SACS PRESENTS:
THE GUIDE TO INTERDISCIPLINARY RESEARCH

INDEX

"[I]n introducing me simultaneously to skepticism and to wonder, [my parents] taught me the two uneasily cohabiting modes of thought that are central to the scientific method." —Carl Sagan

SO, WHAT EVEN IS RESEARCH?

RESEARCH 101

Research is about curiosity and *doubt*. It's the process of asking questions, investigating them, and finding answers based on evidence. As an undergraduate, research is about diving deeper into topics that interest you, learning things that aren't taught in classrooms, working closely with mentors, and adding value to passions. The interdisciplinary nature of CogSci makes research especially valuable, as it helps us understand and appreciate the connections between different fields in a more meaningful way. *But this guide is open to anyone interested in research in general.*

BUT WHAT DO I HAVE TO OFFER?

Don't be insecure about your knowledge. You don't need to know a topic in-depth before working on it — you'll learn on the job! But if you want to be well-prepared:

N.1 Take stats and CS classes, or hone your skills in those subjects! They're very valuable and useful, and you'll encounter them in tons of positions, so don't push them aside! This is also why it's good to:

N.2 Start early! You'll get a better picture of what is expected from you and the time to take any necessary classes! This will help you pace yourself and organize a practical, tangible schedule. This could also motivate you because you'll feel like you're working *towards* something!

BUT WHAT DOES IT REALLY MEAN TO BE PART OF A LAB?

Being part of a lab goes beyond what you might learn in your regular courses! It's an immersive experience where you work alongside a team of researchers to tackle real-world problems. If you're having trouble connecting disciplines, it's best to see them in action or start your own project!

As an undergrad, there are 2 main types of lab experiences: as a research assistant and taking one of the research courses offered at McGill.

The next page will cover this in more depth!

AS A RESEARCH ASSISTANT

Here, you'll be involved in everything from:

N.1 Administrative work
Organizing interviews, lab material, participant correspondence/recruitment

N.2 Running experiments
From running simulations to dissecting rat brains!

N.3 Working with data
Analyzing data, annotating it, or collecting it!

N.4 Brainstorming ideas
Working directly with grad students and researchers!

N.5 And maybe even contributing to published papers!

It's a **hands-on role** that lets you dive into the daily life of a researcher, working closely with professors, grad students, and other lab members.

Being a research assistant or even a participant in a study (or both!) is a great way to get to know what really goes into research before tackling your own research project!

You can also volunteer around labs, but *the next page* will cover some things to keep in mind before taking on unpaid work!

WITH MCGILL COURSES

All science departments have 396 classes (COMP/COGS/BIOL/BASC 396, etc...). These one-term, 3-credit are a great introduction to independent research, and might be a bit more structured than working as a research assistant because of feedback and the final paper you'll be writing for the class!

Small note: if you're aiming for the [Dean's Multidisciplinary Research List](#), BASC 396 will not count (not science) and COGS will be redundant with the other research classes (if you're in CogSci), but you can always do your work under another course code (e.g. COMP) (you don't need to change anything about your research or supervisor as long as they approve)! Talk to your advisor for more info!

COGS 401 and 444 are designed for students in the Interfaculty or Honours CogSci programs and offer a deeper research experience. These courses are 6 credits each and can be completed in a single semester or spanned across two. They give you the chance to work closely with a McGill researcher on an independent project, offering a taste of what it's like to be a research assistant, but with the added structure of regular course requirements and deadlines.

One thing to keep in mind: you're technically paying to do research with these classes.

SUFFERING FROM SUCCESS
DECIDING BETWEEN OFFERS

So, you received an offer or two (or more), now what? How do you pick between offers? Here's what to consider:

N.1 The fit: Consider whether the project you are being offered to be part of really captures your interest. Lab work should be something exciting, not daunting. But don't let this paralyze you! You can quit if the lab is not the right fit. Learning what you *don't* like is as important as learning what you like! **But make sure you talk to your supervisor beforehand and plan this well!**

N.2 The Environment: Labs are full of communication, especially with your supervisor, so make sure that the personality of your supervisor suits you!

N.3 The pay: Is volunteering worth it? This will depend on the type of work you want to do and what's available to you! If no paid positions align with your interests or if you're interested in fields like social work, unpaid roles can still be valuable. They can offer unique benefits, like experience, networking, or travel opportunities —so weigh all aspects in your decision! **That said**, paid positions are ideal when possible; being compensated is important, both to avoid exploitation and to support your efforts!

