# Benchmarks

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**UNT**

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# Benchmarks - December, 2012

## Campus Computing News

## Happy 50th Birthday, UNT Computing!

By Dr. Elizabeth Hinkle-Turner, Director - Academic Computing Technical Services

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Read more    BOOKMARK

## Winter Break Hours

By Claudia Lynch, *Benchmarks Online* Editor

**T**he fall semester is over, winter is upon us; time to rest, relax, catch up on things that were put aside, and generally take a break from what had become your routine these past few months. The following information should help you plan your activities if you need/want to access campus computing facilities over the break.

Read more    BOOKMARK

## Local vs. Network Storage: A Nightmare or a Happy Ending?

By Burt C. Brinegar, Analyst, Operations & Infrastructure Services, Enterprise Storage and Virtualization (ITSS)

**W**e all know that we can go to Wal-Mart™ and buy a 1 TB Hard drive for about $99. You can install, add or plug in this drive to the PC under the desk and away you go.  You think that this is the best thing you have ever seen. You work on projects and research or even a transcript for a book maybe even two. Fourteen months later you sit down to work on your final exams and there is nothing there. The drive is not listed, but it is plugged in and the power light is on.  You reboot the computer and still nothing.

Read more    BOOKMARK

## By the Numbers

### Down the Corridor of Years

- **1962** - IBM 1620 purchased to support academic users. It had 20K (about 10K bytes). The printer was the operator's console, which was an IBM electric typewriter.
- **1964** – IBM 1440 (4K) purchased for administrative data processing.
- **1966** - IBM 1440 replaced with 1401 (12K).
- **1969** - Total operating budget for NTSU Computing is $163,738 (we became UNT in 1988).
- **1970** – IBM 360/50 CPU purchased to support both academic & administrative computing. Original configuration: 1 multiplexor channel, 1 selector channel, 256K core memory, a 1403 line printer, a 2540 card reader/punch, 3 30KB tape drives, & 5 2314 single density disk drives.
- **1973** – Memory capacity of the IBM 360/50 doubled to 512K bytes. The 7–track tape drive was removed, leaving 3 9–track tape drives.
- **1976** – HP-2000 minicomputer purchased to provide low-cost, BASIC language only, time-sharing terminal support.
- **1978 -** IBM 360/50 capacity doubled again when the leased CPU was replaced with a purchased unit of a full megabyte of core memory. 16 Apple microcomputers were installed in the Computer Science Department.

# Today's Cartoon

**C**lick on the link above for an information age laugh.



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UNT's fifty years of computing are chronicled at it.unt.edu/history - an extensive interactive website created and maintained by Hinkle-Turner. The construction of this website is ongoing with a full re-creation of the 27-foot timeline located at the site as well as links to historical documents and archival photos. Historical video and audio content will be added to the site in January.

Below is a photo album of some of the highlights of the event. More photos will be forthcoming at the website mentioned above and readers are encouraged to visit the website frequently for more history and information about computing at UNT.

## 50th Anniversary Celebration - A Photo Album

*Reserved for a party!*

*Philip Baczewski, Mac Edwards, and Claudia Lynch set up the computing history timeline*

*Lots of food for our guests!*


*Delicious anniversary cakes!*


*We had a great turnout for the event*


*Guests received a commemorative lapel pin*

Guests enjoyed interacting with the timeline


John Hooper shared greetings from our CIO and also his own memories


Richard Harris shares reflections and memories


Coy Hoggard tells a great story!


Everyone enjoys listening to our guest speakers

*Lawana Robinson and Steve Vocelka enjoy the reunion*



*The two Steves: Steve Minnis and Steve Glick exchange greetings*



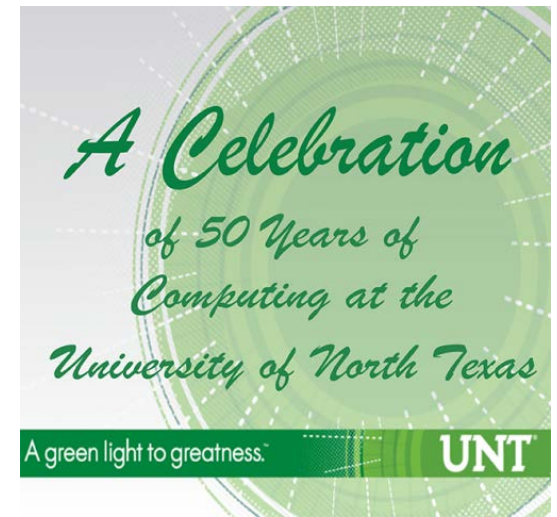*George Morrow, Doug Lilliard, Chris Cofer (in background), and Claudia Lynch enjoy the party*



