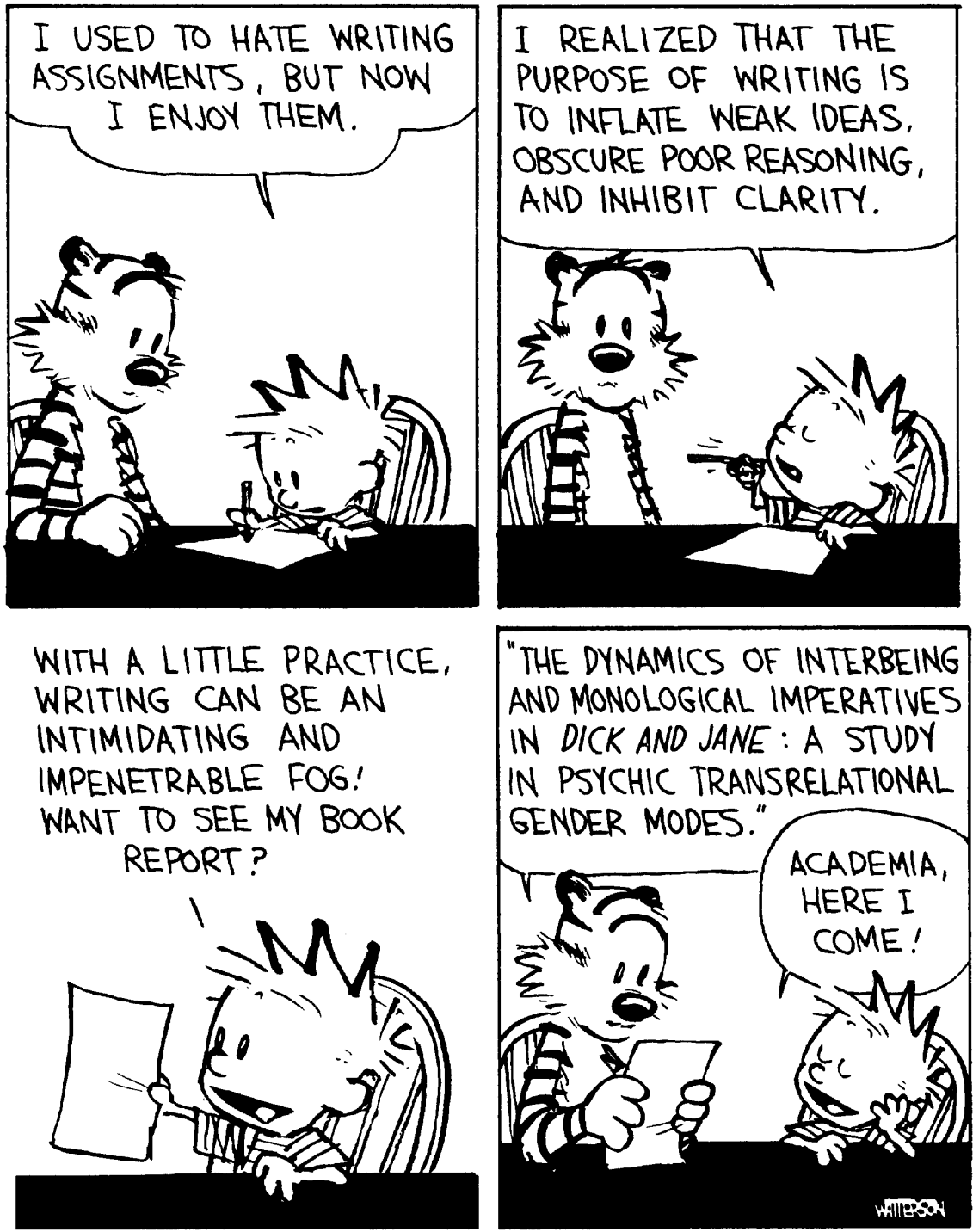
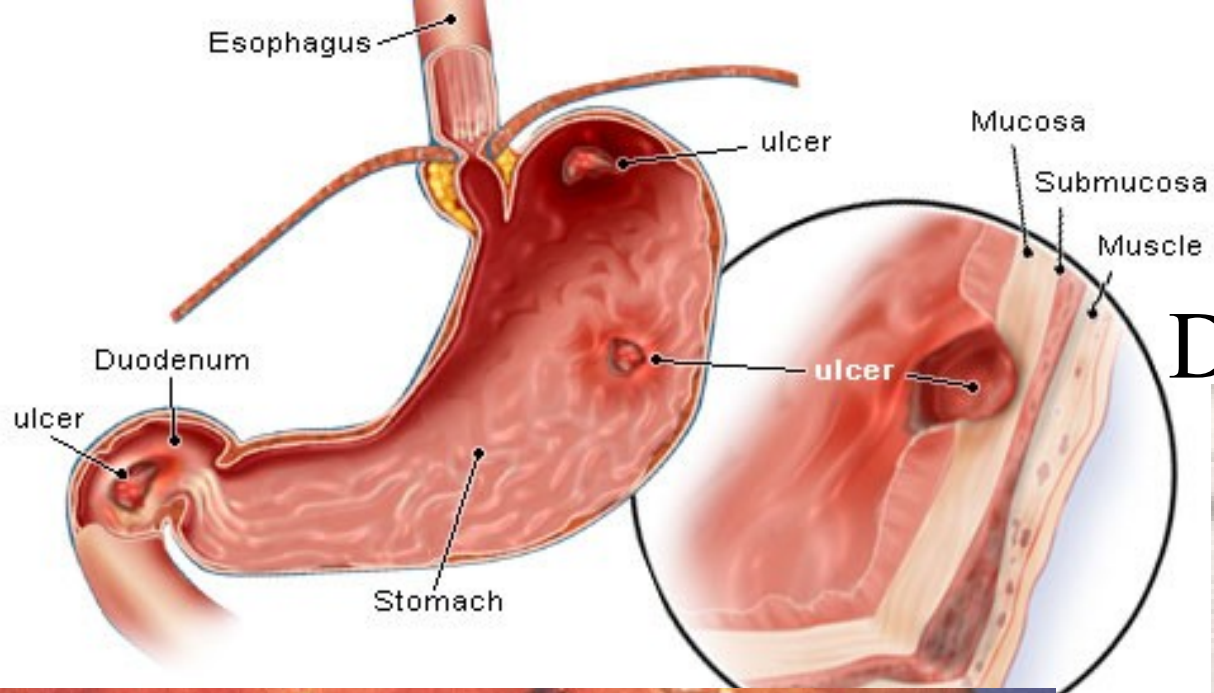
Inquiry 1 proposal due in lab T 7/19

Inquiry 1 information on webpage

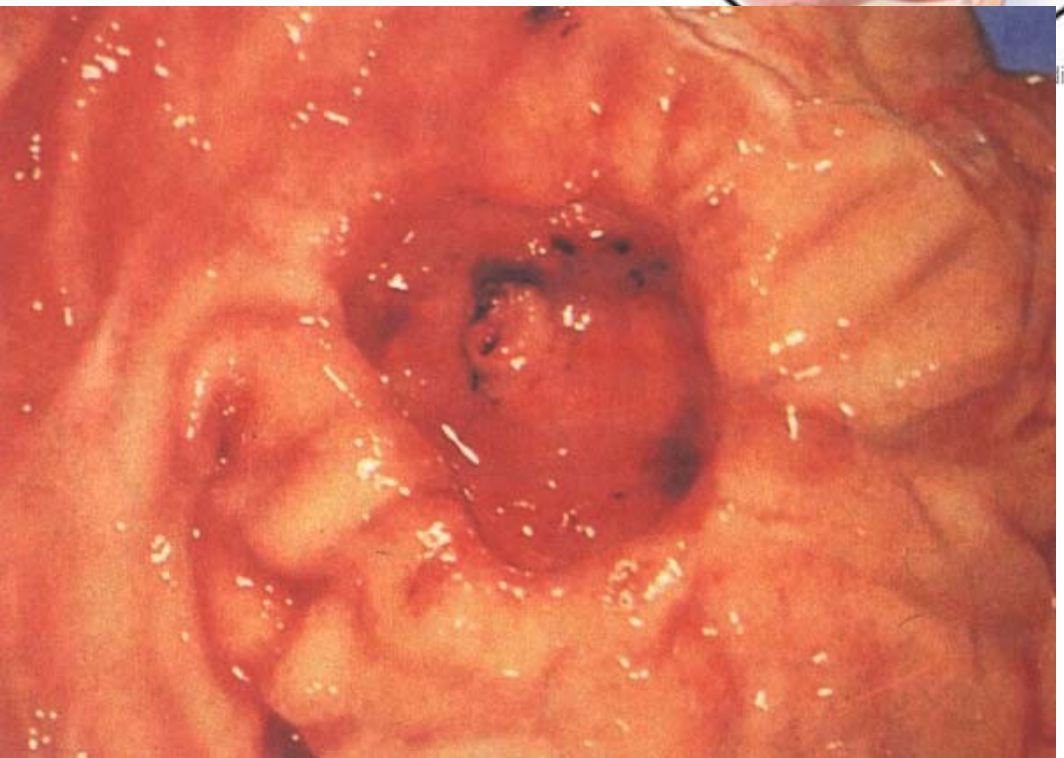
Lab times:
TTh 3-4:^{30}pm OR
MW 1-2:^{30}pm