AFTER THE STORM
ON BEING PART OF A LAB

So, you finally scored a lab position, now what? It can be scary to be an undergrad in a lab, especially with so many established researchers around, but it's not as scary as it seems! Here are some things to keep in mind:

N.1 Ask lots of questions: You're here to learn, **and everyone knows it.** These people were also once in your position, so don't be scared to talk to them! In fact, ask *lots* of questions. It's always better to ask too much than too late. *Asking questions is a skill— this is the environment to develop it!* Besides, researchers love telling people what they're working on (when they're free)!

N.2 Attend lab meetings: Be there for any updates and other lab members' research progress & presentations! This is a great way to learn about other members, presentations, and research methods!

N.3 Use your resources: This includes talking to your supervisor! Again, *ask questions. Check out Chapter 4 for more!*

N.4 Communicate well: Meet your deadlines, but don't be afraid to communicate whether you're swamped or if you want to take on different tasks!

TERMINOLOGY

Roles:

- **PI (Principal Investigator):** The lead researcher responsible for overseeing a research project, securing funding, and ensuring compliance with ethical standards. A lab may also have Co-PI's.
- **RA (Research Assistant):** This will likely be your role! RAs assist with the technical and logistical aspects of a research project, including data collection, literature review, or laboratory work.

  More info on this in the next slides!

- **Lab Tech:** A staff member who performs technical duties in a laboratory, such as maintaining equipment, preparing experiments, and conducting tests or procedures.
- **Postdoc (Postdoctoral Researcher):** A researcher who has completed their PhD and is engaged in further academic research, often working under a PI to gain experience and publish additional papers.

Wet Lab vs Dry Lab:

- **Wet lab:** A laboratory where researchers work with chemicals, biological samples, or other substances that require liquid handling and specialized equipment for experiments (e.g., biology, chemistry labs).
- **Dry lab:** A laboratory where research is conducted using computer models, simulations, and data analysis rather than physical experiments (e.g., computational science, theoretical physics, digital humanities).

Work:

- **Literature Review:** A summary and evaluation of existing research on a specific topic to understand what is already known. Usually broad and qualitative.
- **Meta-Analysis:** A statistical technique that combines the results of multiple studies on the same topic to draw broader conclusions.
- **Benchwork**: The hands-on experimental work conducted at a laboratory bench, typically involving tasks like pipetting, mixing chemicals, or analyzing biological samples.
- **Conference Poster:** A visual presentation summarizing research findings, typically displayed at academic conferences to share ideas and receive feedback from peers. (There's a poster day every year!)

Publishing:

- **Preprint:** A version of a research paper shared publicly before it has been peer-reviewed, often posted to preprint servers like arXiv or bioRxiv for early feedback.
- **Peer Review:** The process by which other experts in the field evaluate a research paper for quality and validity before it's published.
- **Grants:** A sum of money awarded by a government, foundation, or institution to fund research, often requiring a detailed proposal and adherence to specific guidelines.
- **Open Access:** A publishing model where research articles are made freely available to the public, rather than being behind a paywall, allowing wider dissemination of knowledge.

Research:

- **H-index:** A metric used to measure a researcher's impact, indicating both the number of their publications and the frequency with which those publications have been cited.
- **Abstract:** A brief summary of a research article or presentation, highlighting the key points, methods, and findings, often used for conference submissions or journal articles.
- **Ethics:** Guidelines that ensure research is conducted responsibly and respectfully, protecting participants from harm. Different disciplines often have different ethical standards or guidelines (e.g., psychology vs. computer science). Consult with oversight bodies.
- **Sampling:** The process of selecting a subset of individuals or data from a larger population for study. **Random Sampling:** Selecting participants or data randomly to minimize bias.
- **Citation:** A reference to a source used in research, typically following a specific format (e.g., APA, MLA) to give credit to original ideas and avoid plagiarism.
- **Statistical Significance:** A measure of whether the results of a study are likely due to the experimental manipulation or just random chance, often determined by a p-value.

Methodology:

- The specific procedures and techniques used to conduct research, including data collection and analysis methods. Picking the right one is a matter of fit instead of sophistication!
- **Operationalization**: Defining how abstract concepts (like "intelligence" or "happiness") will be measured or observed in a study.

Blind/Double-Blind Study:

- **Blind**: Participants do not know which group they are in (control or experimental).
- **Double-Blind:** Neither the participants nor the researchers know which group the participants are in to reduce bias.

Qualitative vs Quantitative Research:

- **Qualitative research**: Research that explores subjective, non-numerical data, often through interviews, observations, or open-ended surveys.
- **Quantitative research:** Research that focuses on numerical data and statistical analysis to measure and quantify phenomena.
- statistical significance / p-value

Correlation vs Causation:

- **Correlation**: A relationship between two variables where changes in one are associated with changes in the other.
- **Causation**: When one variable directly affects (causes) another.