*Dan Peak, Ray Sanders, and Richard Harris catch up on old times*



*Scott Yockel and Jesse Hamner of ACUS share a laugh*

*The Sharepoint and ImageNow teams smile for the camera*



## A Celebration
### of 50 Years of Computing at the University of North Texas

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*Happy Birthday, UNT Computing!*



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Find the hours for University IT-managed facilities during the Winter break below. The University is officially closed December 24 though January 1, 2013. The University is also closed on January 21, 2013 in honor of MLK Day. The Spring Semester begins on January 14, 2013.

- The **Helpdesk** hours are as follows:

  *Monday, December 24, 10 a.m. – 5 p.m.* **closed to walk-ins** *(email and phone support only)*

  *Tuesday, December 25:* **Closed**

  *Wednesday, December 26 - Sunday, December 30: Normal hours but c**losed to walk-ins** (email and phone support only)*

  *Monday, December 31: 8 a.m. – 6 p.m.* **closed to walk-ins** *(email and phone support only)*

  *Tuesday, January 1, 2013: 10 a.m. – 6 p.m.* **closed to walk-ins** *(email and phone support only)*

  *Wednesday, January 2: Return to normal operational hours and availability.*

  *Monday, January 21 (MLK Day): 8 a.m. – Midnight,* **closed to walk-ins** *(email and phone support only).*

- **Data Management Services** *will be closed when the University is closed (December 24 though January 1, 2013, January 21, 2013).*

- *The* **ACS General Access/Adaptive Lab** *(SYMR 104)* **closed** *at 9 p.m. Saturday, December 15 and will remain* **closed** *until* **Noon** *on Sunday, January 6, 2013, after which normal hours will resume. The lab will also be* **closed** *for MLK Day, Monday, January 21, 2013.*

## Hours for Other Campus Facilities

*General Access Labs*
- *24 Center (formerly known as WILLIS):*

*Monday, December 17 - Friday, December 21:* **Open** *7 a.m. - 7 p.m.*

*Saturday, December 11 - Monday, January 1, 2013:* **Closed**

*Tuesday, January 2 - Friday, January 4:* **Open** *7 a.m. - 7 p.m.*

*Saturday, January 5 & Sunday, January 6:* **Closed**

*Monday, January 7 - Friday, January 11:* **Open** *7 a.m. - 7 p.m.*

*Saturday, January 12:* **Closed**

*Sunday, January 13:* **Open** *at 11 a.m., resume 24-hour schedule.*

- *College of Information General Access Computer Lab (CI-GACLab) (B205):*

*Closed* *as of 6 p.m. Friday, December 14, 2012.*

*Monday, January 14, 2013:* **Open** *normal business hours at 8 a.m.*

*Closed* *for MLK Day, Monday, January 21, 2013.*

- *MUSIC:*

*Closed* *as of 5 p.m. Friday, December 14, 2012.*

*Monday, January 14, 2013:* **Open** *normal business hours*

*Closed* *for MLK Day, Monday, January 21, 2013.*

- *Chilton Computer Labs (College of Public Affairs and Community Service and College of Merchandising, Hospitality & Tourisml):*

*Closed* *as of 5 p.m. Friday, December 14, 2012.*

*Monday, January 14, 2013:* **Open** *normal business hours*

*Closed* *for MLK Day, Monday, January 21, 2013.*

- *CVAD (formerly SOVA):*

*Closed* *as of 5 p.m. Friday, December 14, 2012.*

*Monday, January 14, 2013:* **Open** *normal business hours at 7:30 a.m.*

*Closed* *for MLK Day, Monday, January 21, 2013.*

- *COE:*

*Closed* *as of 5 p.m. Friday, December 14, 2012.*

*Monday, January 14, 2013:* **Open** *normal business hours at 7 a.m.*

*Closed* *for MLK Day, Monday, January 21, 2013.*

*COB*: COB Labs (BLB 185 and 190):

*Closed* as of 4 p.m. Friday, December 14, 2012.