From: Calvin and Hobbes
by Bill Watterson



Dr. Barry Marshall



Johann Baptista van Helmont did a simple experiment in the early 1600's

Useful creativity, in part, occurs when you can be both uninhibited and selective at the same time.

Useful creativity in part occurs when you can be both uninhibited and selective at the same time.

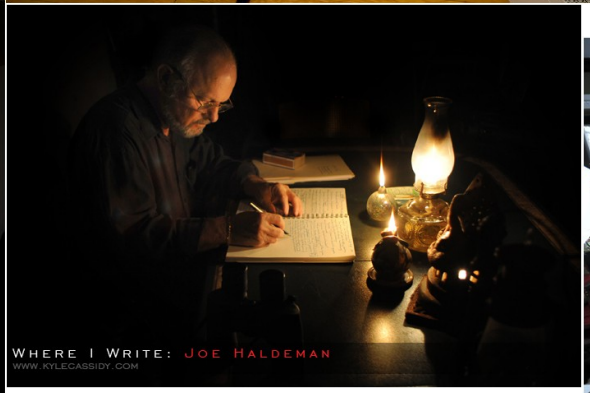
Brainstorming can give ideas, but a list does not get answers.

Useful creativity in part occurs when you can be both uninhibited and selective at the same time.

Brainstorming can give ideas, but a list does not get answers.

After brainstorming you need to be able to determine good from bad ideas.

Where do you do your best thinking ?



www.whereiwrite.org/index.php

What question would you like to answer?

What are your interests?

What do you think is important?

What do others think is important?

What can you see yourself doing?

Once you have a basic idea, it needs refining and a reality check.

Once you have a basic idea, it needs refining and a reality check.

Is your idea realistic?

Once you have a basic idea, it needs refining and a reality check.

Is your idea realistic?

Is your idea doable with the resources and constraints you have?

Wouldn’t it be cool to be able to track thousands of animals’ behavior at once across several continents?

Wouldn’t it be cool to be able to track thousands of animals’ behavior at once across several continents?

All I need are some helicopters, keen sighted minions, and thousands of dollars in fuel, food, and equipment.

Or I could use a supersonic jet to race from place to place and collect data.

Or I could use Google earth…

S Begall, J Cerveny, J Neef, O Vojtech, and H Burda

Magnetic alignment in grazing and resting cattle and deer

PNAS 2008 105:13451-13455; published ahead of print August 25, 2008

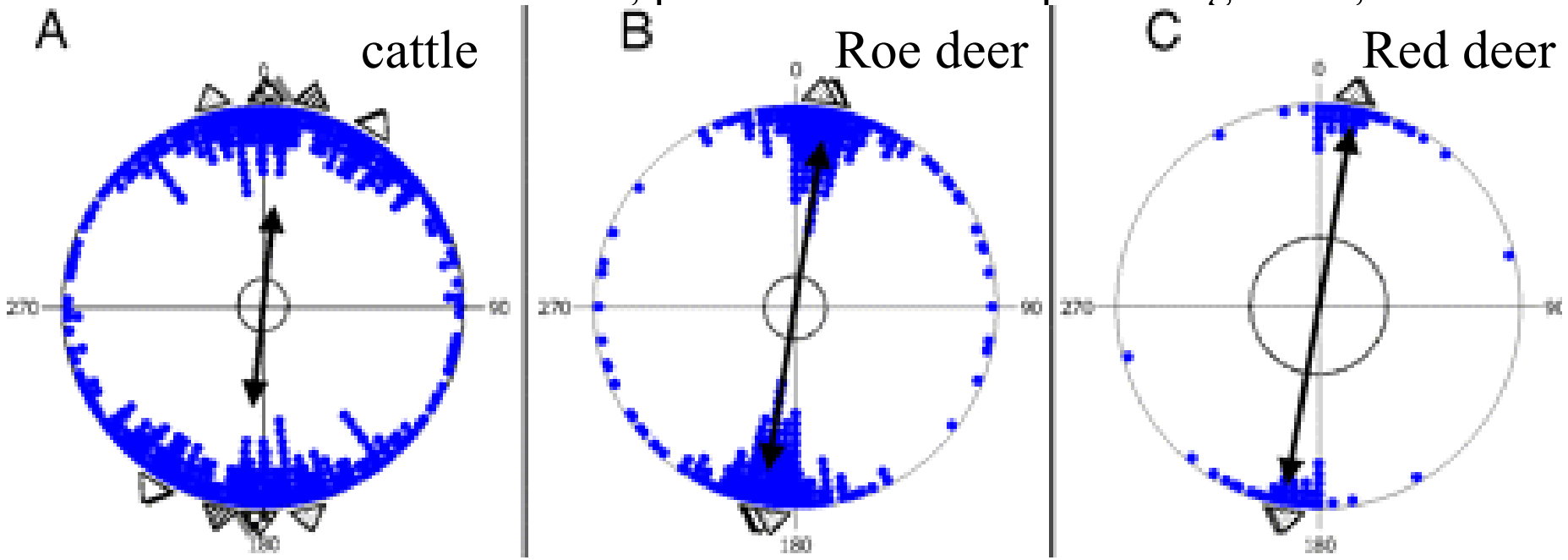


Fig. 1. Axial data revealing the N-S alignment in three ruminant species under study. (A) Cattle. (B) Roe deer. (C) Red deer. Each pair of dots (located on opposite sites within the unit circle) represents the direction of the axial mean vector of the animals' body position at one locality. The mean vector calculated over all localities of the respective species is indicated by the double-headed arrow. The length of the arrow represents the r-value (length of the mean vector), dotted circles indicate the 0.01-level of significance. Triangles positioned outside the unit circle indicate the mean vectors of the cattle data subdivided into the six continents (dotted: North America; gray: Asia; checkered: Europe; striped: Australia; black: Africa; white: South America) (A) and the mean vectors of resting (black) and grazing (white) deer, and of deer beds (dotted) (B: roe deer; C: red deer).

