

# Proposals

## **Writing to Win**

*Eric Donovan & Jo-Anne Brown  
CASCA Graduate Student Workshop  
University of Calgary  
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CASCA 2012

# Outline

- ❑ **Introduction**
- ❑ 5 strategies for maximizing your success
- ❑ Final thoughts



# *Introduction:*

## **What is your goal?**

Students (scholarships):

- ❑ higher “salary”
- ❑ better “working conditions” (e.g., lower TA load),
- ❑ establishment of success writing proposals
- ❑ “proof” of excellence,
- ❑ Reality: *scholarships beget more scholarships!*

Researchers (funding):

- ❑ projects
- ❑ salary
- ❑ students

Other:

- ❑ public building renovations
- ❑ business start-up grants

## *Introduction:*

# **Why should you listen to us?**

- ❑ We have written many scholarship and research proposals.... many successful, and some unsuccessful.
- ❑ We have supervised undergraduate and graduate students who have written proposals.... Successful and unsuccessful.
- ❑ We have sat on scholarship and research proposal review committees.

## SCHOLARSHIPS and AWARDS

Scholarship or Award	Value	Type	Location	Period Held
NSERC PDF	\$40,000/yr (2 years)	National	UofC	<i>declined for faculty position</i>
UTI Fellowship	\$15,000/yr	Institutional	UofC	06/01 - 06/06
Plaskett Medal (CASCA Thesis Prize)	Gold Medal (+ \$600)	National	UofC	04/06
Alberta Ingenuity Fund Associateship	\$55,000/yr <sup>a</sup>	Provincial	UofC	02/07 - 04/10, 06/01 - 06/06
UofC Research Fellowship in Physics and Astronomy	\$6000	Institutional	UofC	01/07
UofC Silver Anniversary Graduate Fellowship	\$18,000	Institutional	UofC	00/09 - 01/08
Ralph Steinhauer Award of Distinction	\$20,000	Provincial	UofC	99/09 - 00/08
JDS Uniphase Scholarship	\$5000	National	UofC	99/09 - 00/08
Ralph Steinhauer Award of Distinction	\$15,000	Provincial	UofC	98/09 - 99/08

\$315,000+ over MSc, PhD, Post Doc

UofC Fee Scholarship	\$3000/yr	Institutional	UofC	96/09 - 98/08
Ontario Graduate Scholarship	\$8000	Provincial	Queen's	92/09 <i>declined for NSERC PGS</i>
NSERC PGS 1,2	\$15,000/yr	National	Queen's	91/09 - 93/08
Queen's Graduate Award	\$6000	Institutional	Queen's	91/09 - 92/08
Dean's Silver Medal in Science	Silver Medal	Institutional	UofA	91/05
NSERC USRA	\$3200	National	UofA	90/05 - 90/08
Physics book prize	-	Institutional	UofA	90/09, 89/09
James McCrie Douglas Memorial Scholarship	\$800	Institutional	UofA	89/09 - 90/04
Sunwapta Broadcasting Limited Scholarship	\$200	Institutional	UofA	89/09 - 90/04

- a. Salary: \$40,000; Research Allowance: \$15,000  
b. Honorarium: \$2000; Research Allowance: \$1200

Jo-Anne

NORSTAR NSERC CRO	360k	2000-2003
CANOPUS CSA Contract	660k	2001-2004
NORSTAR CSA Contract	1500k	2004-2008
NORSTAR CSA Contracts	1300k	2008-2012
THEMIS CSA Contracts	4000k	2002-2013
NORSTAR CFI	700k	2004-2010
RISR-C CFI	25000k	2010-2015
Ravens-KuaFu-PCW	1500k	2003-2012

**\$35,000k+ over 15 years.**

# *Introduction:*

## Why should you listen to us?

*We have written many scholarship and research proposals.... many successful, and some unsuccessful*

*We have supervised graduate students who have been successful and unsuccessful*

**We are (probably)  
reliable sources of  
information!**

*We have sat on scholarship and research proposal review committees.*

# Outline

- Introduction
- **5 strategies for maximizing your success**
- Final thoughts

# Maximize your chances:

## 1. Know the Assessment Criteria



Natural Sciences and Engineering  
Research Council of Canada

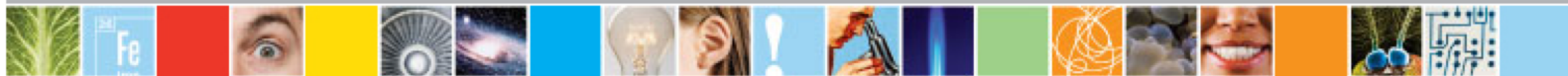
Conseil de recherches en sciences  
naturelles et en génie du Canada

