduction, where you lay the context of the paper out and then tell the reader what you'll be doing in your paper. After that, there's materials and methods, the results section, the discussion section, where you discuss the results that you've presented, and the conclusion and the end. One thing that our students often get wrong is in the results section. What they'll start doing is just showing a figure or a table of results. What they don't appreciate, I think, is that what you want to do is convince the reader of what you're showing them is real. Often you use that section to emphasize all the important things you want to take over, or the reader to take out of the paper. A lot of our students miss that opportunity. They just say "plump, here's the results," and they're not trying to convince the reader of anything at that point, and they should. So that's one thing I found with our students, sort of a lack of practice. Interestingly I think, when you're going to write a paper, you start writing with the materials and methods, it's easy to say what you've done, it's just a good starting point so you don't have that block, it's easy to write that. Next is the results, what did you find. Then you can write the discussion,

what's the meaning of it all. Then you can go back and introduce before you've written the rest. And actually then, the abstract, that little bit, is the last piece that you write.

?: Can you tell us about some of the writing that you've done yourself? Maybe elaborate on some of the problems you've come across as well?

**Smith:** In my undergraduate days, that was probably the hardest. I never had a problem coming across with innovative ideas to write about. My problem always came in the writing of it, not the writing of it, the conveying of what I tried to say. I was a poor writer, grammatical errors and sentence structure was all wrong. It was organized right but then it was done all wrong. I found I could overcome that if I would let the paper sit a week before I'd actually try to turn it in. I'd edit it after I'm unfamiliar with it. Even then I'd recognize that my writing was pitiful. If I just turned it in I didn't notice that, you just turn it in. You try and edit it and it seems fine. Even to this day, when I edit something I've just written, I'll read the first sentence and say, "ok, the paragraph's fine," or I read the first word of the sentence and I'd say, "oh, the sentence is fine," and just quickly send it off. The biggest surprise, I think, when I went to submit one paper, in my fourth year, and the faculty member said the papers are due next week. So I quickly pulled that paper back and put it in my binder so he didn't see it. I actually, I don't know why, I actually edited it before I turned it in a week later and I was proud of myself--I got an "A" on that paper. Every time, since, that I actually gone through and done that, I've done fairly well. I recognize my own mistakes. If I didn't do that, comments come back, "What are you trying to say? What do you mean? This doesn't make sense. Rewrite this." So I think that's just a very valuable lesson. My writing changed around after I did that. I tried to do that routinely.

?: Do you do the same thing with your writing now?

**Smith:** Oh yes. It's more important now than it was before. As you progress through the educational system and end up publishing your own papers and things like that, there's more importance for you to do that than there is just in a class. It's easy to say now but when you're an undergrad everything seems important. But things are more important as you go on.

?: Obviously, objectivity is critical in the sciences but is there any room for senior-level writers or for yourself, is there any role for personal engagement, or personal opinion or views in anything that you do in your writing?

**Smith:** Yes. I think it's just important that whatever you say you try and back up. There are always arguments in science about which hypotheses, even there's three, four hypotheses at certain times, so it's critical that you evaluate the data that you have at hand, or the arguments for a certain hypotheses, and then go with it. You always have to, I think, reflect on what your data shows and what other shows and try to honestly try to support the ideas that best fit. It's also interesting though, that in science you can have two or three hypotheses about a certain theory, or whatever, and they can be very important ones, and the people that support the ones that aren't ending up being accepted, probably end up dying with their hypotheses that

they support as well. So sometimes the whole community doesn't shift at once but I think it's important to try to critically evaluate and honestly evaluate hypotheses and data.

?: This kind of goes back to the question that we were asking about your writing style and you were mentioning that you have problems with punctuation and grammar. As a professor now, in the sciences, do you look for those grammar problems in students' papers?

**Smith:** oh yes.

?: And it makes a difference in their grades as well, I'm sure.