Primary vs. Secondary Sources:

- **Primary Source:** Original research, data, or firsthand accounts (e.g., journal articles, experiments).
- **Secondary Source:** Summaries or analyses of primary sources (e.g., review articles, textbooks).

Reliability and Validity:

- **Reliability**: Consistency of the research results when repeated under similar conditions.
- **Validity**: Whether the research accurately measures what it is intended to measure

WHAT ABOUT INTERDISCIPLINARY RESEARCH?

COMBINING DISCIPLINES

Interdisciplinary work isn't limited to Psyc+CS or Ling+Phil, it can also look like social work, game development, UX design, product management, and so much more! The possibilities are truly endless, especially when you go beyond the 5 core CogSci fields! Here's some advice to make the process of combining disciplines less overwhelming:

Step 1: Make it a Journey!

N.1 Keep a Cross-Disciplinary Notebook

Note down connections, no matter how subtle!
For apps, I recommend notion or obsidian for this!

N.1.1 Create concept maps

N.1.2 Identify common tools and methodology

N.1.3 Conversely, identify areas where you think one field can benefit from the approaches of another

Step 2: Learn from the Best

N.2 Talk to people in different fields

And not just in ones you're interested in! There's something to learn from everywhere (in true CogSci fashion)!

N.2.1 Learn from your profs

Beyond classroom content! If you're interested in their research, ask them about it!

N.2.2 Or industry professionals!

Check out our alumni resources section for more!

N.2.3 Find a mentor!

N.2.4 Talk to students in different programs

Step 3: Make your own stuff!

N.3 Apply your knowledge

Refer to your notebook! You may have written down the seed of an idea during your observations!

N.3.1 Get feedback!

If you're working for a lab, ask your supervisor or a grad student there. You can also attend a B21 lightning session and ask questions there!

N.3.2 Work with a team— *It can be less daunting!*

Step 4 (3.5): Wait... How?

N.4 Mashup stuff

N.4.1 Ask (and answer) "Why" questions

N.4.2 Or tackle "What if" questions

N.4.3 Look at things from the perspective of different fields

Or different schools of thought, or people, or characters!

N.4.4 Learn new skills when needed

N.4.5 Look back at what inspires you

Reignite your flame of creation!
Rediscover your childlike wonder!

COMBINING DISCIPLINES:
SOME MORE THINGS TO KEEP IN MIND

Carry your passions with you

The awesome thing about interdisciplinary research is that you don't have to let go of your passions! There's always a way to integrate them into your work. If you love film, you can research it or, on the opposite end, write accurate medical dramas (for once)!

Watch out for tunnel vision

It's easy to become engrossed in one field when you're studying it, but remember to regularly take a step back and ask yourself if this is really your final goal (which it could be! don't be afraid to change trajectories)
Make sure you're working with deliberation, and not just being influenced by your environment!

PRO TIP: keep a mood board (or list) of your goals, the things that interest you and are more intuitive to you, AND the things you dislike! Return to it every so often to remind yourself of what's really important and ways to translate your skills!

If you need more help or would love to explore this topic more, consider taking BASC 201— it covers exactly that!

COMBINING DISCIPLINES:
INSPO AND COOL EXAMPLES

Don't tell them I'm telling you this, but profs love students who think critically, bring new perspectives, and have a diverse skillset. Sound like someone you know yet? Your interdisciplinary perspective is valuable, and profs recognize that!

Getting your hands dirty is the best way to really learn how to combine disciplines, apply your knowledge cross-disciplinarily, and learn interdisciplinary-specific skills. New methods and schools of thought are often born at the intersections of disciplines. What kind of knowledge do you need to combine anthropology and storytelling in a video game or combine the history of science with psychology to reimagine school curricula? Intersections of subjects will need curated skillsets that go beyond what can be found in individual fields! Sounds tough and exciting, right? The important thing is to start!

Need Inspiration?

Check out projects other students have done from previous CogSci poster fairs (2023 research day and 2024 research day)! Here are some journals, too:
Science-leaning: Science Daily. Their Strange and Offbeat section is *really cool.*
Arts-leaning: PArtsHum or Nature's Humanities and Social Sciences Communications
Interdisciplinary: Journal of Interdisciplinary History (MIT), SIJIS, and The Innovation.

And don't forget McGill-affiliated journals!
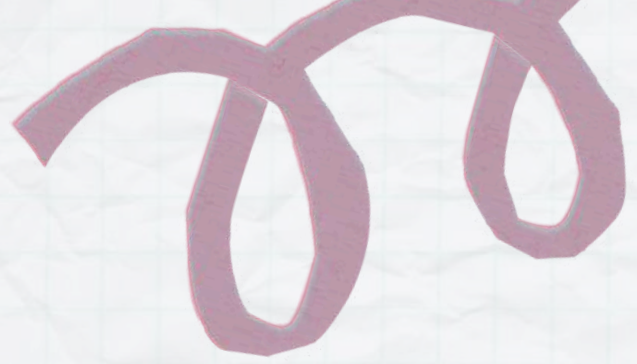
OPPORTUNITIES, AND MAKING THEM FIND YOU

WHERE DO I START?