Canada



**Natural Sciences and Engineering Research Council of Canada**

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1 | 2 | 3 | 4

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and Innovation

More +

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More +

Where we Invest  
and Why

More +

NSERC at the Museum

# *Maximize your chances:*

## 1. Know the Assessment Criteria

### Post- Graduate Scholarship Criteria

#### **Selection Criteria**

CGS/PGS applicants are evaluated and selected according to the criteria in the following categories:

- **Academic excellence**
  - Academic record
  - Scholarships and awards held
  - Duration of previous studies
- **Research ability or potential**
  - Quality of contributions to research and development
  - Relevance of work experience and academic training to field of proposed research
  - Significance, feasibility, and merit of proposed research, and justification for location of tenure
  - Ability to think critically
  - Ability to apply skills and knowledge
  - Judgment
  - Originality
  - Initiative and autonomy
  - Enthusiasm for research
  - Determination and ability to complete projects within an appropriate period of time
- **Communication, interpersonal and leadership abilities**
  - The ability or potential to communicate scientific concepts clearly and logically in written and oral formats. For example, this could include:
    - quality of the application's presentation;
    - participation in preparing publications; and
    - awards for oral presentations or papers.
  - Professional and relevant extracurricular interactions and collaborations. For example, this could include:
    - mentoring;



# *Maximize your chances:*

## 1. Know the Assessment Criteria

### Discovery Grant Criteria

- **Scientific or Engineering Excellence of the Researcher(s)** (see *Policy and Guidelines on the Assessment of Contributions to Research and Training*)
  - Knowledge, expertise and experience.
  - Quality of contributions to, and impact on, the proposed and other areas of research in the natural sciences and engineering.
  - Importance of contributions to, and use by, other researchers and end-users.
  - Complementarity of expertise of the members of the team and synergy (where applicable).
- **Merit of the Proposal**
  - Originality and innovation; extent to which the proposal suggests and explores novel or potentially transformative concepts and lines of inquiry.
  - Significance and expected contributions to research; potential for technological impact.
  - Clarity and scope of objectives.
  - Clarity and appropriateness of methodology.
  - Feasibility.
  - Extent to which the scope of the proposal addresses all relevant issues, including the need for varied expertise within or across disciplines.
  - Appropriateness of, and justification for, the budget.
  - Explanation of the relationship between other sources of funding and the current proposal; extent to which it is clear, comprehensive and convincing.
- **Contribution to the Training of Highly Qualified Personnel** (see *Policy and Guidelines on the Assessment of Contributions to Research and Training*)
  - Quality and impact of past contributions to the training of highly qualified personnel (e.g., postdoctoral fellows, graduate and undergraduate students, technicians).
  - Appropriateness of the proposal for the training of highly qualified personnel.
  - Enhancement of training arising from a collaborative or interdisciplinary environment (where applicable).

*Maximize your chances:*

# 1. Know the Assessment Criteria

Reviewers are given instructions. These instructions spell out what are often called ToR - it defines what “excellent” means, and what is required for “compliance”.

CANDIDATE EXCELLENCE	PROJECT	Location of Tenure
Academic Record	Research Project	Facilities
Awards/Scholarships	Project Plan	Research Environment
Experience/Publications	Learning Experience	Supervision
References		Opportunities (travel etc)

## *Maximize your chances:*

# 1. Know the Assessment Criteria

Candidate will have excellent opportunities to network and collaborate with other researchers. The candidate will receive excellent coaching and mentoring to complete the research project and to acquire additional skills that are relevant to success in their career. Appropriate resources and facilities are in place.