Limits for inquiry 1: (1 week)

Plan on time to collect data,
-then-
time to analyze your data and produce the written and oral report

Limits for inquiry 1: (1 week)

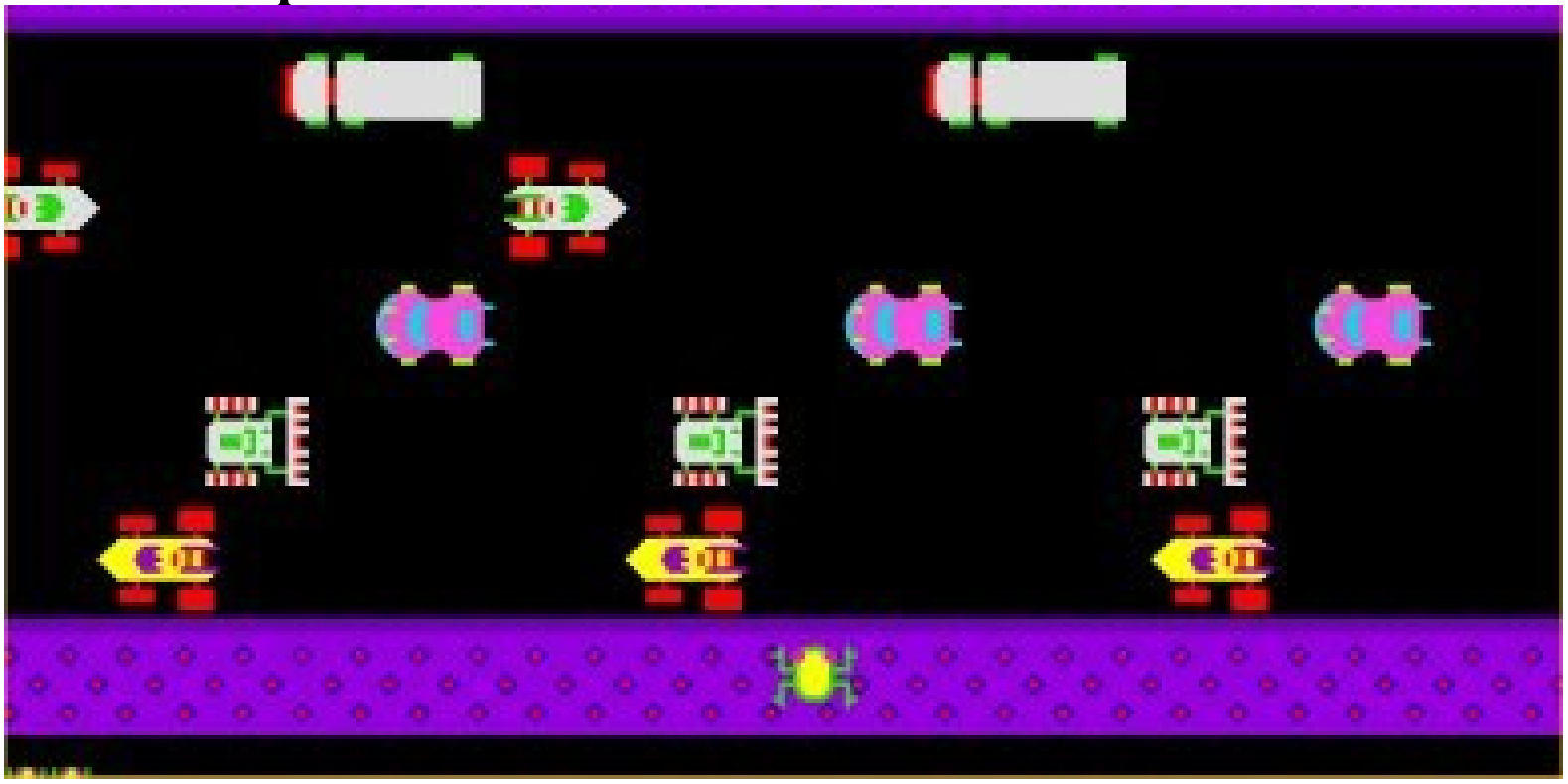
- Observational, no complex data acquisition

- Observational, no complex data acquisition
- You may observe people, but not intrusively. **You may not question strangers**.
- You may observe non-human organisms, but only non-intrusively.
- Data may be collected online, but you must analyze the collected information in some way.

Limits for inquiry 1: (1 week)

- Observational, no complex data acquisition

- Your safety and the safety of your subjects is of utmost importance.



Can your experiment(s) be done safely?

Safe for you?

Safe for others?

Proposal Format:

1. Question

State succinctly and clearly the question you will try to answer.

Proposal Format:

1. Question

State succinctly and clearly the question you will try to answer.

For inquiry 1 your question will be answerable without any specialized equipment. You will use observation to answer your question.

Proposal Format:

2. Hypotheses

Give all of the reasonable hypotheses that you can think of. This may require some research.

Proposal Format:

3. Experiment

a. Describe how you will collect data. What data will you collect? Where, when, and how will you collect the data?

b. Include how your data will allow you to eliminate your hypotheses, and how you will analyze the data.

Proposal Format:

4. References

If you used any references to develop your question, hypotheses, and/or experiment(s), be certain that you cite them. Remember, when doing research, using other's ideas is fine and necessary, but using someone else's idea without citing them is plagiarism.

Proposal Rubric

Originality

Hypotheses, Disproof, and Analysis

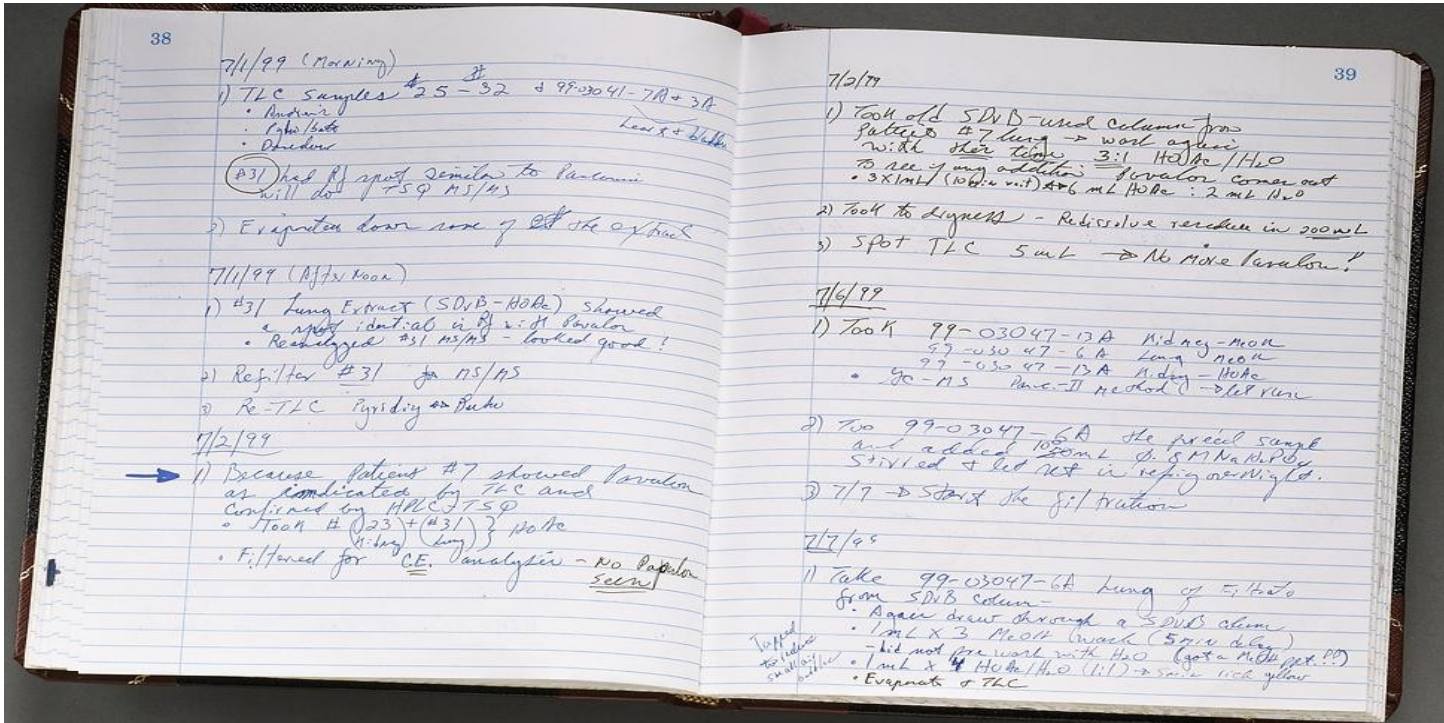
Safety and Appropriateness

What will happen in class on 7/19?
You should print 2 copies of your proposal and bring them to lab for approval.

