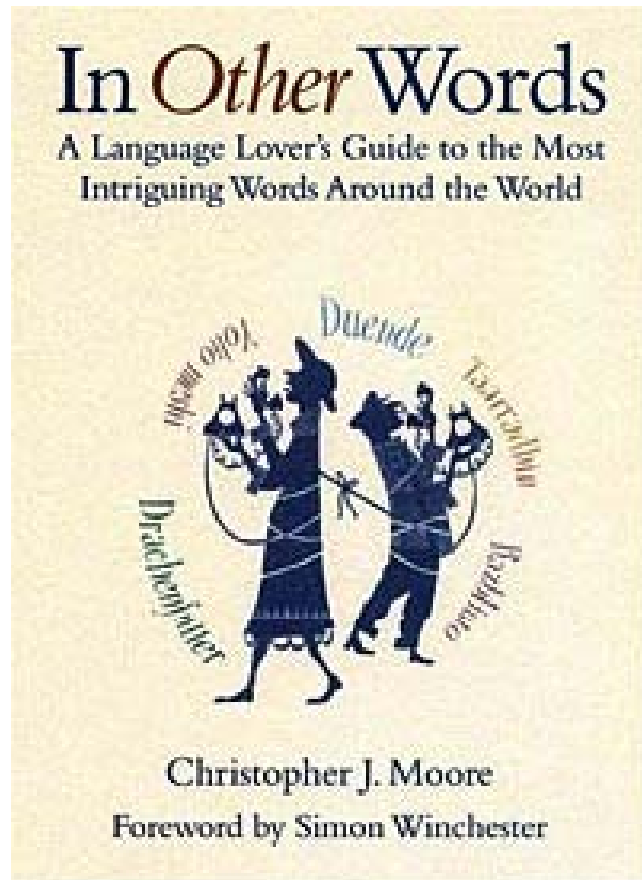


So ... you want to get a PhD ...
Now what?

Things you want to hear

Things you don't want to hear

PhD = μερακι



Translating the untranslatable ...

meraki [may-rah-kee] (adjective)
This is a word that modern Greeks often use to describe doing something with soul, creativity, or love -- when you put "something of yourself" into what you're doing, whatever it may be.

QUIZ ...

- Question

- What is the main difference between being an "undergraduate student" and "doing research"?

- Answer

- It's all about learning how to ask **your own** questions and not look for answers to **someone else's** questions

The most serious hurdle to overcome: Stop acting like a "student"



Exam vs Research

Exams

- You are told exactly what you are looking for
- You are given all the necessary data
- The answer exists, is unique, someone already knows it and you have to figure it out or verify it

Research

- You do not know what you are looking for
- You do not have all the data, if any
- The answer may not exist, may not be unique, no one knows whether it exists or how to find it