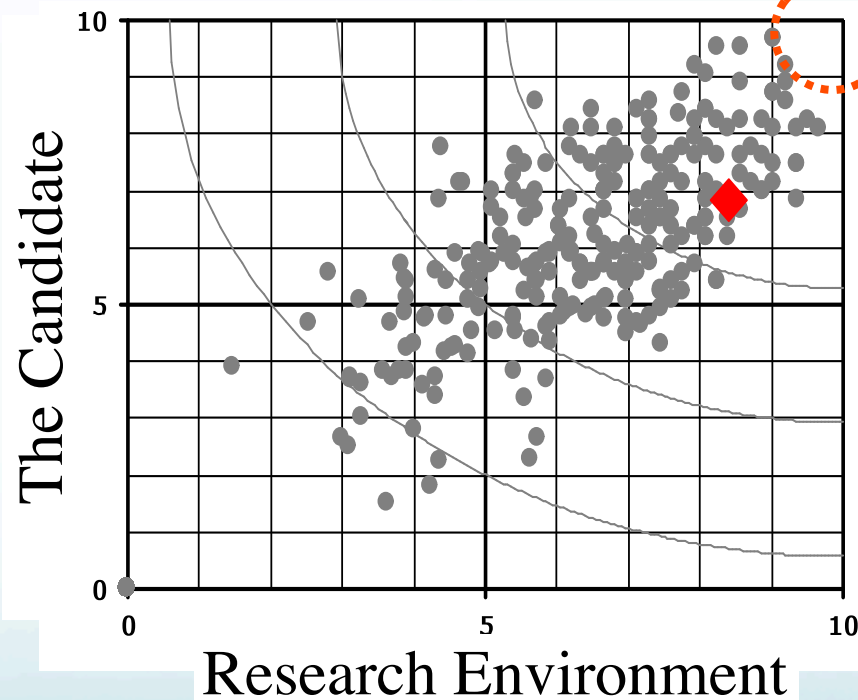
tions spell

CANDIDATE EXCELLENCE	PROJECT	Location of Tenure
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*Maximize your chances:*

# 1. Know the Assessment Criteria

*Be as close to here as you possibly can.*



*Maximize your chances:*

## **2. Follow the Instructions.**

- ☐ *Fill in all boxes on a form*
- ☐ *Give correct codes*
- ☐ *Follow the font and margin specifications*
- ☐ *Pay attention to the number of pages*
- ☐ *Use specified headings*
- ☐ *Obtain required signatures*
  
- ☐ **MEET THE DEADLINE!**

*“The Devil is in the Details”*

*Maximize your chances:*

### **3. Give reviewers what they need to see!**

- ❑ Don't allow yourself the 'luxury' of questioning the organization's wisdom. They have their reasons!
- ❑ Make sure your proposal "fits" with the specified purpose of the program.

*Maximize your chances:*

### 3. Give reviewers what they need to see!

#### Bonds

- \*Precision cosmology*
- \* $\Lambda$ CDM refinements*
- \*Star formation and galaxy evolution*
- \*Black hole feedback and growth in galactic nuclei*

#### Stocks

- \* $w=w(z)$*
- \*Dark matter search in LHC and Milky-Way halo*
- \*Annihilation/decay signatures of dark matter*
- \*Constraints on inflation*

#### Venture Capital

- \*Modified gravity (MOND,  $f(R)$ , ...)*
- \*Anthropic reasoning (landscape)*
- \*No Big Bang or Inflation (ekpyrotic/cyclic universe)*
- \*Variable constants of Nature*

From “Taking “The Road Less Taken”: On the Benefits of Diversifying Your Academic Portfolio” by Abraham Loeb.  
arXiv:astro-ph/1008.1586v1]



*Maximize your chances:*

### 3. Give reviewers what they need to see!

#### Bonds

*\*Precision cosmology*

*\* $\Lambda$ CDM refinements*

*\*Star formation and galaxy evolution*

*\*Black holes*

#### Stocks

*\* $w=w(z)$*

*\*Dark matter search in LHC and Milky-Way halo*

*\*Constraints on inflation*

#### Venture Capital

*\*Modified gravity*

*(MOND,  $f(R)$ )*

*\*No Big Bang or Inflation (ekpyrotic/cyclic universe)*

*\*Variable constants of Nature*

**VISION!**

From "Taking "The Road Less Taken": On the Benefits of Diversifying Your Academic Portfolio" by Abraham Loeb.  
arXiv:astro-ph/1008.1586v1]



*Maximize your chances:*

### **3. Give reviewers what they need to see!**

*a) Reference letters (referee letters, support letters):*

Pick appropriate references...

- ... in your field and who can speak well to your contributions.
- ... preferably in a 'high' or respected position.
- ... including your supervisor. (It looks suspicious if you don't!)

Provide them with a 'framework' of what you need from them:

e.g.,

- ... Comment on my highest grade in a class of 20 peers
- ... Mention my first-author paper while an undergraduate
- ... Mention how poor my family is
- ... Please discuss my TA award
- ... Please discuss my **personal circumstances**.

*Maximize your chances:*

### **3. Give reviewers what they need to see!**

Remind referees to avoid unsubstantiated statements:

*“She is one of the best students I have seen.”*

*“Her work is excellent.”*

*“He is creative.”*

*“He is above average.”*

Rewrite as:

*“She is one of the top 5 of the 200 students I have supervised.”*

*“She has created a change in the way observations are done.”*

*“He came developed an innovative way of imaging the data.”*

*“He excels in the laboratory environment as evidenced by...”*

*Maximize your chances:*  
**4. Keep it easy to read!**

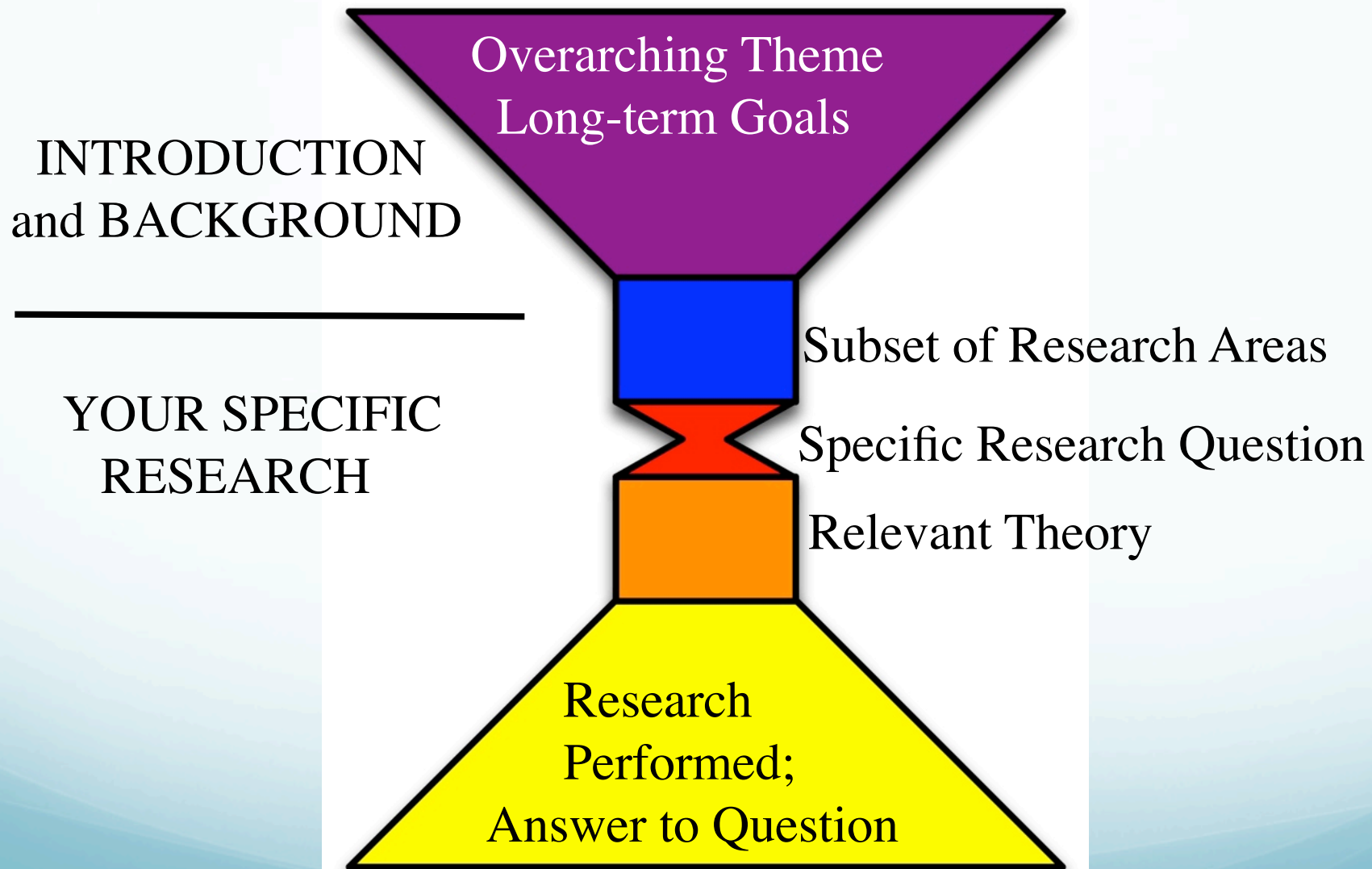
*a) Remember the ‘big picture’ – always keep that in mind.*