There are numerous opportunities for help…

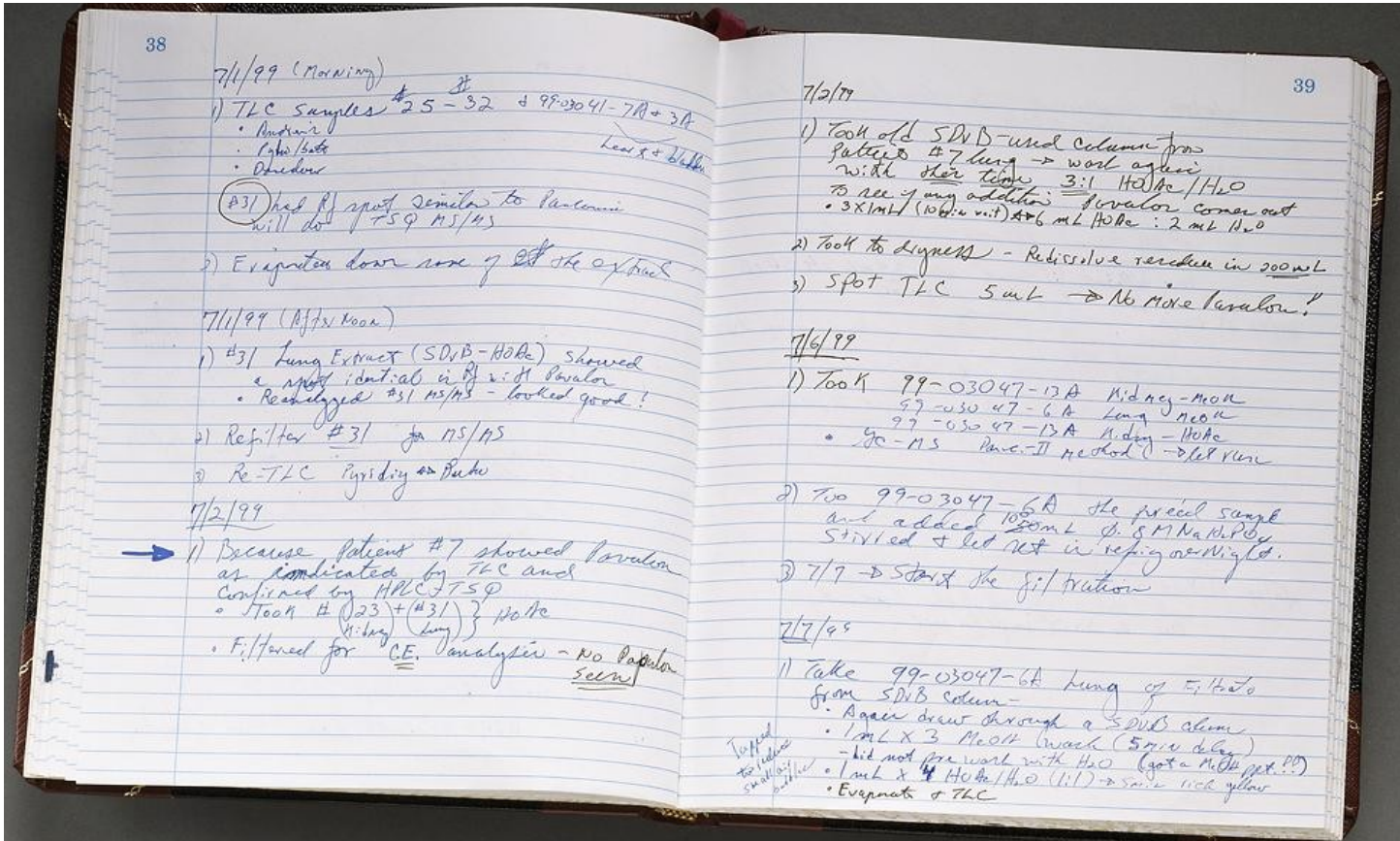
What do you do with your lab notebook?

- Write everything about your experiments.
- Each entry should have a date.
- Include notes (intro and conclusions), so when you go back to look at your notebook, the entries make sense.



What do you do with your lab notebook?

- Use permanent ink.
- Do not erase.
- Your entries should be understandable by others.



The written report for your inquiries will be formatted similarly to a scientific research article.

- Title
- Abstract
- Introduction
- Results
- Discussion
- Materials and Methods
- References

Lab times: TTh 3-4:^{30}pm OR MW 1-2:^{30}pm

Inquiry 1 proposal T 7/19

(Inquiry 1 information on webpage)

From: Calvin and Hobbes by Bill Watterson

The Rules of Strong Inference:

Strong Inference is a method for looking at scientific problems by trying to disprove hypotheses and accepting the hypotheses that can not be disproved. Using Strong Inference entails following these rules (from an article by John Platt, 1964):

1. **Devise multiple hypotheses.**

2. **Design experiment(s) to eliminate one or more of the hypotheses.**

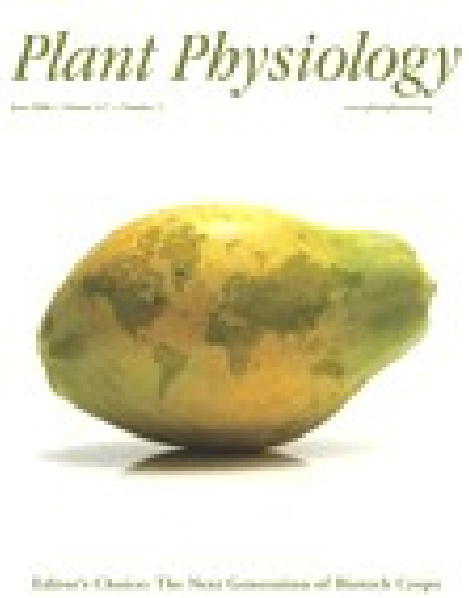
3. **Carry out the experiments to get reliable results.**

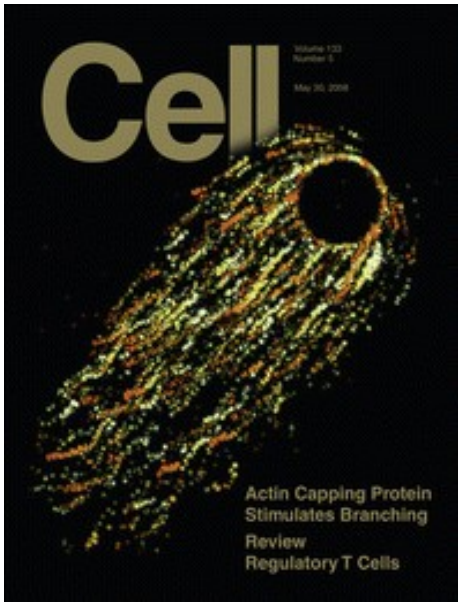
4. **Repeat. Refine hypotheses.**

Please be nice to the termites:

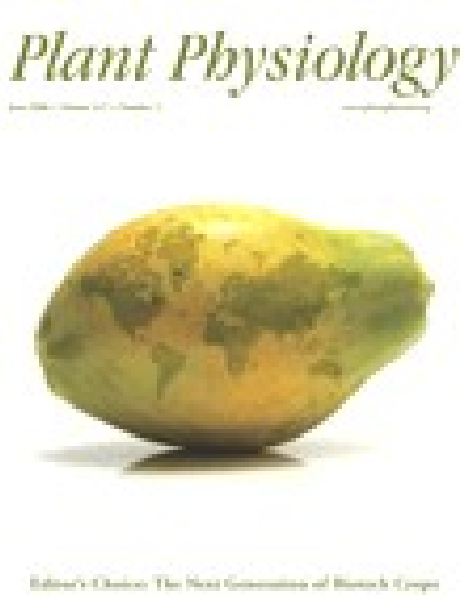
- They will not bite or harm you.
- Use about 8-10 per group.
- Only move them with a brush.
- Keep them in a container with a moist towel between experiments.

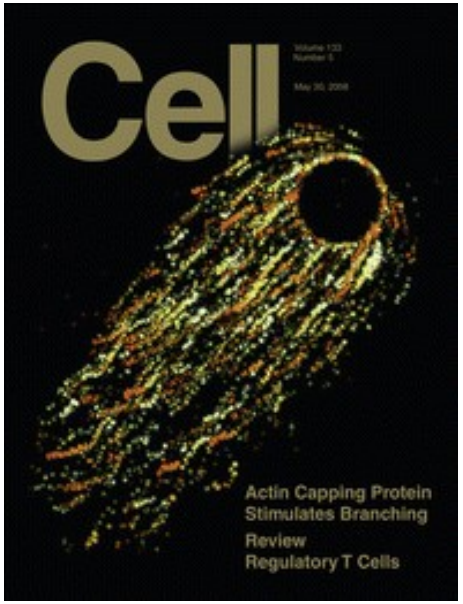
Scientists communicate by publishing their findings in journals…





What is in a research article?