We're glad you asked! The next section will cover talking about profs (which is ultra important!!) but here are some opportunities with lower stakes & barriers of entry that will still yield high reward and prime you to get started with research:

N.1 Networking events

Keep an eye out for Soup and Science, Wine and Cheese, Conferences (on and off-campus), Panels, Fairs, and Research/Poster Day (usually at the end of the academic year)!

N.2 Campus Involvement

Get involved in your councils or your favorite clubs! This is not only limited to Academic groups— there's something to be learned from being part of a team. You'll have the opportunity to reach out to profs and professionals depending on your role! You might even get to write a cool guide like this one!

N.2.5 Ever heard of B21?

If you have a project idea that doesn't fit into academia, then try checking out Building 21! B21 is a great community that gives space for thoughtful and flexible discourse, supporting both undergrad and grad students with original and bold ideas. It offers various programs and funding opportunities (such as the BLUE and Cordelia Dingle Fellowships). Check out the B21 website for more information!

N.3 Hackathons and Workshops

Besides allowing you to develop some of your skills and learn new ones here, these evets are a great place to have access to mentors, meet like-minded people and network, like the AI4Good lab and McGill XR's NeuroVR hackathon!

Be on the lookout for events and openings through your student associations' socials, newsletters, and posters around campus bulletin boards! And remember: your classwork can count as experience, whether it's a project, paper, or lab experience!

YOUR PROFS ARE PEOPLE TOO!

One of the best ways to find opportunities is by talking to your profs, especially if they have a lab or project that interests you! You can do this during:
N.1 Office hours
N.2 After class
N.3 During events *like our lab tours or NUM's "Meet the Prof"!*

Don't be afraid to just walk up to them and ask your burning questions about their projects and whether their lab has any openings, but ***make sure you have a plan for the conversation***! Ask them direct questions and be ready to carry the conversation, at least at the beginning.
This is also a good time to **gauge your fit** with a prof! If they're going to be supervising you, you'll want some mentorship compatibility!
It's an effort from both sides: your ability to communicate well, and their ability to give you the mentorship you need! *Refer to page 6 for more!*

Beware: they might tell you to:
A. come back again at the very start/end of the semester when students shuffle around
B. come back after you learn something specific (e.g. after your take one of their classes or learn a specific programming language)! **That's why it's important to start early**: you'll have the chance to make yourself known and show your commitment to the role before that short, critical period between semesters where they'll need to make the decision to hire you!

COLD EMAILING, AND OTHER SOUL-CRUSHING ACTIVITIES

Sometimes you might not be able to meet profs in-person. Get ready for some cold emailing. Here are some tips for your emails:

N.**1** Start emailing for projects and labs as early as possible.

Don't wait until last minute! Spots fill up quickly and some profs might ask you to come back again after taking specific classes!

N.**2** Make sure to use formal language.

*Use formal language and **show that you have thought critically** about topics of research/interest. This is how you'll stand out among the wealth of emails profs receive everyday! Make use of your interdisciplinary perspective (and your notebook!)*

You can check out SRI sources for more advice on the template of your emails.

N.**3** Prioritize emailing about the projects that you genuinely want to spend time on.

Projects/labs often require a big time investment, so it helps to actually be interested! This will not only help you in the long term, but it'll also make your emails stand out!

You can follow-up your emails if you don't get a response, but emails have a low click rate in general, so we recommend redirecting your energy to meeting profs in-person. Still, don't be dejected if you get turned down (or get your email ignored)! Oftentimes, labs have to deal with the stress of funding and profs tend to be very busy with very full inboxes, so don't take it too personal!

Here's a non-exhaustive list of profs to contact, but there are a lot more in 20+ different departments, so don't limit yourself to that link!

SUMMER OPPORTUNITIES

It might seem challenging to find summer opportunities, but there are tons of volunteering opportunities, conferences, paid experiences, and more out there! We'll give you some sites to look through, but there's info on this all over the place, so watch out for **newsletters and announcements** from advisors and other organizations! You can also ask other people who found success in this! Here's a non-exhaustive list to give you some ideas:

Research/funding opportunities

Undergraduate Student Research Awards (USRA)

The USRA supports more than 3,000 students annually across Canada and is administered jointly by Canada's three research granting agencies for researching:

- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Canadian Institutes of Health Research (CIHR)
- Social Sciences and Humanities Research Council of Canada (SSHRC)

McGill Biomedical Research Accelerator (MBRA)

The MBRA award is a 15-week paid internship May-August designed for students in the second to last year of their undergraduate degree who hold an interest in the field of biomedical research.