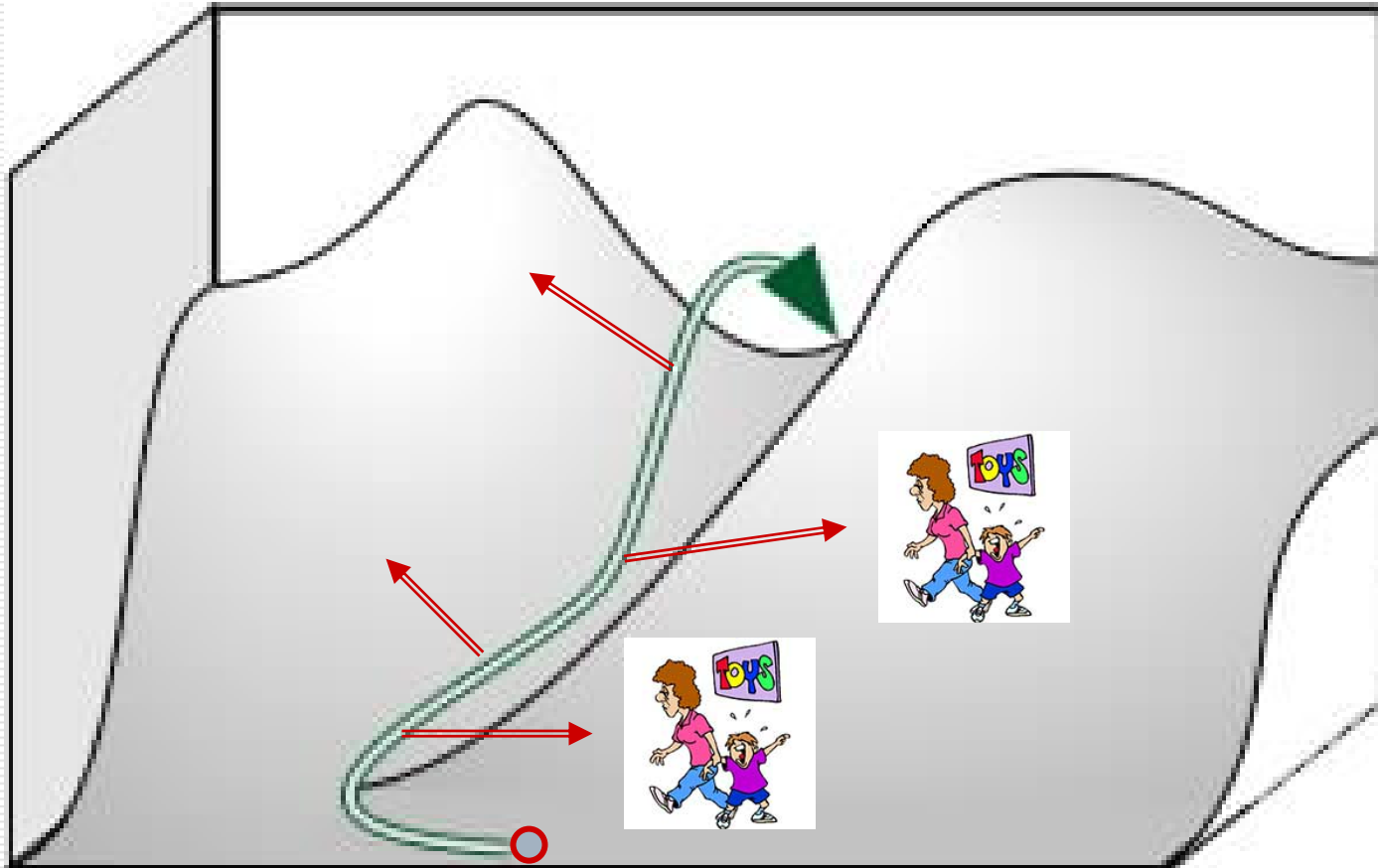
Interpret ... don't just answer

- Develop your interpretive skills
- In research, unlike hwks/exams, we are not looking for "a" single **answer** which is the end of it
 - Usually it is hard to define an answer
- In research we are looking for **understanding** which will lead us to the next question