*Monday, January 14, 2013:* **Open** *normal business hours*

*Closed for MLK Day, Monday, January 21, 2013.*

- **CAS**

  **GAB 330:**

  *Closed as of 5 p.m. Friday, December 14, 2012.*

  *Monday, January 14, 2013:* **Open** *normal business hours*

  *Closed for MLK Day, Monday, January 21, 2013.*

  **GAB 550:**

  *Closed as of 5 p.m. Friday, December 14, 2012.*

  *Monday, January 14, 2013:* **Open** *normal business hours*

  *Closed for MLK Day, Monday, January 21, 2013.*

  **Terrill 220:**

  *Closed as of 5 p.m. Friday, December 14, 2012.*

  *Monday, January 14, 2013:* **Open** *normal business hours*

  *Closed for MLK Day, Monday, January 21, 2013.*

  **Wooten 120:**

  *Closed as of 5 p.m. Friday, December 14, 2012.*

  *Monday, January 14, 2013:* **Open** *normal business hours*

  *Closed for MLK Day, Monday, January 21, 2013.*

- **Engineering** **General Access Lab** *(CENGAL,* englab@unt.edu*, Discovery Park, B129, 891-6733):*

  *Closed as of Noon Friday, December 14, 2012.*

*Monday, January 14, 2013:* **Open** *normal business hours*

*Closed for MLK Day, Monday, January 21, 2013.*

*The* **UNT Shuttle Schedul***e over the break is:*

*Click here:* http://www.unt.edu/transit/routes_sched.html

*and here:* http://www.unt.edu/transit/pdf/2012-2013_calendar.pdf

*for more information about the Shuttle routes and schedules.*

*Remember:*

**UNT Shuttle Holiday Service Schedule:**

**December 17th through 21st:** Limited Service (Discovery Park only)

**December 22nd through January 1st:** No Service

**January 2nd through 4th:** Limited Service (Discovery Park only)

**January 7th through 8th:** Limited Service (Discovery Park only)

**January 9th thorugh 13th:** Limited Service (Discovery Park, Eagle Point, Campus Cruiser)

**January 14th: Regular Service resumes**

*Get your alerts fast in case of inclement weather*

*Visit the Emergency Management website*

*City of Denton Residents, sign up for the CodeRED Emergency Notification System*

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**By Burt C. Brinegar, Analyst, Operations & Infrastructure Services, Enterprise Storage and Virtualization (ITSS)**

We all know that we can go to Wal-Mart™ and buy a 1 TB Hard drive for about $99. You can install, add or plug in this drive to the PC under the desk and away you go.  You think that this is the best thing you have ever seen. You work on projects and research or even a transcript for a book maybe even two. Fourteen months later you sit down to work on your final exams and there is nothing there. The drive is not listed, but it is plugged in and the power light is on.  You reboot the computer and still nothing. Now concerned you call for help and the first thing out of the technicians' mouth is did you back up your work?  After thinking about it, yes a year ago when I updated to Windows7™. At that instant you realize that the grant report and the research that you and your team have worked on for the last year and spent the last two weeks preparing is not there. At this moment the nightmare is true. The report to the DOD is due in two days and a $1,500,000 grant is on the line. What can you do? The better question is what you should have done 14 months ago.

## Go back in time?

If you could go back in time and make a different choice what should I have done? The first thing is bigger is not always better.  Next is what would it cost in manpower and other resources to reconstruct the data that you need to store.  Then how much data do you need to store over the life of the project.  The key question is can you afford to count on a single device that is out of date the moment you take it out of the package. That is worth less than .0001% of the worth of the project.  What would you say to that statement?