Arts Undergrad Research Internship Award (ARIA)

The purpose of ARIA is to support undergraduate students who undertake research during the summer under the direct supervision of a faculty member. The Faculty's awards (valued at $2,500) are matched by individual faculty members (in the amount of $2,500) to provide a total award of $5,000 to the student.

AI4Good Lab

The AI4Good Lab empowers diverse groups to use AI for social impact, focusing on increasing diversity in tech. Through training and mentorship, participants learn AI skills and apply them to real-world projects in health, environment, and social justice. Every trainee receives a minimum stipend of $1000 after completion of the program.

SUMMER EXPLORATION

Out Abroad!

If you know you're leaving Montreal for the summer, don't be afraid to ask your professors if they have work that can be done remotely! Or branch out and look for research opportunities abroad! Look into individual universities at your dream destination, ask your peers, or check out this resource:

McGill International Experience Awards (MIEA)

The MIEA provides students with the opportunity to study abroad. Students are able to participate in academic activities that can range in length from one semester to a full academic year, including internships, field research trips, and courses.

CONFERENCES

Here are some upcoming academic conferences in Montreal, but double check their official sites! And you don't have to limit yourself to one city!

Mutek - Late August

The MUTEK conference in Montreal is an annual event celebrating digital creativity. It features innovative performances, workshops, and discussions that blend art, technology, and sound. MUTEK attracts global artists and audiences interested in cutting-edge digital culture.

### International Conference on Artificial Intelligence for Healthcare - Early July

The ICAIH offers a significant opportunity for students, industry experts, organizations, and professionals in various fields of science, technology, engineering, and the environment. They also offer a platform for all academicians to display their research and ideas.

International Conference on Cognitive and Neural Systems Engineering - Mid-June

The International Research Conference is a federated organization dedicated to bringing together a significant number of diverse scholarly events for presentation within the conference program. As a student, you can sign up using the "Listener Registration" and learn about groundbreaking research in a variety of fields.

MAKING USE OF MCGILL (RESOURCES)
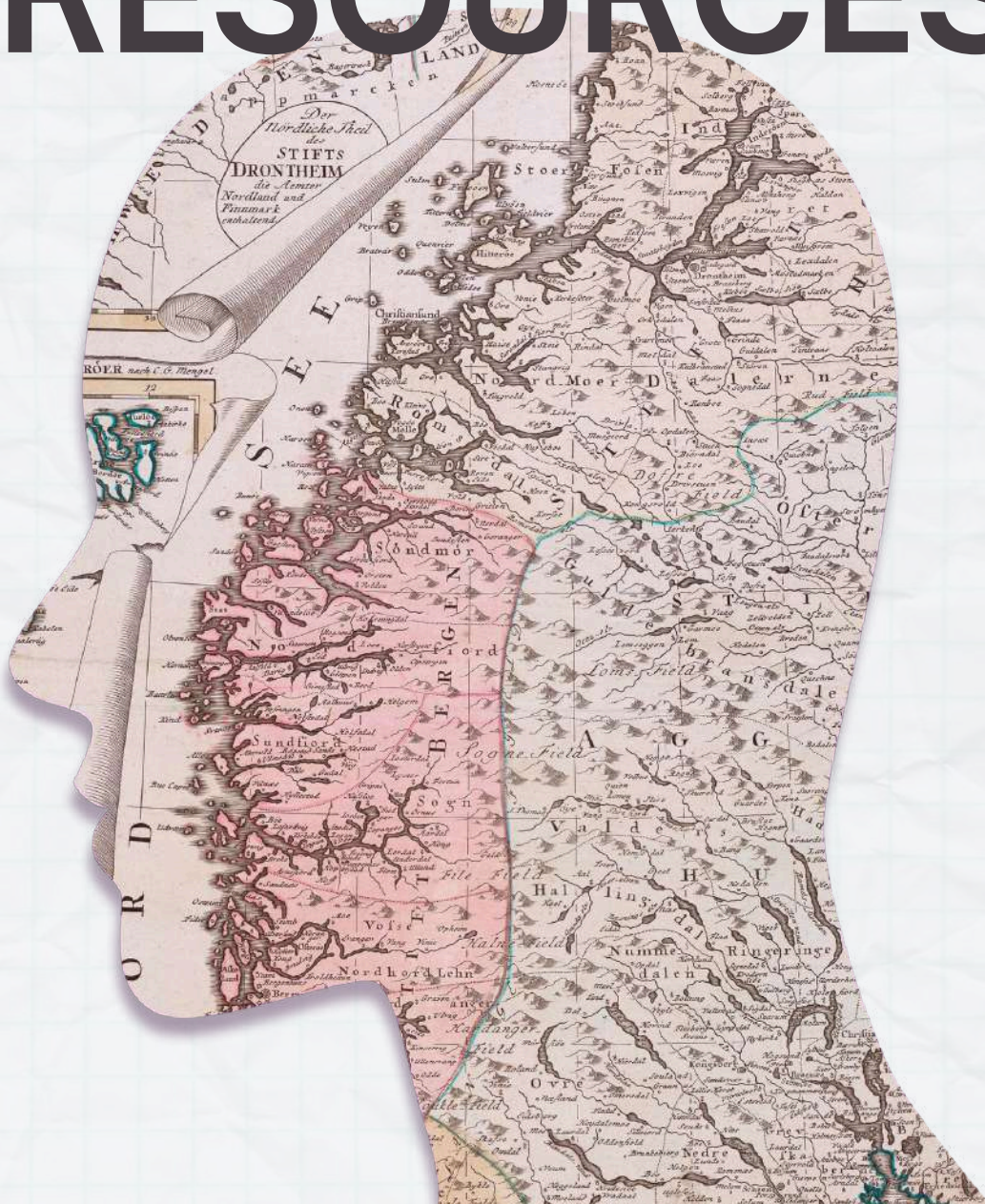
THE DIRECTORY OF EVERYTHING YOU *NEED (PART 1):*