What is in a research article?

AMERICAN JOURNAL OF HUMAN BIOLOGY 18:714–717 (2006)

Short Report

Season of Birth Contributes to Variation in University Examination Outcomes

MARTIN FIEDER,[1,2*] HERMANN PROSSINGER,[2] KAROLINE IBER,[3] KATRIN SCHAEFER,[2] BERNARD WALLNER,[3] AND SUSANNE HUBER[3]
[1]*Rector's Office, University of Vienna, A-1010 Vienna, Austria*
[2]*Department of Anthropology, University of Vienna, A-1090 Vienna, Austria*
[3]*Research Institute of Wildlife Ecology, University of Veterinary Medicine of Vienna, A-1160 Vienna, Austria*

ABSTRACT Epidemiological studies show that birth season influences a wide range of biological parameters such as growth, reproduction, mental illnesses, dyslexia, personality, and success in school. The present study is aimed at examining birth season's relationship to examination marks achieved at a university in a very large contemporary sample of male and female undergraduate students. We find that female university students born in spring and summer achieve better marks than those born in autumn and winter. Male students born in spring receive worse marks than those born in other seasons of the year. Furthermore, we find a birth-week periodicity in examination results of female students, with highest examination results for those born in May. We suppose that biological mechanisms might explain part of the observed effects. Am. J. Hum. Biol. 18:714–717, 2006.

Epidemiological studies show that birth season influences a wide range of biological parameters such as growth (Weber et al., 1998), reproduction (Huber et al., 2004a,b), mental illness (Castrogiovanni et al., 1998), dyslexia (Livingston et al., 1993), personality (Chotai et al., 2001), and success in school and in science (Bell and Massey, 1994), and fluctuating asymmetry in humans (Benderlioglu and Nelson, 2004). For children, the claimed relationship between birth season and school performance has been attributed to the peculiarity of the school system (Williams et al., 1970). In Austria, for instance, children born in summer are at a disadvantage because they are the youngest in their school age cohort, comprising children born in September–August. Season-of-birth effects on examination performance in adults, however, must (if they do indeed exist) have other causes, as age-based season-of-birth influences vanish by age 12 years (Hutchinson and Sharp, 1999). Their putative existence may shed light on very early neuronal and cognitive development.

SUBJECTS AND METHODS

To investigate the influence of birth season on examination marks, we used the (anonymous) examination results from 1995–2001 of undergraduate students at the University of Vienna, together with their dates of birth. We included only examinations of those students who had taken more than five examinations. In this large data base (947,662 examinations of 33,036 female students, and 411,642 examinations of 16,397 male students), we looked for a possible association between examination marks received by male and female students, separately, with their birth dates. The median age of students at time of examination was 22.75 years (quartiles: 25%, 20.92 years; 75%, 25.67 years). The examinations covered a wide range of disciplines taught in various faculties: theology (0.9%), economics (8.8%), social sciences (33.9%), humanities (27.7%), natural sciences and mathematics (20.6%), and others (8.0%).

In the Austrian university system, examination scores are encoded on a five-grade scale from "sehr gut" ("excellent," encoded here as "5") to "nicht genügend" ("failure," encoded here as "1"). Our procedure was as follows. 1) We com-

Martin Fieder and Hermann Prossinger contributed equally to this work.

Grant sponsor: Austrian Program for Advanced Research and Technology, Austrian Academy of Sciences; Grant sponsor: Austrian Science Fund; Grant number: P18089-B03.

*Correspondence to: Dr. Martin Fieder, Rector's Office, University of Vienna, Dr. Karl Lueger Ring 1, A-1010 Vienna, Austria. E-mail: martin.fieder@univie.ac.at

Received 21 March 2006; Accepted 22 March 2006

Published online in Wiley InterScience (www.interscience.wiley.com). DOI 10.1002/ajhb.20539

Basic info: who, what, where, when

AMERICAN JOURNAL OF HUMAN BIOLOGY 18:714–717 (2006)

Short Report

Season of Birth Contributes to Variation in University Examination Outcomes

MARTIN FIEDER,[1,2*] HERMANN PROSSINGER,[2] KAROLINE IBER,[1] KATRIN SCHAEFER,[2] BERNARD WALLNER,[2] AND SUSANNE HUBER[3]
[1]*Rector's Office, University of Vienna, A-1010 Vienna, Austria*
[2]*Department of Anthropology, University of Vienna, A-1090 Vienna, Austria*
[3]*Research Institute of Wildlife Ecology, University of Veterinary Medicine of Vienna, A-1160 Vienna, Austria*

The **abstract** is a summary of the rationale and results.

ABSTRACT Epidemiological studies show that birth season influences a wide range of biological parameters such as growth, reproduction, mental illnesses, dyslexia, personality, and success in school. The present study is aimed at examining birth season's relationship to examination marks achieved at a university in a very large contemporary sample of male and female undergraduate students. We find that female university students born in spring and summer achieve better marks than those born in autumn and winter. Male students born in spring receive worse marks than those born in other seasons of the year. Furthermore, we find a birth-week periodicity in examination results of female students, with highest examination results for those born in May. We suppose that biological mechanisms might explain part of the observed effects.

The **introduction** has background information.

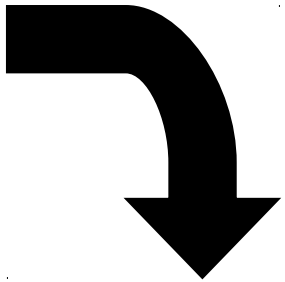
Epidemiological studies show that birth season influences a wide range of biological parameters such as growth (Weber et al., 1998), reproduction (Huber et al., 2004a,b), mental illness (Castrogiovanni et al., 1998), dyslexia (Livingston et al., 1993), personality (Chotai et al., 2001), and success in school and in science (Bell and Massey, 1994), and fluctuating asymmetry in humans (Benderlioglu and Nelson, 2004). For children, the claimed relationship between birth season and school performance has been attributed to the peculiarity of the school system (Williams et al., 1970). In Austria, for instance, children born in summer are at a disadvantage because they are the youngest in their school age cohort, comprising children born in September–August. Season-of-birth effects on examination performance in adults, however, must (if they do indeed exist) have other causes, as age-based season-of-birth influences vanish by age 12 years (Hutchinson and Sharp, 1999). Their putative existence may shed light on very early neuronal and cognitive development.

What is this?

Epidemiological studies show that birth season influences a wide range of biological parameters such as growth (Weber et al., 1998), reproduction (Huber et al., 2004a,b), mental illness (Castrogiovanni et al., 1998) dyslexia (Livingston et al., 1993), personality (Chotai et al., 2001), and success in school and in science (Bell and Massey, 1994), and fluctuating asymmetry in humans (Benderlioglu and Nelson, 2004). For children, the claimed relationship between birth season and school performance has been attributed to the peculiarity of the school system (Williams et al., 1970). In Austria, for instance, children born in summer are at a disadvantage because they are the youngest in their school age cohort, comprising children born in September–August. Season-of-birth effects on examination performance in adults, however, must (if they do indeed exist) have other causes, as age-based season-of-birth influences vanish by age 12 years (Hutchinson and Sharp, 1999). Their putative existence may shed light on very early neuronal and cognitive development.

References are how scientists cite other people's ideas or data.

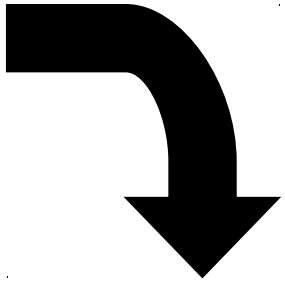
(Castrogiovanni et al., 1998)



Castrogiovanni P, Iapichino S, Pacchierotti C, Pieraccini F. 1998. Season of birth in psychiatry: a review. Neuropsychobiology 37:175–181.

Using other's ideas or data is fine, but not citing where the information came from is plagiarism.

(Castrogiovanni et al., 1998)



Castrogiovanni P, Iapichino S, Pacchierotti C, Pieraccini F. 1998. Season of birth in psychiatry: a review. Neuropsychobiology 37:175–181.

Materials and methods or other synonymous sections detail how the experiments were done.