## We can help!

By discussing your research with the Talon HPC Team or your college IT support group and by moving your server applications to the VM Service provided by ITSS and requesting backup support you would get the space you need and your applications would perform faster in a more secure environment.  The hardware is monitored 24x7x365 and a scheduled backup could be requested.  Plus this is the good part, it could cost significantly less than .0065% of the project depending on the space you need.   If you think that this is a better choice you should talk to the above groups to see what they can do to support your needs. If you had, your nightmare would be non-existent.  Instead the DOD names your team as the grant recipients, and it is a "Happy Year."

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## Network Connection

By Dr. Philip Baczewski, Senior Director of Academic Computing and User Services and Deputy Chief Information Officer for University Information Technology

# Making the Connection

**U**NT recently celebrated 50 years of Academic and central computing services. For 25 of those years, I've had the opportunity to work in Academic Computing Services providing help to professors and students pursuing research and instruction using IT resources. After joining ACS in January of 1987, I was assigned the role of BITNET ("Because It's Time NETwork") Educational Representative. BITNET was an early academic store and forward network that for a brief time was the most widely adopted wide area network in higher education. As the Educational Representative, it was my job to be a support resource for those wanting to use the network to communicate with their peers and to be an advocate for this brand new networking technology.

As part of the educational outreach for BITNET and the newly burgeoning ARPA Internet, this column was created as a regular feature of *Benchmarks* starting in March of 1989 under the heading, *The BITNET Connection.* In the introductory column (actually, the second occurrence) I wrote, "BITNET services can easily open international lines of communication which might otherwise be unavailable. The aspiration is that future columns can give you just a peek into the opportunities for communication on BITNET. One disclaimer, however. I don't think that pizza is available via BITNET (at least, not yet…)." I was right. It would be 1994 before Pizza Hut initiated online ordering via the Internet, and it now seems obvious that you should be able to order anything via the Internet. International electronic communication is taken for granted today, but in the late 1980's, wide area networks were beginning to revolutionize scholarly communication which, to that date, had relied on world wide postal services.

In documenting UNT's 50 years of computing, I was able to look back at many of these columns published over the years here in *Benchmarks Online* and its predecessor on-paper version. I thought I'd present some highlights here as a way to review the past 25 years of Internet history. This column has conveyed a lot of information as well as Internet-related commentary over the years. It's not possible for a comprehensive review here, but I've selected a few milestones that help to characterize the Internet as it existed at those times.

## 1989

The column from May/June 1989 was titled *Getting on the LISTs.* Long before the Web, Facebook, and Twitter, e-mail mailing lists were the forums that allowed people to exchange information or coalesce around a common topic of interest, whether it was professional or social. This early column was an introduction to finding and subscribing to mailing lists run via LISTSERV, the most popular mailing list program running on BITNET-connected mainframe computers. LISTSERV survived a transition from BITNET to the Internet and remains a viable and popular program today for managing Internet mailing lists.

In those days, postal mail was the conveyor of what we now see as SPAM in e-mail. The U.S. Postal service was very willing to provide businesses a bulk mail rate that ensured that many paper-based ads and offers would be delivered to your postal mailbox. E-mail was a much more exclusive communication medium that had yet to be infiltrated by those seeking to take some of your money via legitimate or illegitimate means. The concept of SPAM was just becoming a phenomenon as unwelcome or non-topical posts to mailing lists, but generally, e-mail allowed communities of interest to develop and flourish around these special-topic mailing lists. As I said in 1989, "Electronic mailing lists make frequent and speedy communication possible in a way which would not be available through surface [postal] mail." Today's tweets and IM's cast e-mail in an antiquated light, but mailing lists still maintain a large degree of utility. LISTSERV mailing lists will probably be around as long as there is electronic mail.

## 1994

By 1994, we were seeing the final days of the BITNET network. Back in September of 1991, this column was renamed

*The Network Connection* in acknowledgement of the growing role of the Internet within higher education. I wrote about *The Death of BITNET* in the November/December 1993 issue of Benchmarks when "Rice University announced that as of April 1994, they will no longer serve as a core node on the BITNET II network" Rice was then the sole transfer point for all BITNET traffic to and from Texas. They decided that they could no longer sustain the amount of networking traffic that was passing through their mainframe system. By July of 1994, *Benchmarks* was announcing that it was likely that UNT would drop their BITNET connection as of August of that year and we were encouraging adoption of Internet-style e-mail addresses on the host computer systems that were connected to BITNET.