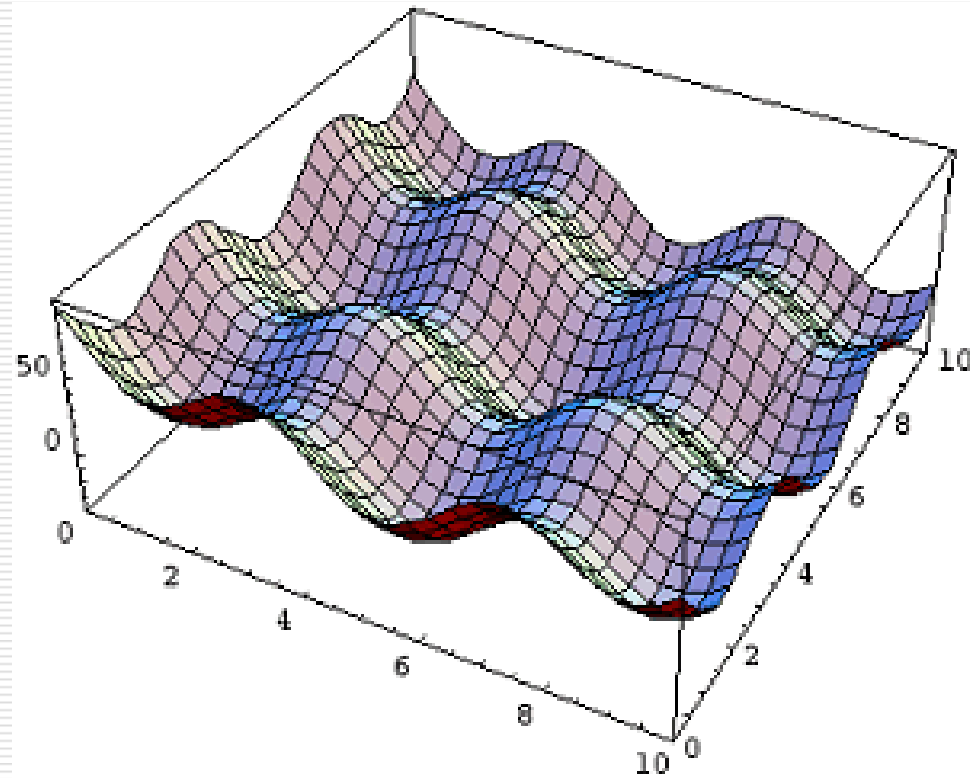
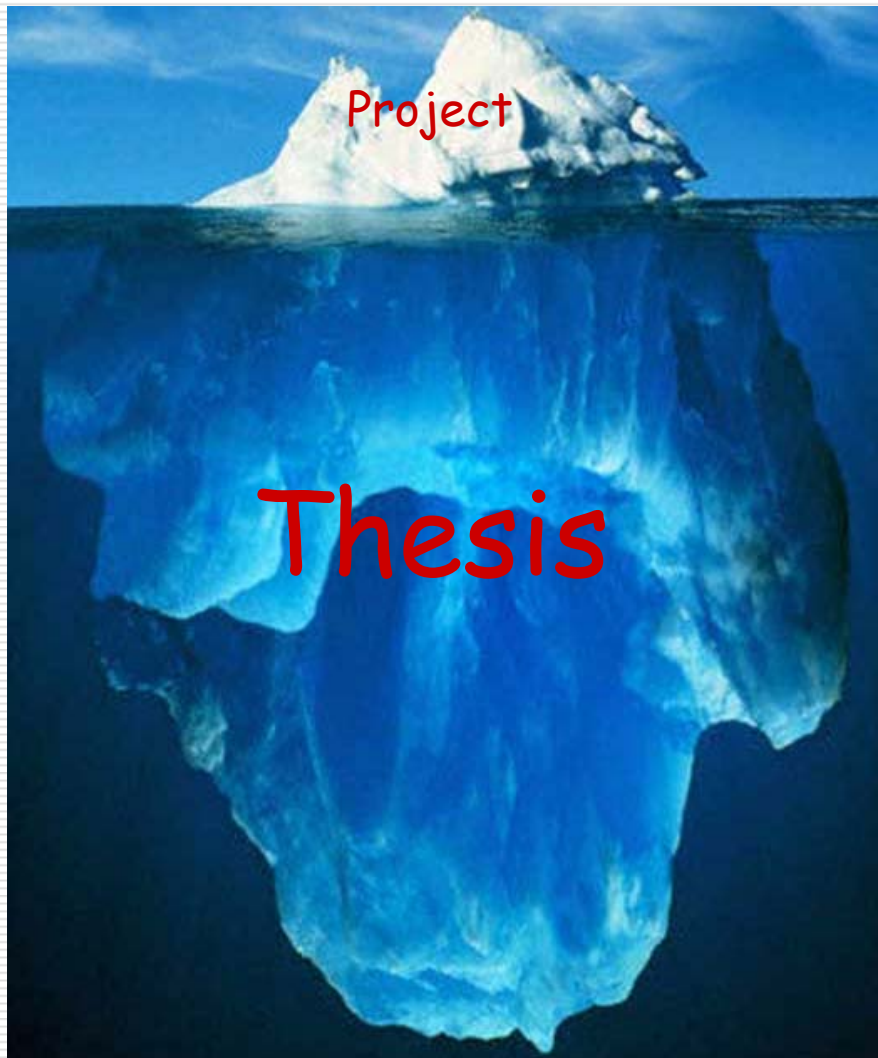
Qualities you have to develop

- Be responsible
- Be a team player
- Be proactive
- Be aggressive-minded
- Be prepared
- Be trustworthy
- Be persistent
- Be focused
- Be in charge
- Be aware of your field
- Be involved ... You are researchers and not willing slaves

It's the process that is exciting!



It's not about **answering** questions
It's about **asking** questions



Imagine the big picture

- Research is like a jigsaw puzzle only you don't really know what you are trying to make and not sure where the pieces are



Things can get exciting!

- Your target may evolve, so stay focused



Learn how to ask questions

- How? **WORK AND STUDY!!!**
- Learn the area, be the "master of your domain"
- Follow the literature and the recent advances
 - There is nothing more embarrassing than re-inventing the wheel
- Identify the challenges and learn how to ask tough questions
- Your favorite question should be ... **so what?**
- Realize that research is not like homework problems where the answer can be found in some book. You have to synthesize the approach
 - **It is not magic! It's hard work!**

You have to master the **process** and not just the **project**

- Projects evolve and often come and go
- What stays with you is your ability to analyze problems and synthesize answers
- **You have to learn the process of learning**
- There is no textbook to teach you that it is trial-and-error and hard work
- Dissect the problem and proceed to look at it piece by piece
- Learn to speak other peoples' language (and I do not mean Greek ...)