SUBJECTS AND METHODS

To investigate the influence of birth season on examination marks, we used the (anonymous) examination results from 1995–2001 of undergraduate students at the University of Vienna, together with their dates of birth…….

The **results** section details the outcomes of the experiments.

RESULTS

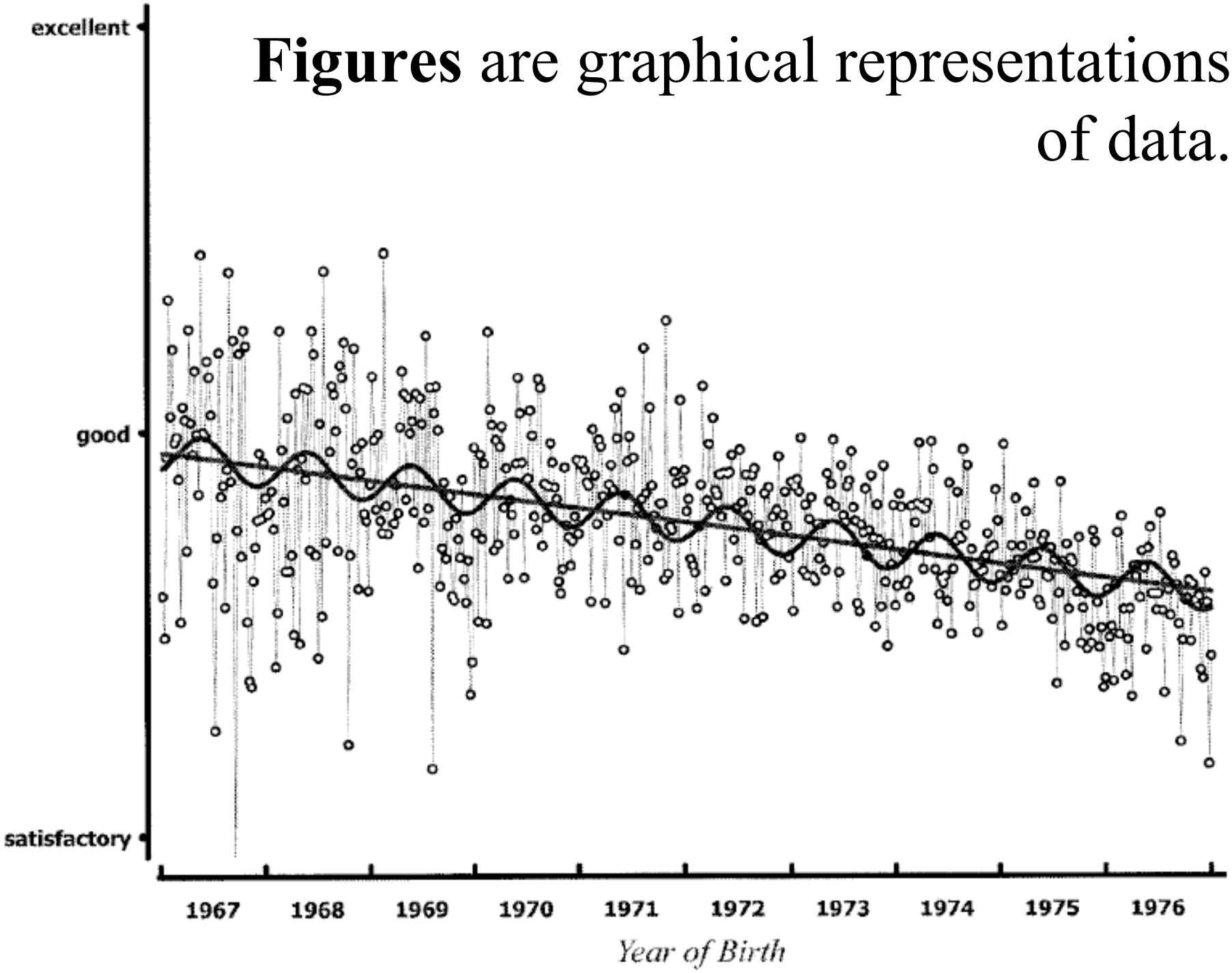
The distribution of scores attained by male and female students is associated with their birth season (see data in Table 1)…….

The **results** section details the outcomes of the experiments, and refers to the tables and figures in the paper.

RESULTS

The distribution of scores attained by male and female students is associated with their birth season (see data in Table 1)……

Figures are graphical representations of data.



Sometimes **tables** are used.

TABLE 1. Data and statistical estimators of examination scores[1]

	Female students				Male students			
	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn
Excellent (%)	33.07	33.14	33.08	32.48	34.58	34.06	34.45	33.87
Good (%)	27.75	27.63	27.56	27.68	25.45	25.13	25.53	25.40
Satisfactory (%)	18.87	18.96	18.95	19.28	18.04	18.11	18.14	18.18
Passing (%)	11.23	11.18	11.29	11.52	11.69	11.92	11.47	11.97
Failure (%)	9.08	9.08	9.11	9.05	10.24	10.77	10.41	10.58
Mean mark	3.6449	3.6457	3.6422	3.6303	3.6245	3.5979	3.6215	3.6001
Standard error	0.0026	0.0026	0.0027	0.0027	0.0042	0.0041	0.0041	0.0043
Median age (years)	22.71	22.47	22.42	22.66	23.81	23.50	23.45	23.60
N (examinations)	238,229.0	250,390.0	234,128.0	224,915.0	102,404.0	107,515.0	106,286.0	95,437.0

[1]Distribution of scores awarded (percentage), mean score, standard error, median age of students, and sample size (*N*) for birth seasons, separately for females and males taking examinations.

The **discussion** is where the results are explained and related to other research. (sometimes it is combined with the results)

DISCUSSION

We find that examination scores are related to season of birth in both female and male students, indicating that there could be some biologically significant underlying ontogenetic or early life-history mechanism……

Where and how do you find a journal article?

AMERICAN JOURNAL OF HUMAN BIOLOGY 18:714–717 (2006)

Short Report

Season of Birth Contributes to Variation in University Examination Outcomes

MARTIN FIEDER,[1,2*] HERMANN PROSSINGER,[2] KAROLINE IBER,[3] KATRIN SCHAEFER,[2] BERNARD WALLNER,[3] AND SUSANNE HUBER[3]
[1]*Rector's Office, University of Vienna, A-1010 Vienna, Austria*
[2]*Department of Anthropology, University of Vienna, A-1090 Vienna, Austria*
[3]*Research Institute of Wildlife Ecology, University of Veterinary Medicine of Vienna, A-1160 Vienna, Austria*

ABSTRACT Epidemiological studies show that birth season influences a wide range of biological parameters such as growth, reproduction, mental illnesses, dyslexia, personality, and success in school. The present study is aimed at examining birth season's relationship to examination marks achieved at a university in a very large contemporary sample of male and female undergraduate students. We find that female university students born in spring and summer achieve better marks than those born in autumn and winter. Male students born in spring receive worse marks than those born in other seasons of the year. Furthermore, we find a birth-week periodicity in examination results of female students, with highest examination results for those born in May. We suppose that biological mechanisms might explain part of the observed effects. Am. J. Hum. Biol. 18:714–717, 2006.

Epidemiological studies show that birth season influences a wide range of biological parameters such as growth (Weber et al., 1998), reproduction (Huber et al., 2004a,b), mental illness (Castrogiovanni et al., 1998), dyslexia (Livingston et al., 1993), personality (Chotai et al., 2001), and success in school and in science (Bell and Massey, 1994), and fluctuating asymmetry in humans (Benderlioglu and Nelson, 2004). For children, the claimed relationship between birth season and school performance has been attributed to the peculiarity of the school system (Williams et al., 1970). In Austria, for instance, children born in summer are at a disadvantage because they are the youngest in their school age cohort, comprising children born in September–August. Season-of-birth effects on examination performance in adults, however, must (if they do indeed exist) have other causes, as age-based season-of-birth influences vanish by age 12 years (Hutchinson and Sharp, 1999). Their putative existence may shed light on very early neuronal and cognitive development.