Click!

There are a variety of valuable academic, social and wellness resources available for Cognitive Science students. Below are the different resources that you can use for your future success. If you ever need guidance from other organizations or resources, you can always reach out to SACS and your advisors!

1. McGill Library Website

The library website is a great place to begin research for any project, as it offers services from databases to citation guides.

2. Google Scholar

Google Scholar is a valuable starting point for research, offering easy access to a wide range of credible, peer-reviewed sources. It's user-friendly, free, and helps you quickly find key literature and track citations.

3. Undergraduate Research Skills

This workshop equips you with essential tools to start and improve your research papers and projects. You'll cover everything from identifying research needs to creating a bibliography. You'll learn about:

4. McGill Library Workshops

McGill libraries also provide a wide range of workshops! That includes academic guides, software tutorials, intersectional presentations, and so much more!

Getting started with your research:
- Finding articles, books, and other library resources for your project
- Evaluating resources
- Using citation styles
- Ask your supervisor or other researchers!

THE DIRECTORY OF EVERYTHING YOU NEED:

Look out for student associations too! Here's a non-exhaustive list of departmental ones related to CogSci and some of the events they do:

Group (hyperlinked)	CV Reviews	Panels, Interviews, or Meet the Profs	Academic Events/Lab Tours	Workshops	Networking
SACS		Panels + Podcast	Both!	GenAI workshop	Wine & Cheese Grad ball
NUM		Meet the Prof	Grad Scholarship		Social Events
MPSA	CV Workshop	Trivia Night with Profs	Grad School Panel		Social Events
LINGUA (SLUM)		Colloquium Series			Language Exchange
PSA		Philopolis			Directed Reading Program
CSUS		Tech Career Panels		WebDev Workshops	Check Socials
SUS			Grad Fair	Academia week	Grad Fair
AUS	CV + cover letter		Research funding		Arts Internship Office

The next page will have some non-departmental organizations! We tried our best to compile the events into a neat table, but there's a lot we might have missed, and even more groups we couldn't fit in! Look into **campus bulletin boards, newsletters, and activities night** for more!

THE DIRECTORY OF EVERYTHING YOU NEED:

Look out for student associations too! Here's a non-exhaustive list of McGill-affiliated ones and some of the events they do (check their socials!):

Group (hyperlinked)	CV Reviews	Panels, Interviews, or Meet the Profs	Academic Events/Lab Tours	Workshops	Networking
CaPS	Reviews + guides	Industry Insider		LinkedIn crashcourse	McGill Mentor Program + Career Fairs
Student Research Initiative	CV Editing Workshop		Summer Funding, Info Events	CV Editing Workshop	Faculty Student Speed Networking
Building 21		B21 Calendar	SACS CogCircles!	B21 Calendar	B21 Calendar
Engine			Chwang-Seto Innovation Fellowship	Lots! Check their socials	Check their socials
Game Dev McGill	gamedev CV Review	Company tours and industry talks		Bootcamps	Career fairs
McGill XR				XR development	Pre-Hackathon Networking
EJC		Speaker Series		Ai Robotics Workshop	follow their listserv!
Girls Who Code	CV Review	Women in Tech Panel		Hackathons	Check socials
MAIS		Panels+Podcast	The Kernel	Bootcamps	Project Fair
Design Collective McGill		UX Panel		2D/3D/app prototyping	

MENTAL HEALTH RESOURCES AT MCGILL

1. **McGill Wellness Hub**

The Student Wellness Hub provides comprehensive support for mental health, offering services like counselling, workshops, and peer support. They provide access to mental health professionals, wellness resources, and crisis intervention to help students manage different challenges.