However, in the January/February 1994 issue of *Benchmarks*, this column talked about *A Brave New Internet*. As I said back then, "You may have caught news reports of Vice President Al Gore's proposal to restructure the communications industry in the U.S. The administration's proposal seeks to reduce regulation on the telephone and cable industries and encourage the development of a new level of electronic information access for U.S. households. If implemented and successful, the new policies will have a definite effect on who and how many will have access to the Internet." (You see, in a way Al Gore DID invent the Internet as we know it today.)

That column went on to state, "Changes to the Internet as we now know it may happen even sooner. Currently, much of the Internet traffic is carried on the National Science Foundation-subsidized NSFnet. This network was developed primarily to support communication to the NSF-funded supercomputer sites, however, another result has been the development of a national networking infrastructure that includes local sites, regional networks, and national communications providers. The most recent legislation implementing the concept of a National Research and Education Network (NREN) is encouraging the privatization of a number of services which to date have been subsidized."

What actually happened was that the NSFNet, which had been acting as the core for the national Internet at that time, was gradually replaced in functionality by private network carriers such as Sprint and the predecessors of Verizon and the current AT&T. The NSFNet returned to its original mission of providing access to the supercomputer centers and as a result, the commercial Internet was able to be "born." The November/December 1994 *Network Connection* talked about accessing commercial Internet providers that could serve as an alternative to what had previously been the exclusive domain of academic and research institutions.

## 1999

By 1999, the Internet has already been a commercial entity for at least 6 years. Benchmarks Online and this column had started appearing as a web site in April of 1998. We were about to see the bursting of the Internet bubble. The bubble was that short time period when it seemed that any idea could turn into an Internet business and just having the idea could turn you a millionaire. The Internet itself was 30 years old in 1999 and had developed as a community of research institutions fostering a free market of technology ideas. Commercialization was seen in some circles as the beginning of stagnation in the development of Internet technology. But the research and higher education community had an answer. It was named Internet2.

In February of 1999, this column introduced Internet2 to readers as the sequel to the Internet as we'd previously known it. I wrote, "The Internet2 project is a cooperative effort by a number of U.S. universities and research centers which hopes to promote the development of new networking and application technologies in support of the needs of the academic community." Internet 2 has delivered on some of its promises, but was never the same kind of incubator of tech progress as the original Internet had been for its first 30 years. Internet2 remains an active resource for universities and their research partners and has made a number of partnerships to benefit its higher education members.

## 2004

Fast forward to 2004 and we're talking about iPods and iTunes. In a column entitled *Online Music Revisited*, we reviewed the previous years of strife over the sharing of music on the Internet, in light of Apple's then relatively recent entry into the business of selling music and portable devices on which to play that music. The idea of buying music on the Internet was very new. In the preceding years, the technology to digitize and upload musical selections had become so readily accessible that online collections of popular music began to appear on the Internet. The entertainment industry had previously dealt with copyright violations in the form of counterfeit media. Now people who had legally purchased that media were copying it and sharing it on the Interent with others who may or may not have been able to claim "ownership" of that media.

By 2004, Napster had a 15 year history as the sacrificial lamb of online music services. Apple's move into the music business, was not without its own controversy. In 1978 they'd run afoul of Apple Corps, the company that produced albums for The Beatles. As music-related technology, like MIDI, became available on Apple computers, this disagreement heated up and after the final straw of iTunes, an agreement was reached in 2007 which assigned ownership of the apple-related trademarks involved to Apple inc., the company formerly known as Apple Computer (with a large sum of money going to the former Apple Corps.) Apple records, the iconic company that inspired Steve Jobs' name for his computer company, has been subsumed by the now iconic Apple inc., just as physical entertainment media is being steadily displaced by the electronic delivery of content.

In spite of the fact that online music sales are greater than ever (and much more prevalent than unauthorized

sharing), the fight over online media [continues](#). In Europe, political [Pirate Parties](#) have been formed in opposition to the labeling of those accused of copyright infringement as "pirates" and they seem to be the newest targets of the media trade organizations. Among the causes of the pirate parties is reform of the copyright and patent laws that have extended the duration of copyright protection and generally increased the restrictions on the fair use of materials. I'm guessing we'll have to revisit this issue multiple times before we see any resolution.