The things I learned in graduate school

- Learn how to read, especially between the lines
- Learn how to ask questions
- Learn how to identify targets
- Learn how to analyze systems
- Learn how to synthesize systems
- Learn how to think
- These are the qualities future employers are looking for in future successful people
 - Otherwise they would be looking for lab technicians

Your work is an extension of yourself

- One of the most challenging tasks is to learn how to excite others and how to communicate with people from other fields
- No one has patience for nonsense. If you have something to say, say it! It has to be clear, consistent and meaningful
 - Otherwise, no one will ever pay attention to you. Why should they?
- If you don't care about expressing yourself properly it is usually an indication that don't really care about what you do. So, why should I waste my time trying to understand what you are saying?

Take every task seriously

- When preparing a manuscript, assume you are working on the final version
- When preparing a talk, assume it's a job interview
- The way you present yourself and your work says much about who you are
- Deadlines are there for a reason
- Everybody has lucky breaks ... You have to be ready when yours comes along
 - It's not about being lucky, it's about being well prepared

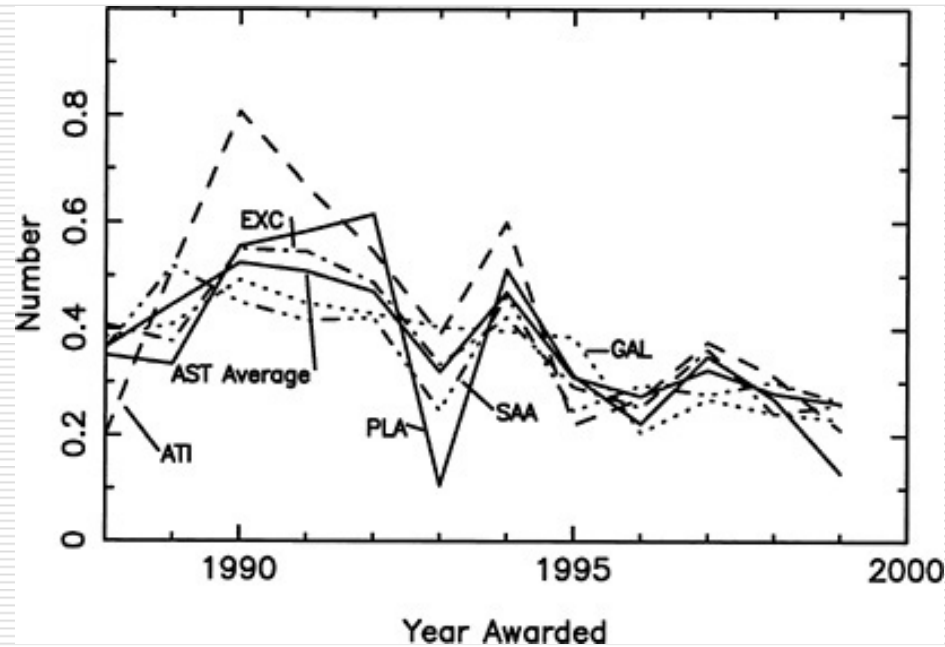
The world is self-similar

- We all have deadlines
- We all have bosses
- We all have constraints

- Realize that we all are part of a team and we all have responsibilities to each other

\$\$ is not everything, but ...

- No free lunch
- We all are resource-limited so learn to respect that
 - A PhD is not an all-expenses-paid vacation