3. **Peer Support Center** (PSC)

The PSC is a confidential and non-judgemental place where students can share their experiences with well-trained peer-supporters. Appointments can be booked online.

2. **Local Wellness Advisors**

Local Wellness Advisor (LWAs) are trained mental health clinicians embedded within faculties and services to orient and connect you with the appropriate support resource - on-campus or off-campus - for your unique situation.

4. **McGill Office of Religious and Spiritual Life** (MORSL)

MORSL hosts free workshops, events, meditation spaces and more for all McGill students, regardless of their religious denomination, affiliation, or lack thereof.

ALUMNI WISDOM
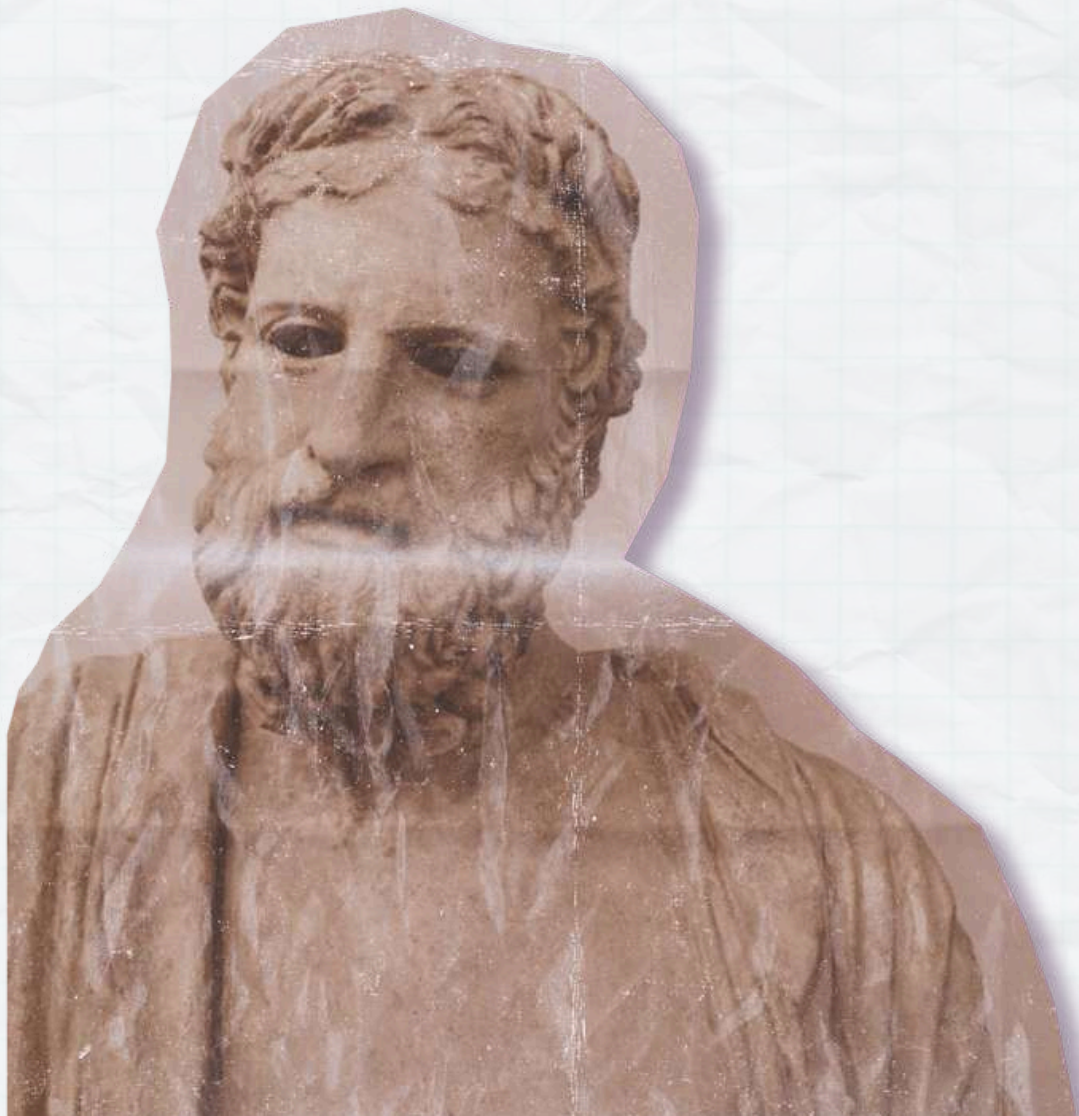
THIS IS ALL REALLY GREAT IN THEORY, BUT IN PRACTICE...