*b) Be consistent in Voice, Tense, Person*

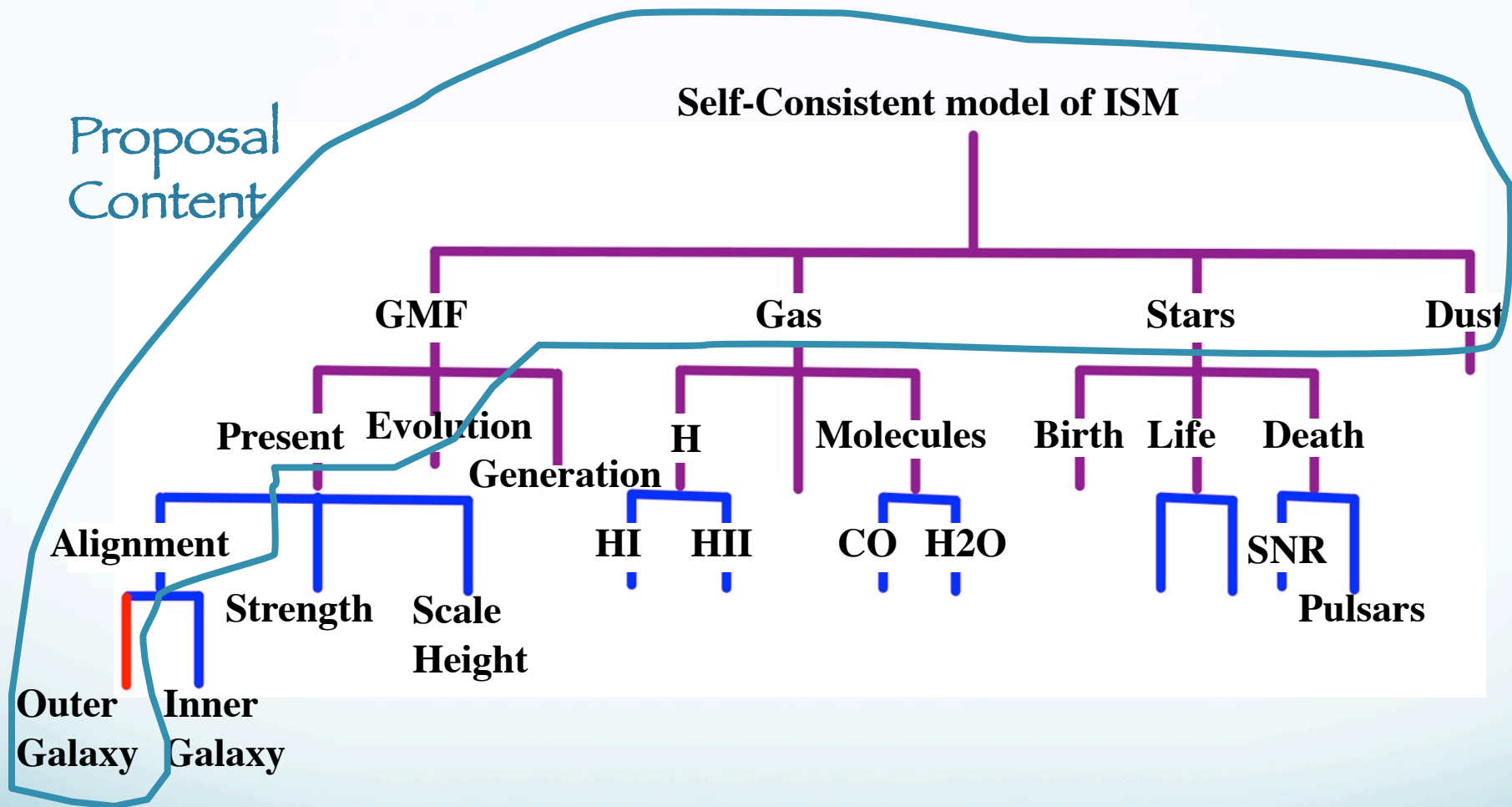
*c) Write with passion, but not emotion.*

*d) Be concise and grammatically correct!*

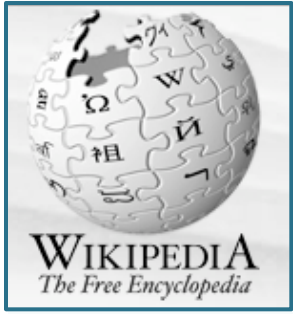
## 4a) The Big Picture: Visualizing Your Research 'Story'



## 4a) The Big Picture: Visualizing Your Research 'Story'



## 4b) Be consistent in **Voice**, Tense and Person



The *Voice* of a verb describes the relationship between the action and the participants (identified by its arguments).

When the subject is the agent of the verb, the verb is in the active voice.

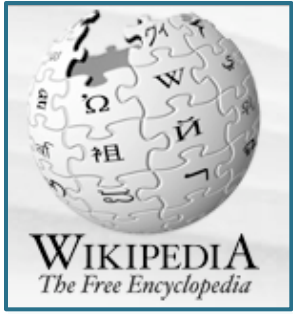
The cat ate the mouse - “ate” is active.

When the subject is the patient of the action, the verb is in the passive voice.

The mouse was eaten by the cat. - “was eaten” is passive.

## 4b) Be consistent in Voice, **Tense** and Person

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Tense is one of at least five qualities, along with mood, voice, aspect, and person, which verb forms may express.

English has two tenses by which verbs are verbs are inflected: present tense, and past tense. The ‘future tense’ is indicated with a modal auxiliary, not verbal inflection.

There are languages like Chinese in which tense is not used, but implied in temporal adverbs when needed. Some languages, like Japanese, have the temporal information in the inflection of adjectives, lending them a verb-like quality.

## 4b) Be consistent in Voice, **Tense** and Person

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- Past tense:

“In the article, the authors discussed their future plans, which included...”