Annual Budget

ORGANIZATION				PROPOSAL NO.			DURATION (MO)	
Rutgers University							Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR				AWARD NO.			Funds Granted by NSF	
A. SENIOR PERSONNEL: PI/PD, Co-PI'S, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months			Funds Requested By	
0.	First Name	M Last Name	Title	CAL	ACAD	SUMR	Proposer	
1.	Ioannis	P Androulakis	Title	0.00	0.00	1.00	\$0	
(1) TOTAL SENIOR PERSONNEL (1-6)							\$0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)								
1.	0) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	\$0	
2.	0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			0.00	0.00	0.00	\$0	
3.	0) GRADUATE STUDENTS						\$23,500	
4.	0) UNDERGRADUATE STUDENTS						\$0	
5.	0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						\$0	
6.	0) OTHER						\$0	
TOTAL SALARIES AND WAGES (A+B)							\$23,500	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							\$5,405	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)							\$28,905	
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000)								
			\$1,000					
TOTAL EQUIPMENT							\$1,000	
E. TRAVEL								
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							\$2,000	
2. FOREIGN							\$0	
F. PARTICIPANT SUPPORT COSTS								
1.	STIPENDS		\$0					
2.	TRAVEL		\$0					
3.	SUBSISTENCE		\$0					
4.	OTHER		\$0					
(0) TOTAL NUMBER OF PARTICIPANTS							\$0	
G. OTHER DIRECT COSTS								
1. MATERIALS AND SUPPLIES							\$1,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							\$1,000	
3. CONSULTANT SERVICES							\$0	
4. COMPUTERS SERVICES							\$0	
5. SUBAWARDS							\$0	
6. OTHER							\$9,607	
TOTAL OTHER DIRECT COSTS							\$11,607	
H. TOTAL DIRECT COSTS (A THROUGH G)							\$43,512	
I. INDIRECT COSTS (SPECIFY RATE AND BASE)								
	Name of indirect cost item	Amount	Rate					
	FirstIndirectCostItem	\$33,905	54.00%	18309				
TOTAL INDIRECT COSTS							\$18,309	
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)							\$61,821	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)							\$0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$61,821	

Annual Budget

ORGANIZATION Rutgers University				PROPOSAL NO.			DURATION (MO)	
							Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR				AWARD NO.			Funds Granted by NSF	
A. SENIOR PERSONNEL: PI/PD, Co-PI'S, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months			Funds Requested By	
0.	First Name	M Last Name	Title	CAL	ACAD	SUMR	Proposer	
1.	Ioannis	P Androulakis	Title	0.00	0.00	1.00	\$0	
(1) TOTAL SENIOR PERSONNEL (1-6)							\$0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)								
1.	0) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	\$0	
2.	0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			0.00	0.00	0.00	\$0	

\$61,821

1. MATERIALS AND SUPPLIES				\$1,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				\$1,000	
3. CONSULTANT SERVICES				\$0	
4. COMPUTERS SERVICES				\$0	
5. SUBAWARDS				\$0	
6. OTHER				\$9,607	
TOTAL OTHER DIRECT COSTS				\$11,607	
H. TOTAL DIRECT COSTS (A THROUGH G)				\$43,512	
I. INDIRECT COSTS (SPECIFY RATE AND BASE)					
Name of indirect cost item	Amount	Rate			
FirstIndirectCostItem	\$33,905	54.00% 18309			
TOTAL INDIRECT COSTS				\$18,309	
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)				\$61,821	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)				\$0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$61,821	

Annual Budget

ORGANIZATION Rutgers University	PROPOSAL NO.	DURATION (MO)						
		Proposed	Granted					
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR	AWARD NO.	Funds Granted by NSF						
A. SENIOR PERSONNEL: PI/PD, Co-PI'S, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)								
0.	First Name	M	Last Name	Title	NSF Funded Person-months		Funds Requested By	
					CAL	ACAD	SUMR	Proposer
1.	Ioannis	P	Androulakis	Title	0.00	0.00	1.00	\$0



I. INDIRECT COSTS (OFFER PRICE AND BASE)			
Name of indirect cost item	Amount	Rate	
FirstIndirectCostItem	\$33,905	54.00%	18309
TOTAL INDIRECT COSTS			\$18,309
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)			\$61,821
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)			\$0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			\$61,821

What a group meeting should look like



How much time should you spend in research

- Numbers in principle don't mean much, but there are limits ...
 - *much in little ... nothing in too little*
- If you work **40** hours a week get a **job**
- If you work **80** hours a week get a **life**
- **50-60** hours a week is what is **realistic**

Keep your curiosity alive!

- Research is a non-stop process
- It has to be consuming you and you have to be passionate
- I would strongly advise you to take advantage of the academic environment (courses, seminars, meetings) ... don't overdo it ...
- But ... never loose your focus!

Structure of group meetings

- **Research update**

- Each of you will be giving an update on your recent work
- This is not meant to be a general overview but a focused updated target on the most recent work

- **Paper review**

- This year's emphasis will be on modeling complex systems

- **Literature review**

- You have to be up to date in your respective areas
- At any time you should be able to give a general overview of the area, the challenges, state of the art, your expected contributions