Consult people who went through the process already! Finding mentors is important, so here's how to learn from Alumni:

- CaPS Alumni Interviews: Industry Insider archive
- McGill Alumni Network
- Our alumni panels! *They happen every year, but check out the 2023 alumni panel and 2024 panel*.
- Our alumni handbook
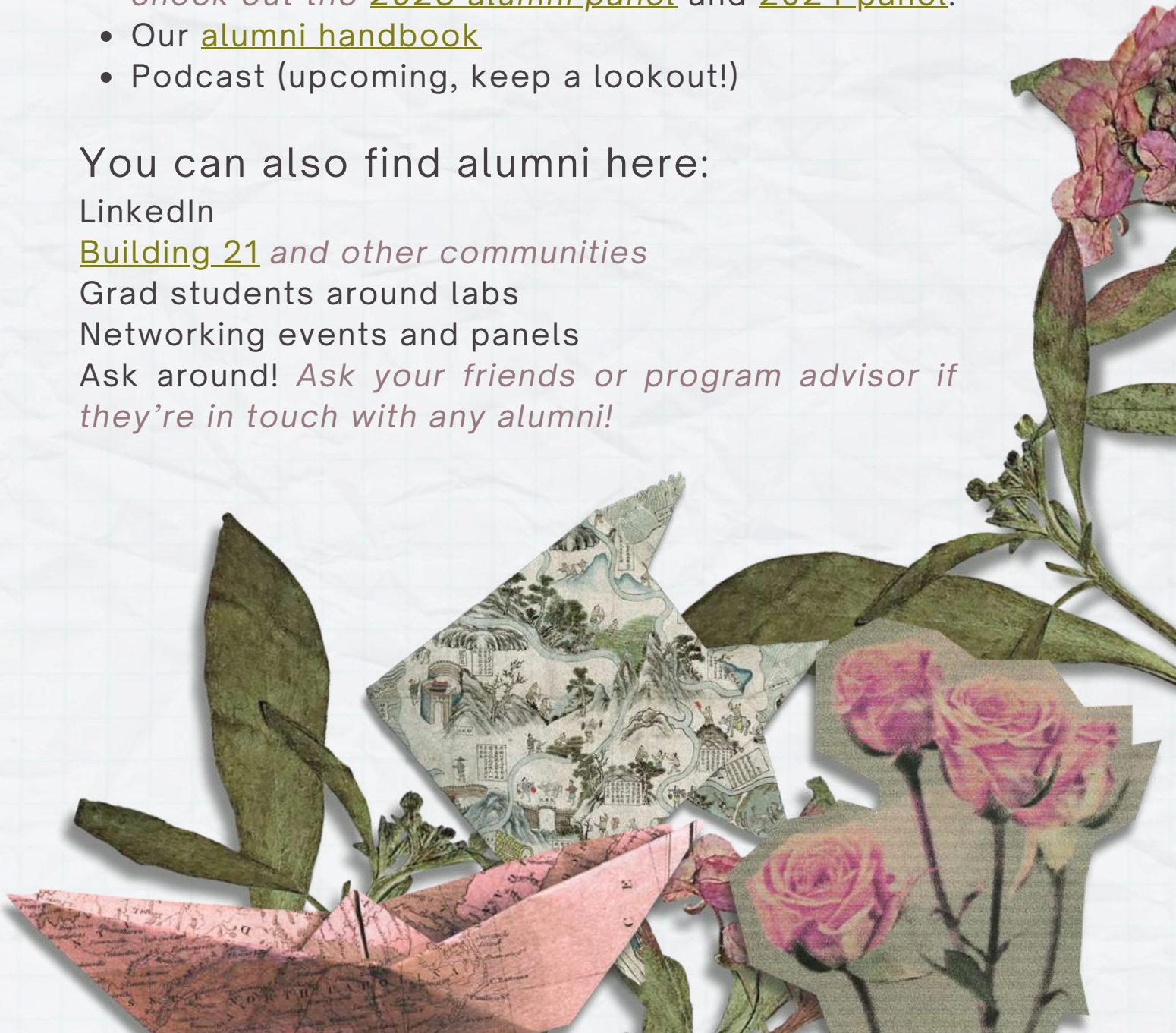- Podcast (upcoming, keep a lookout!)

You can also find alumni here:

LinkedIn

Building 21 *and other communities*

Grad students around labs

Networking events and panels

Ask around! *Ask your friends or program advisor if they're in touch with any alumni!*

WRITTEN BY:
THE ACADEMIC
COMMITTEE 24/25