- Present tense:

“The authors are researching the effects of their recent discovery.”

- Future tense:

“The authors are going to do much more work, including...”

*Choose a tense and stick to it.*



## 4b) Be consistent in Voice, Tense and **Person**

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Person defines the languages set of personal pronouns and affects verbs, nouns and possessive relationships.

English has three grammatical persons.

**First person:** *I* (singular) or *We* (plural)

**Second person:** *You* (both singular and plural)

**Third person:** *He, She, It, They* (all else not referring to speaker or addressee)

## 4b) Be consistent in **Voice**, Tense and **Person**

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Use a 'voice and person' appropriate to your audience.

**We prefer “first person active”.**

### Person

- First Person uses “I” or “We” when discussing the work
- Third person removes the author from the discussion.

### Voice

- The voice can either be “active” or or “passive”:
  - “Darwin formalized the concept of evolution”.  
(third-person active)
  - “The concept of evolution was formalized by Darwin.”  
(third-person passive)
  - “We took the observations over 3 nights in June”.  
(First person active)
  - “The observations were taken by us for 3 nights in June.”  
(First person passive)

#### 4c) **Write with passion**, not emotion.

*Write with passion about your work – if you can't, reconsider your proposal.*

*Avoid applying to get funding for things you are not interested in – the reviewers WILL notice!*

*Passion is contagious, and doing things you are passionate about will enable you to build a great career.*

**Note: Passion  $\neq$  Emotion!**

#### 4c) Write with passion, **not emotion**.

- ❑ Scientific writing should be thoughtfully composed and controlled.
- ❑ Do not make 'value judgment statements'.
- ❑ Avoid imparting excessive feelings or emotions
  - Do not use **larger font size** for emphasis
  - Do not use exclamation points!!!
  - Do not use informal, exaggerated words
    - Really unusual
    - Awesome
    - Amazing
    - Very

#### 4d) Be concise and grammatically correct!

- ❑ Eliminate wordiness - Don't make it sound like you are trying to fill the boxes!
- ❑ Avoid vague references – use proper citations!
- ❑ Use scientifically accurate language; avoid: “stuff”...
- ❑ Rely primarily on *paraphrasing*, not direct quotes.
- ❑ Check for spelling and typographical errors.
- ❑ Re-read what you have written. If possible, ask other people to read it; they will catch things that you miss.

#### 4d) Be concise and grammatically correct!

- ❑ Remember the “Magic Three Lines” to begin your proposal:
  - ❑ First sentence: **WHAT** is your research area?
  - ❑ Second sentence: **WHY** is it ‘important’?
  - ❑ Third/Fourth sentence(s): **HOW** are you going to contribute?

# Maximize your chances:

## 5. Never Underestimate Visual Appeal!

*Pay attention to layout  
(font, font size,  
italicization, spaces,  
indentation, etc.)!*

### RECENT PROGRESS

The focus of my work to date has been to determine the structure of the large-scale magnetic field in disk of the Galaxy. As with any observational scientific study, there are two key elements required to ultimately answer the scientific question being asked: getting the right data and extracting the correct information. I discuss my contributions to these two elements below.

**Observation of low-latitude extragalactic rotation measures:** Most of what is known about the Galactic magnetic field comes from observations of polarised emission from compact sources – typically pulsars (compact remnants of exploded stars) within the Galaxy, and compact, polarised extragalactic sources (EGS), which are usually galaxies. As polarised emission propagates through regions containing free electrons and a magnetic field, such as in the ISM of our Galaxy, the polarisation angle will rotate through the process of “Faraday Rotation”. For a source that emits radiation at a polarisation angle  $\phi_o$ , the received signal will have a wavelength ( $\lambda$  [m]) distribution of polarisation angles,  $\phi$ , given by

$$\phi = \phi_o + \lambda^2 0.812 \int n_e \mathbf{B} \cdot d\mathbf{l} = \phi_o + \lambda^2 \text{RM}. \quad (1)$$

Here,  $n_e$  [ $\text{cm}^{-3}$ ] is the electron density and  $\mathbf{B}$  [ $\mu\text{G}$ ] is the magnetic field along the propagation path  $d\mathbf{l}$  [pc], and the “quasi-longitudinal” approximation has been invoked (Ratcliffe 1962). The Rotation Measure (**RM**) integral is over the path from the source to the receiver. The sign of RM can only be affected by the dominant line-of-sight component of the magnetic field, where the line-of-sight average of  $\mathbf{B}$  is weighted by the electron density. Thus, with some idea of the electron density, it is possible to infer general features of the GMF from RMs.