SUBJECTS AND METHODS

To investigate the influence of birth season on examination marks, we used the (anonymous) examination results from 1995–2001 of undergraduate students at the University of Vienna, together with their dates of birth. We included only examinations of those students who had taken more than five examinations. In this large data base (947,662 examinations of 33,036 female students, and 411,642 examinations of 16,397 male students), we looked for a possible association between examination marks received by male and female students, separately, with their birth dates. The median age of students at time of examination was 22.75 years (quartiles: 25%, 20.92 years; 75%, 25.67 years). The examinations covered a wide range of disciplines taught in various faculties: theology (0.9%), economics (8.8%), social sciences (33.9%), humanities (27.7%), natural sciences and mathematics (20.6%), and others (8.0%).

In the Austrian university system, examination scores are encoded on a five-grade scale from "sehr gut" ("excellent," encoded here as "5") to "nicht genügend" ("failure," encoded here as "1"). Our procedure was as follows. 1) We com-

Martin Fieder and Hermann Prossinger contributed equally to this work.

Grant sponsor: Austrian Program for Advanced Research and Technology, Austrian Academy of Sciences; Grant sponsor: Austrian Science Fund; Grant number: P18089-B03.

*Correspondence to: Dr. Martin Fieder, Rector's Office, University of Vienna, Dr. Karl Lueger Ring 1, A-1010 Vienna, Austria. E-mail: martin.fieder@univie.ac.at

Received 21 March 2006; Accepted 22 March 2006

Published online in Wiley InterScience (www.interscience.wiley.com). DOI 10.1002/ajhb.20539

What, Where, and How to Search

University of Texas Libraries

Based on material from Roxanne Bogucka, librarian in the Life Science library

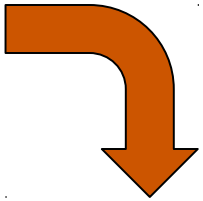
Kinds of Science Literature

Grey Literature

Unpublished research articles, working papers, company reports, etc.

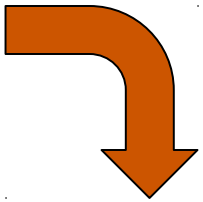
Primary Literature

Journal articles (research), dissertations & theses, datasets, conference papers & posters



Secondary Literature

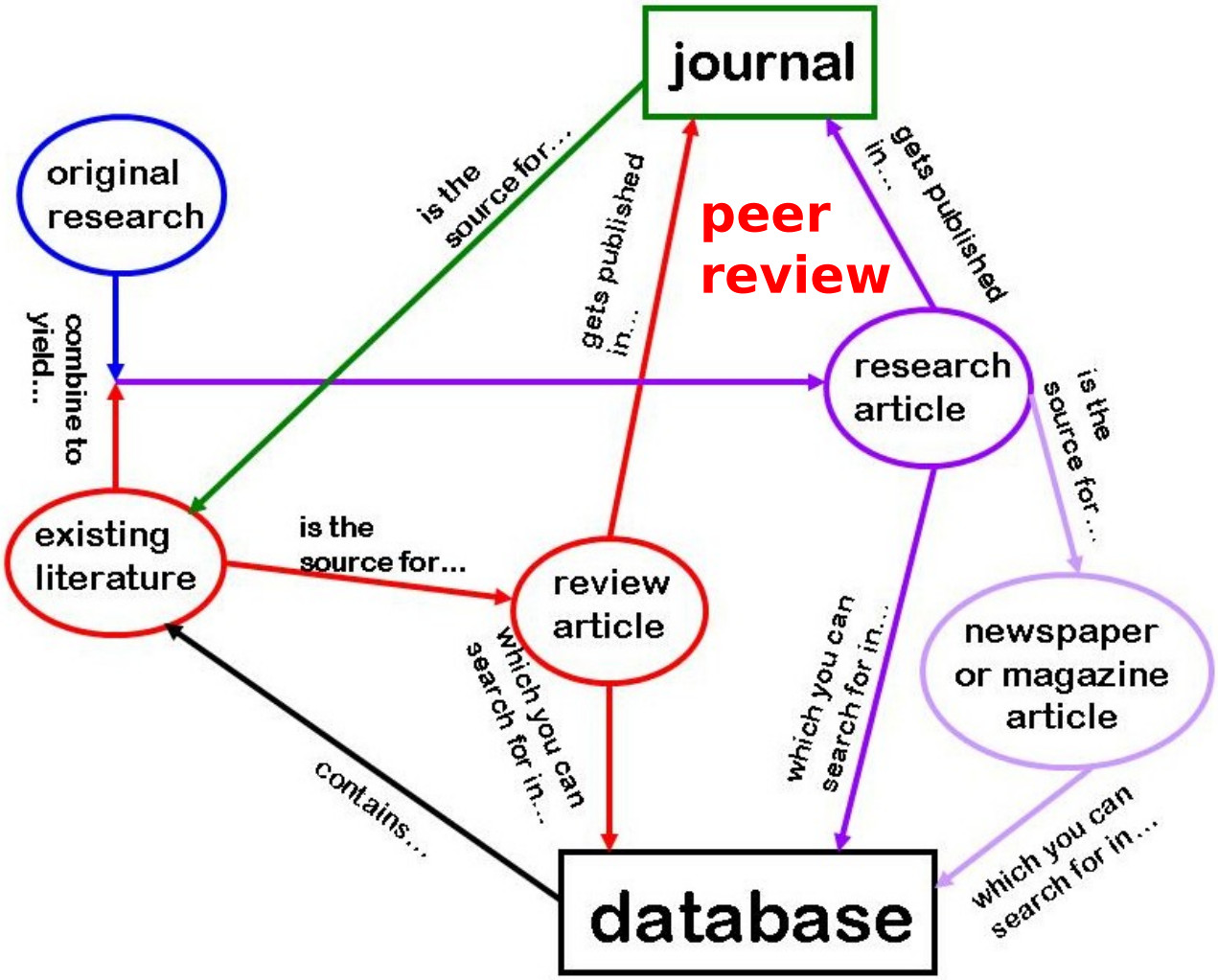
Journal articles (review), term papers, scientific books



Tertiary Literature

Newspaper articles, magazine articles, textbooks, lab manuals, popular science books, popular science web sites, reference books, encyclopedias

Building Blocks of Scientific Literature



Scholarly Articles vs. Popular Articles

Here are two articles on the same topic.

Hites *et al*., 2004. Global assessment of organic contaminants in farmed salmon. *Science* 303: 226-229.

Stokstad, 2004. Salmon survey stokes debate about farmed fish. *Science* 303: 154-155.

Are these articles popular or scholarly? Why do you think so? (http://ur-il.blogspot.com/2008/08/are-these-articles-popular-or-scholarly.html)

Now view the UT Libraries chart on scholarly vs. popular articles. (http://www.lib.utexas.edu/students/find/popularvscholarly.html)

Review Articles vs. Research Articles

Life Science Library's pages on review articles and research articles

Which of these articles is a research article and which is a review?

"Omega-3 fatty acids and the benefits of fish consumption: Is all that glitters gold?"

"Preliminary examination of contaminant loadings in farmed salmon, wild salmon and commercial salmon feed."

Look at the rest of these articles. Are they are review or research?
(http://ur-il.blogspot.com/2008/08/research-articles-vs-review-articles.html)