**Smith:** There's something I try to do because the other thing I noticed in a couple, and my professors did this, is they let me resubmit works to try and improve them. What I did when I was an undergrad, and I'm sure it still happens today, is when you get a paper back and you look at the mark and you throw it in a pile and sometimes you'll actually look at the comments that are written on it. That's not very helpful unless you actually do something with those comments. I add the carrot, or the inducement, that I'll let the students turn back their papers, trying to fix them up, and really try to have them look at what they first turned in and then see the change it's made, not only the higher mark but just the change in how the paper reads. I try to offer that inducement and carrot to the students. Something that I would have learned from. If it happened earlier for me it would have been better.

?: What advice would you give a student...I know science papers usually rely heavily on graphs and that sort of thing, and numbers and things. What advice would you give a student for integrating the text and the graphic material, that sort of thing? I think you sort of touched on this a little bit. What's a good way to go about that?

**Smith:** I think what a graph or a table shows is sort of all of the data. What you want to convey to the reader, and it's very important that you're writing that paper for the reader to follow, you're not writing it for the mark, you're not writing it for the assignment, you're writing it for a reader. What's very important is that what you do is you describe the data that's in that figure in the table that you want the reader to take away or you want to make a conclusion from. Often times the whole figure isn't important to make your point, it's focussing in on a very specific part of what's shown in that figure. So when the text is preceding the figure, either when writing a lab report or a paper for publication, or writing an essay, what you want to do is convey to that reader the important part of that figure and emphasize it. Therefore, you're bringing that to the front. At the same time there are other parts of that figure that don't need emphasizing, they actually need de-emphasizing, and you can do that as well. That's the important part about the results section of a paper, it's to provide that reader with...I guess you're leading them into the eventual outcome and you want to lead them along to that outcome.

?: How do writing expectations change from lower-level courses to upper-level courses? Or do they at all?

**Smith:** Yes, they change. We expect more out of the upper-level, third-, fourth-year students. It's something in our program we have to look at seriously. I guess eight years ago, nine years ago, when I first got here, students didn't do any writing probably until third or fourth year and sometimes not even much then. In our first year we decided to try and fix that. In our first year assignments we had the students go into the library into the current literature to find a paper to summarize or do an annotated bibliography. Now we've got something in the order of 320 students and four sections, so that's a lot of marking for instructors to do in those sections. Now unfortunately, our second year courses, we've got something on the order of 65 students per course and section, up to 100 students per section in second year, and we don't actually end up with more writing in second year. So we haven't followed through with our writing and we have to, as a department, go back and revisit that and try and get more writing in our second year. Because when they come to third year, bang, they're expected to start writing their research essays that are up to 10-15 pages long and do lab reports. I'm always a little bit surprised at what they don't include in their papers, and whatnot, but then reflecting on it, we don't make them do the writing in second year that they have to. So we expect more but we really haven't given them the opportunity to progress as much as they should.

**??:** Are you concerned that scientific papers are considered rather inaccessible to people in other fields, or is being able to understand these papers a part of being an accepted member of the field?

**Smith:** There's a whole range of papers. There's the "Scientific American" and "Discover" that give anyone that's not a scientist access to that literature. And I think if you even follow the newspapers, the Globe and Mail, Post and Daily News, always has science in it. So I think that just the general populous always has access to that science. Now if you want to actually analyze that science critically, you have to go back to the paper that might be hard to understand. I think, though, that you can fight your way through it, anyone can fight their way through the papers. The most difficult part isn't the writing, it's probably just the acronyms and some of the vocabulary. But the actual concepts aren't that hard. If you can fight through a bit of the vocabulary, you're probably ok. But as an entry level you can always go to the public scientific press, I think, and understand it. That's easy for me to say, perhaps.

**??:** I heard you mention a couple times about publishing. In comparison to English or something, where people try to publish poetry or short stories, is there sort of an end goal to writing to doing scientific writing or studies in terms of publishing the results? Is there a relationship there?