Over the past few years, my students and I have determined RMs for over  $\sim 1650$  RMs with lines-of-sight through the disk of the Galaxy. Prior to my work, there were only 98 EGS with published RMs within  $\pm 5^\circ$  of the disk. My catalogue has the highest average source density across the entire disk ( $\sim 1$  source per square degree) and the highest reliability (see Brown et al. 2003a, 2007; Van Eck et al. 2010; Rae and Brown 2011).

**Determination of Critical Properties of the GMF:** Determining what the magnetic field looks like *now* is essential in order to understand how the magnetic field originally formed and how it is evolving. I outline below my contributions to this goal.

**a. Number of Magnetic Field Reversals.** A magnetic field reversal is a region of magnetic shear where the magnetic field is observed to reverse direction by roughly  $180^\circ$  with Galactic radius. The number and location of these reversals places very strict constraints on the possible dynamo modes operating within the Galaxy. Our latest results indicate that *there exists a single reversed region that spirals out from the Galactic center* (Van Eck et al. 2010).

**b. Pitch Angle of the GMF.** Our latest work utilizing CGPS observations indicates the GMF in the outer Galaxy has a very low pitch angle (Rae and Brown 2011; Van Eck et al. 2010). This

*Maximize your chances:*

## 5. Never Underestimate Visual Appeal!

*“A picture is worth a thousand words” but “Less is More”!*

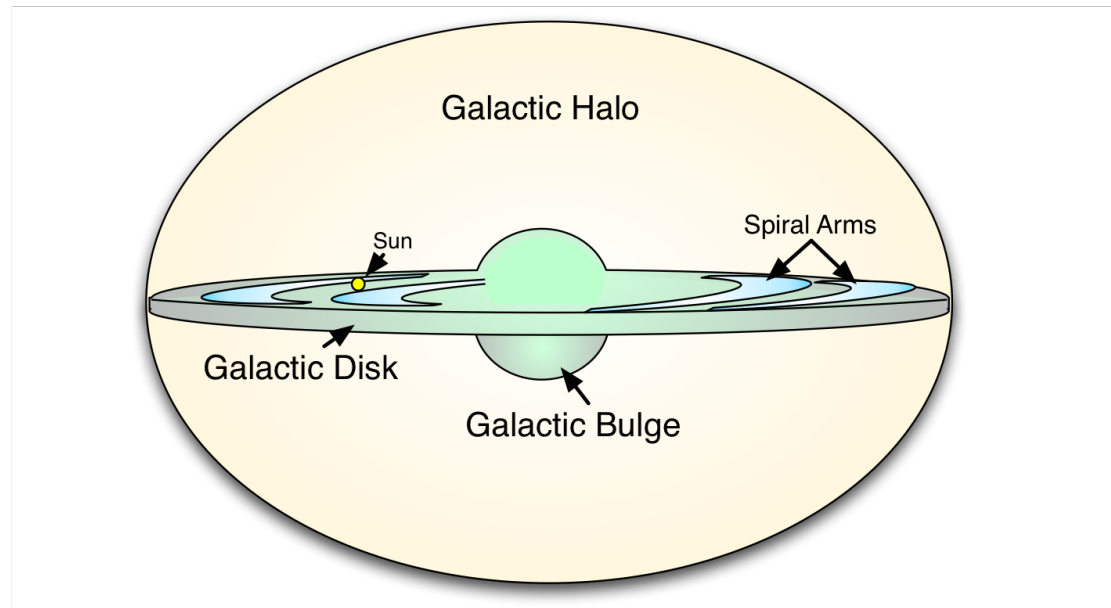
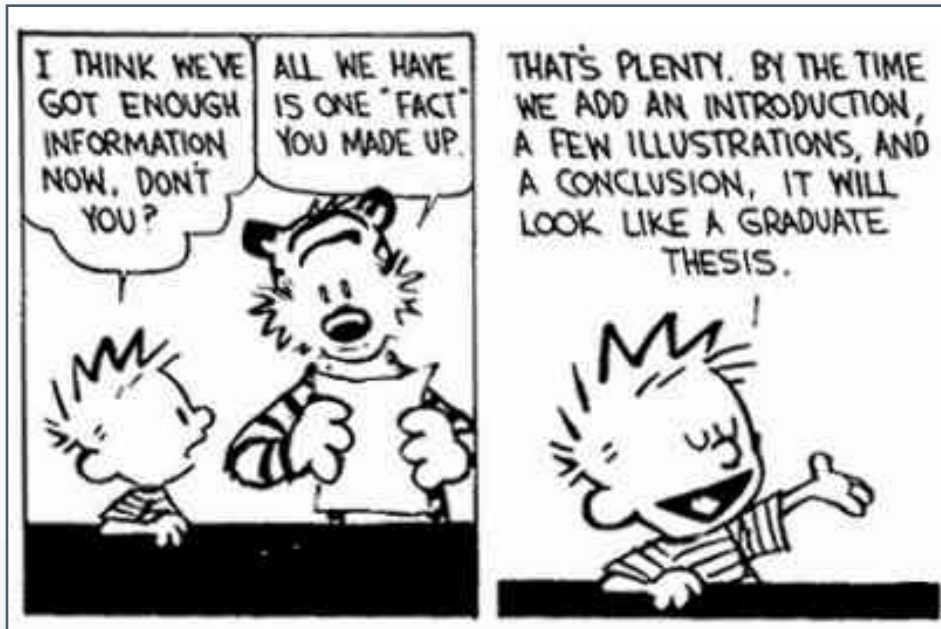