## 2009

In 2009, [Facebook](#) began to attract the attention of millions and [Twitter](#) was not far behind. We'd featured [social networking](#), including Facebook, in February of 2006. But back then, Facebook was a college and university phenomenon just opening up to the general public. Most concerns about it were in regard to the kinds of information posted by students and the ongoing privacy concerns that would be associated with creating such a public "permanent record." The rest of the world seemed to discover Facebook in 2009, and in the subsequent 3 years, it's become as commonplace as the e-mail services that preceded it many years before. In fact, the average high school and college-aged teen communicates via Facebook and cellular SMS (text) messages much more frequently than they use e-mail.

Facebook's [initial public (stock) offering](#) (IPO) occurred on May 18, 2012, and opened at $38 per share in spite of a rather weak revenue generating model that relied mostly on advertising. But, since the number of Facebook members rivals the population of a large country, investors must have confidence (currently at around $26 per share) that it's too big to not not fail at making some kind of hefty money down the road. However, [privacy concerns](#) still are an issue surrounding Facebook. In a way, it's ironic that people so blithely give up details of their lives to Facebook and then are concerned about personal privacy. However, part of the blame falls on Facebook, which has had a record of changing their privacy settings and making their members responsible for "catching up" if they want to preserve their previous limited visibility. But, what do you expect from a company whose founder has [argued](#) that privacy was no longer a "social norm."

In 2009, the Internet marked its [40th anniversary](#). As I observed, as of that year "a lot of other things are 40 too, including UNIX, CCD (digital camera) technology, men landing on the moon, the Boeing 747, The Brady Bunch, Walmart, and Heavy Metal." In 20 years, the Internet had developed from a wide spread research project into a ubiquitous utility that for some would make life unimaginable if it didn't exist.

## New Times

Times really do change, and we've got the written record to prove it, at least as far as the Internet is concerned. In 2012, we've discussed, among other things, [congressional efforts to combat "piracy"](#), Google's [terms of use](#), [new efforts to manage Internet domain names](#), the [bring your own device (BYOD)](#) movement, [cloud storage services](#), [phone wars](#), and [online texts](#). There's still a lot to talk about, so until further notice we'll keep discussing it here on a monthly basis.

**Site last updated on April 22, 2016**

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# Link of the Month

## History of Computing at UNT

**T**he website says it all:

> This historical site has been created in connection with the fiftieth anniversary celebration (2012) of computing at the University of North Texas.  This 'living document' will be regularly updated with textual and multimedia content.

Visit the website and see what is available today:   *https://it.unt.edu/history*

BOOKMARK

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# Helpdesk FYI

By Jonathan "Mac" Edwards, CITC Helpdesk Manager

### UNT wireless network connection settings for Mac

The UNT network offers two main benefits over Eaglenet.  First, the UNT network has increased security providing encryption. Second, it avoids going through a log-in portal to access the wireless network.

When trying to connect to the Wi-Fi on campus first locate the wifi icon, shown in the screenshot below, located in the top right hand corner of your screen. Click on the wifi icon and a drop down window should appear.  Select "UNT" from the dropdown menu.



- Once connected a popup window will appear and with a log-in prompt:
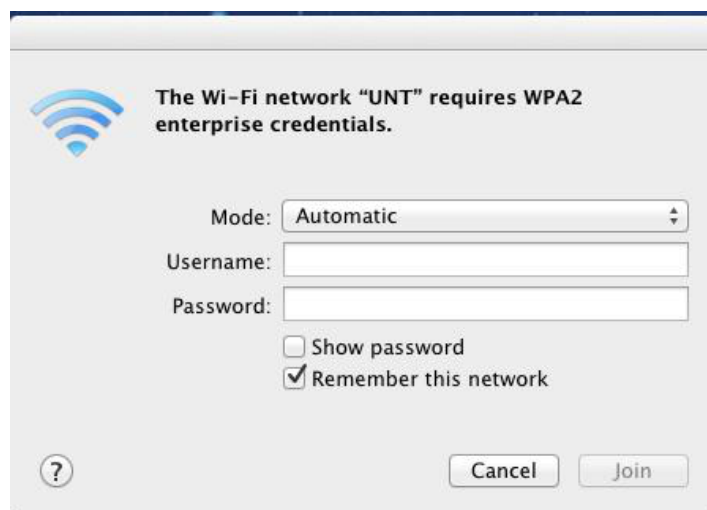


- Leave **Mode**: set to Automatic.  Type in your EUID in the Username field and your UNT password in the

password field.