**Smith:** Yes. It's not so much at U.C.C. but if you go to the sort of mainstream university, the typical university, UBC, Simon Fraser, any of them, it used to be that you're evaluations were all based on how much you published, how much grant money you brought in. The grant money you can bring in is related to how much you've published previously. So the end result, I guess, was trying to publish your work. So doing your experiments, writing it up and submitting it for publication and having it being expected. So that was sort of the end result or your studies. I

guess also at the universities what tended to happen is that you had grad students that did a lot of your work. In some instances the grads students would write it up, in some instances the faculty member would write it up and it's a joint effort with the students and the faculty member. And for their success it was best for them to publish too because that lead to other, further degrees and post-doctoral work and jobs.

?: To continue with this publishing, how do you stay in touch with all the different articles that are being published and then from there, when you do research how do you compile information from other research into yours when most research is so specific?

**Smith:** What you had better do, if you're interested in working in the field, is you better keep up with it continually. You have to always monitor the literature that is being published in your field, or even broader. There are a couple search engines that make that really easy to do. There's one that the library supports called "Karl and Cover" (?). It's not great for retrieval of information, it costs \$30 an article to retrieve it, but the actual search engine what it does is with some key words or authored names or journal titles, it will send you weekly the articles that you've asked for by key word or table of contents of journals that have been published. So there are key journals that I'm interested in, there are key subjects that I'm interested in and I can keep abreast of them just by signing on to this "Karl and Cover" (?), getting through e-mail the list of all those potential articles and then deciding whether I want to read them or not, or at least archive them. Another way is just to go to the library every week and go to your journal shelf and just flip through them. Did that help?

?: No, a little bit more. When you go to do research and you have to compile the information from all the journal articles, is it difficult when most of the journal articles are on something very specific?

**Smith:** No, no, because you're interested in that very specific thing too and the ones that you've targeted, the ones that you've asked the search engine to produce for you are that range of articles that fit within your field and that interest. It's a bit more daunting to actually start the search. You have to then get the backlog of information, back 10 years or so. The other things that happens, if you're so lucky, you never want to see the article you want to publish out there because that means someone has scooped you and you can't do it anymore, but for articles that are similar you can use their lit. cited section and that often gives you the rest of your search right there for you. So it's not that hard. Although, students often find it difficult.

?: Obviously it's important that students take some sort of an English course, I think it's mandatory here at U.C.C. for all students to take an English course...

**Smith:** We've changed our requirements: they've either have to take two or three depending on how well they do. So if they don't get a "B" in their first-year English course they have to take a second first-year English course and then once they've got through the first year they have to take a second-year English course which is technical writing in science. So potentially we make our students take three because we recognize the importance of writing.

?: Do you ever suggest to your student to take an upper-level, writing intensive English class to maybe improve their writing even more?

**Smith:** We never have. We've never known the options but I would strongly suggest, I think in any discipline, you can almost judge how well the student will do, and they're potential, by how well they can write. So it's essential to communicate well in any discipline and you'll do better if you're a good communicator--written and oral. I notice the students that were my compatriots when I went through. The ones that did well seemed to write very easily; it flowed, it made sense. It's amazing.

?: I was thinking, before this last question, if you're working with data and you're replicating previous studies, how do you look at plagiarism for students in the sense of what they work with and what they don't, and conclusions?

**Smith:** Plagiarism spans a whole lot of different types of plagiarism. It's easy to pick up the stuff that people are just taking in bulk and moving over to their essay, that's a bit easier to do. The other plagiarism is not giving someone due credit for the work that they've done in the past. That's a bit harder and it's sometimes a fine line. We, always in science, try to cite the people so you make a couple statements that so-and-so did this, and then you might have a couple more sentences where you don't actually put a citation in but it's obvious it's related back to the previous work. So that kind of plagiarism I treat very leniently and I let the students fix in their second go around, and say "you shot down (?) your citations here. Out of citation in this part of the paragraph." Because it's obvious because it follows it, you're giving this person credit and not in that fact. So, fairly lenient in that kind of plagiarism, were you should be giving credit a bit more often in your paper, harder on the plagiarism where you're just copying someone's ideas. I once had a student go through, I think it was a cultural thing in this case, but he said, writing along and suddenly it says, "the next experiment I decided to do was..." and it was obvious that he was just taking someone's article...but it was a cultural thing I think.