Figure 1: A sketch of a spiral galaxy showing the Galactic disk, the Galactic halo, and the spiral arms. In our Galaxy, we are located roughly between  $1/3 - 1/2$  of the way out from the Galactic center, at the edge of a spiral arm, inside the disk.



*Maximize your chances:*

## 5. Never Underestimate Visual Appeal!



Details matter.....



# Outline

- ❑ Introduction
- ❑ 5 strategies for maximizing your success
- ❑ **Final thoughts**

*Final thoughts – Learning from Failure*

Don't focus on the failure, but rather what you can do about it.

NSERC DG

Recovery from a “zero”.



# J. Brown: Dept. Physics & Astronomy; Evaluation Group 1505

Category	2009
Excellence of Researcher	Strong
Merit of Proposal	Strong
Training of HQP	Moderate
Funding level	\$0

2009 Committee Comment: *“The applicant’s contribution to the training of HQP were found to be very limited when compared to those of other applicants in the competition.”*

MSc Student (May 2010): C.L. Van Eck  
2010 Summer Student: K.M. Rae

○ ***Refereed Publication***

1. Van Eck, Brown, Stil, Rae, et al. (2011) – submitted for publication in the Astrophysical Journal in June 2010, and accepted in December 2010.

○ ***Conference Proceedings***

2. Van Eck & Brown (2011) – proceedings for “The Dynamic ISM” held in Naramata, BC. June 2010 (submitted July 2010)
3. Rae & Brown (2011) – as above (submitted August 2010)

○ ***Conference Presentations***

4. Van Eck & Brown (2010) – presentation at the Naramata workshop.
5. Rae & Brown (2010) – as above.



# My Proposal Improvement Strategies

I talked to successful scientists/proposal writers in my department:

- **Remember the “wow” factor!** (B. Sanders)
  - I wrote about what I *wanted* to do, NOT what I thought I *should* do – this brought more natural passion to my writing.
- **Focus on the *science questions*, not (just) the cool data.**  
(D. Knudsen)
  - I listed specific questions I wanted to address in my “objectives” section, and suggested student projects to address these in “methods”.
- **Have a good balance of ‘doable’ with ‘pie-in-the-sky’ ideas.**  
(T. Landecker)
  - In 2009, I was way too conservative. In 2010, I allowed myself to imagine the possibilities.



J. Brown: Dept. Physics & Astronomy;  
Evaluation Group 1505

Category	2009	2010
Excellence of Researcher	Strong	Strong
Merit of Proposal	Strong	Very Strong
Training of HQP	Moderate	Strong
Funding level	\$0	\$22k, 5 yrs.

2009 Committee Comment: *“The applicant’s contribution to the training of HQP were found to be very limited when compared to those of other applicants in the competition.”*



# Full Disclosure is best.

J.C. Brown

PIN:

1

**Message to Applicant from the 2009 DG Competition:** “The applicant’s contributions to training of HQP were found to be very limited when compared to those of other applicants in the competition.” *My first graduate student, Cameron Van Eck, began in May 2010. I have expanded my ‘Delays in Research’ section, and discussed my role and philosophy in the ‘Contributions to Training of HQP’ section of my form 100. As well, I discuss below projects I have outlined for students I intend to recruit over the next 5 years.*



## *Final Thoughts:*

*Proposal writing is an essential skill (even in the 'real' world!)*

- ❑ *Fact: In reality, the only thing you can guarantee is failure.*
- ❑ *Fact: There is both luck and unfairness in this.*
- ❑ *Fact: Some people who get these do not do well in the end.*
- ❑ *Fact: Many people who do not get these excel in the end.*
- ❑ *Fact: If you do not succeed this year, you might next year.*
- ❑ *Fact: Even if you do not succeed, you can still learn from this.*

# Take-Away Points

- ❑ Obtain assistance from reliable sources
- ❑ 5 strategies for maximizing your success
  - 1. Know the Assessment Criteria
  - 2. Follow the Instructions.
  - 3. Give reviewers what they need to see.
  - 4. Make your proposal 'easy to read'.
  - 5. Never underestimate 'visual appeal'.
- ❑ “Failure is the first step of success”