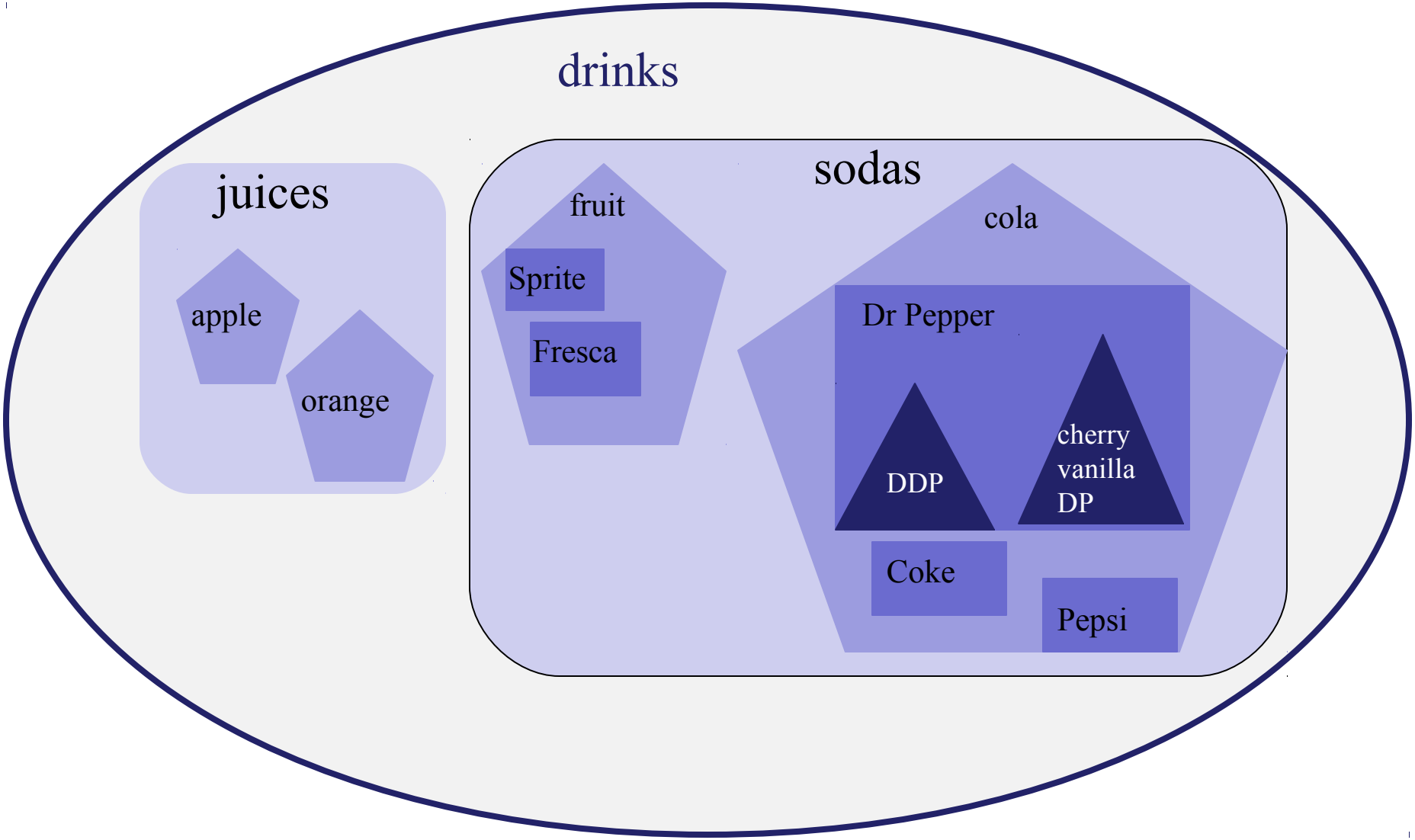
Keywords

Look at these searches in the database Academic Search Complete.

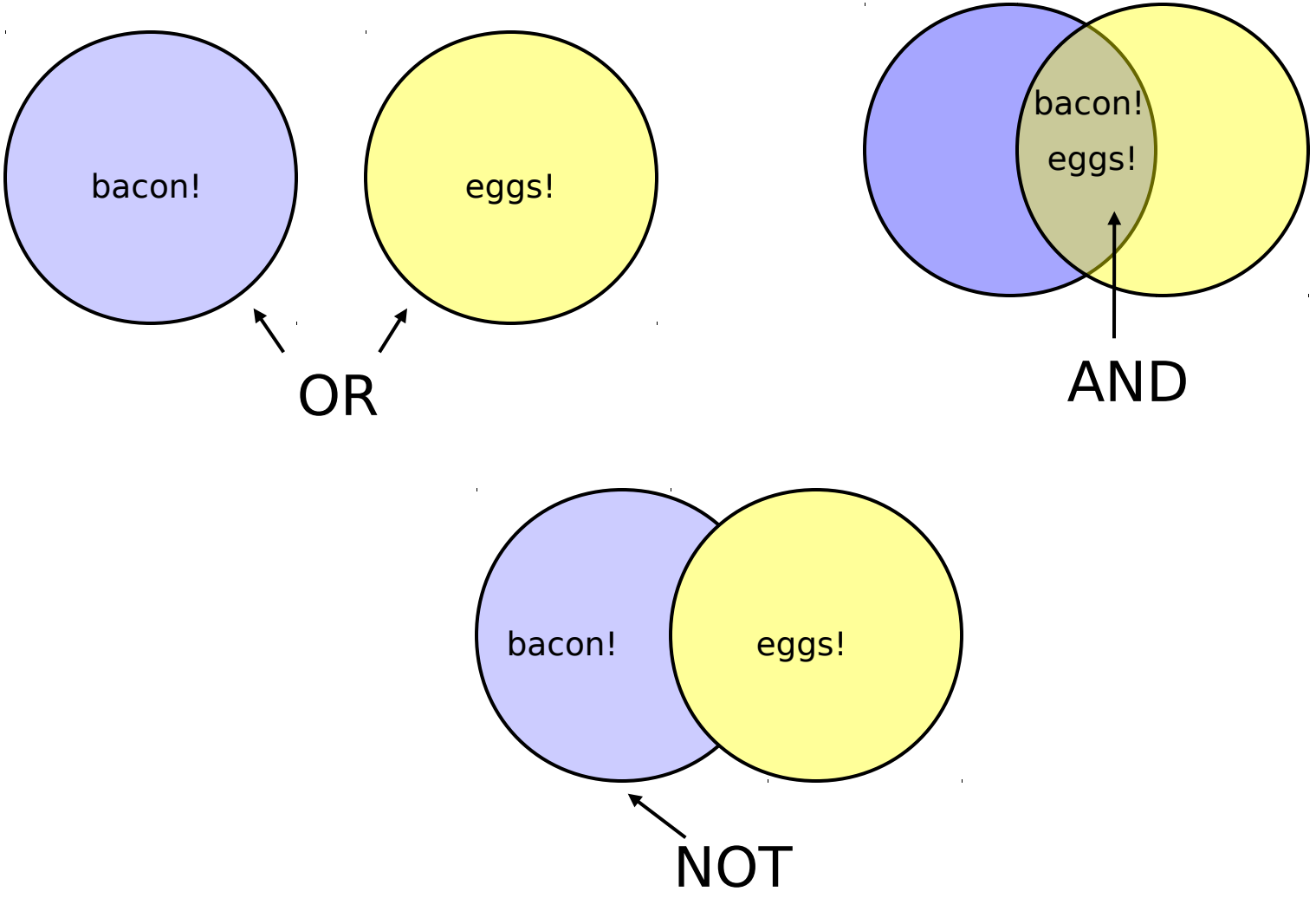
<statistics on obesity in U.S. children>

<obesity AND statistics AND child* AND “united states”>

Broader, Narrower, and Related Terms



Boolean terms (connectors)—AND, OR, NOT



Putting It All Together

Picard, A.L., 2005. Courtship in the zig-zag salamander (*Plethodon dorsalis*): Insights into a transition in pheromone-delivery behavior. *Ethology* 111(9): 799-809.

From the citation above, you could construct a search strategy like this—

courtship OR behavior OR reproduc* AND Plethodon OR amphibian* OR salamander*

Look at these citations. Using **Pubmed.gov**, construct search strategies to find more like them. Use the format shown to record your search strategies.
(http://ur-il.blogspot.com/2008/08/search-strategies.html)

University of Texas Libraries

Where can scientific articles be found?

Databases vs. the Library Catalog

The Library Catalog (http://catalog.lib.utexas.edu/)

1. Title=ecology + Location=Journals
2. Keyword=ecology + Location=Journals
3. Printed Journal Title=ecology
4. ejournal Journal Title=ecology

Databases & Indexes to Articles

Where should you search for these items?

(http://ur-il.blogspot.com/2008/08/catalog-vs-database.html)

In the **library catalog**? Or in a database (like **Pubmed** or **Web of Science**)?

Searching in databases like PubMed (http://www.ncbi.nlm.nih.gov/pubmed/) or Web of Science (http://www.lib.utexas.edu/indexes/titles.html?let=W)

I want to find…

1. articles on dugongs by a researcher named Wirsing
2. articles on whales in the journal *Anatomical Record*
3. articles from 2004 forward, on the genetics of hantaviruses

Lab times: TTh 3-4:^{30}pm OR MW 1-2:^{30}pm

Inquiry 1 proposal T 7/19

(Inquiry 1 information on webpage)

From: Calvin and Hobbes by Bill Watterson