?: We've been talking a lot about the process of writing in our English 309 class, very briefly could you summarize for me the ideal process that you would like to see your first year students go through when they tackle one of your biology papers?

**Smith:** I think it's very important that, and I think we try to stress it, what you want to do, just to make sure you understand what you're writing about, and often you're writing a review of some sort or a summary, is you make notes for yourself. So that it does two things: I think it gives you an understanding of your topic area, and the second thing is that it makes sure you avoid plagiarism because you're putting it into your own words first and then you're going to compose your article. I think the first thing would just to take good notes of the reference material that you've got. After that, and I think this helps too, once you've got your notes you can start formulating your paper and you should make a good outline for yourself. Then once you've got, I think then, your information, you've got an outline, it actually becomes fairly easy



to fill in the blocks under your outline. I know once I've got an outline it's easier to start the writing and you get over that hurdle of just starting. After that, again, what you want to do is let it sit a week and then edit it. I can't stress how important that part is, at least for someone like myself anyway.

**??:** How do you know if you had a good topic? Did you bring any examples of the topics people study in biology.

**Smith:** The best topic is one that you're interested in yourself. When I assign a paper in biochemistry or cell physiology, plant physiology, it has to fit within that discipline but those disciplines are very broad. The most important thing is to make sure that you have a topic that you're interested in because that way you'll spend some time with it and be interested in learning about it. If you try to write on something that's not interested to you, you're in trouble right from the start. So I always try to stress that it's something that's interesting for you. Secondly what you could do as a strategy is just go to the library, close your eyes and pick one. The value of that is trying to pick one that you're interested in but as soon as you pick one you've got a reference to start from because some people do find it hard to find the reference material. But it's got to be interesting to you. I find it all interesting so whatever you pick, especially one that I don't know about is even greater because then I learn something. I don't want to just read what I already know, it's boring.

**Garrett-Petts:** I've got a couple of questions but the one that really strikes me as kind of interesting is a phrase that you've used and a number of other people in the sciences use habitually, I think, which is "writing up," "I'm writing up the research." It tends to suggest that writing is the final stage in the process of doing research. One of the things I might suggest in the humanities to my own students is that writing is a process of discovery. That you use writing to find out what you think about a particular subject and what you think may change towards the middle or towards the end of writing. Is that kind of attitude consistent with writing in the sciences or is it really an end stage? Is it really "writing up" and presenting it, dressing up the research that you've done and presenting it to the public?

**Smith:** I think the "writing up" is used as an end, the start of an end. If you're in grad school you do your courses, you do your experiments and then you "write up." That's looked upon as the awful stage, it's the onerous stage, if you will, of writing up your thesis. I think that's because a lot of science students tend not to be good writers. They've gone into science because they've tended not to be good writers, just a tendency. Now, you're right though in that it's not the end of the process because when you "write up," when you try to make your arguments, you see where the holes are and that might lead to other experiments. I think though, that when you are writing up that one paper that you've just finished you're fairly sure that you've done everything you need to do in that particular publishable unit but science never ends. Once you do one experiment and write it up, or a series of experiments and write them up for publication, you're going to be working on another projects which leads from that first one. So, in the process of writing up, although it may not impact upon that bit of work, it's certainly going to lead into the next one. It helps you clarify what is next. One difference between Arts

and Science is that we tend to do the short little bits and then keep adding on, adding on, adding on, doing another bit, do another short bit, do another bit. We don't produce the books and what not, we produce 7-10 page articles.

?: I guess, Ron, I'd like to thank you for doing this interview with us today. Do you have any final comments?

**Smith:** Thank you for having me.

**English 309 Class and Professor Will Garrett-Petts:** Thank you for speaking with us today—for sharing your insights and experiences. Applause.