- Click Join.  You should now have access to UNT Wi-Fi.

These instructions can also be found in our Knowledgebase  at: http://remedy4.ars.unt.edu:8080/rkm/viewdoc.jsp?doc=410&sid=22383&type=Published&terms=quick_searchTerms&user=Self%20Help

Windows 7 instructions for connecting to the UNT Wireless network can be found at: http://remedy4.ars.unt.edu:8080/rkm/viewdoc.jsp?doc=395&sid=22387&type=Published&terms=quick_searchTerms&user=Self%20Help

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## Columns, December 2012

## RSS Matters

### Research and Statistical Support
### University of North Texas

# Un-modeled confounders: Don't get burned by Simpson's Paradox.

*Link to the last RSS article here: lavaan:* *Creating a Great Conference Poster Presentation with our Data Visualization Resources*. *-- Ed.*

By Dr. Jon Starkweather, Research and Statistical Support Consultant

**A** long time ago, in a faraway place…, the term data mining carried with it a negative connotation. However, thanks in part to Google and other pioneers of huge data analysis, data mining has become much more acceptable. The purpose of this article is to demonstrate the necessity of applying data mining principles to the initial data analysis phase of any study utilizing quantitative data. In short, it is the responsibility of the primary investigator to thoroughly explore the collected data in order to determine if the data supports the planned statistical procedures for addressing research questions or formal hypotheses; as a former colleague often said: *know thy data.* One concern common to most empirical quantitative studies is *conditional independence*. Conditional independence refers to a situation among three (or more) random variables when the relationship between two of them is independent of values of the third. Essentially, all other influences have been controlled and only the effect of interest (the relationship between two variables) is displayed in the results. In other words, ensuring that the experimental effect is isolated from any confounds, often done with probability estimates (e.g., propensity scores, matching, etc.), or the design of the study (experimental control). This article demonstrates a simple example in which the primary effect of interest is not conditionally independent of confounds. The example(s) at the bottom detail Simpson's paradox, wherein a correlation between two variables (*X* & *Y*) is strikingly misleading unless one also recognizes the underlying groups (*Z*) of cases. First, however, the article makes clear the definition of conditional probability and independence.

## Conditional  Probability  &  Independence

In traditional symbolic probability terms, we say *X* is independent of *Z* if:

$$p(X) = p(X|Z)$$

which can be interpreted as: the probability of *X* is equal to the probability of *X* given *Z*. This statement should make clear that *X* is unrelated to *Z* (i.e. *X* is independent of *Z*). Likewise, we could say *Y* is independent of *Z* if:

$$p(Y) = p(Y|Z)$$

which can be interpreted as: the probability of *Y* is equal to the probability of *Y* given *Z*. Now, conditional independence refers to the conditional probability of *X* given *Z* being unrelated to the conditional probability of *Y* given *Z*. Stated another way, *X* and *Y* are conditionally independent given *Z*, if:

$$p(X \cap Y|Z) = p(X|Z)p(Y|Z)$$

In other words, *X* and *Y* are conditionally independent given *Z* if they are independent in their conditional probability distributions given *Z*. Knowing the values of *Z* does not inform *X* or *Y*.

# The   Example(s)

The following examples utilize the **R** statistical programming environment. Those unfamiliar with **R** can learn more at the Research and Statistical Support Introduction to R Short Course. The examples also utilize the function 'scatterplot' from the package 'car' (which requires loading it and its dependencies [package 'MASS' & package 'nnet']). An example of the script used to create the images below can be found here.

The first example illustrates conditional independence:



As can be seen above, the correlation between *X* and *Y* is positive (*r* = 0.63). We see (below) a fairly standard scatterplot generated with *X* and *Y*, without respect to the grouping variable *Z*. The green line represents the ordinary least squares (OLS) regression line.
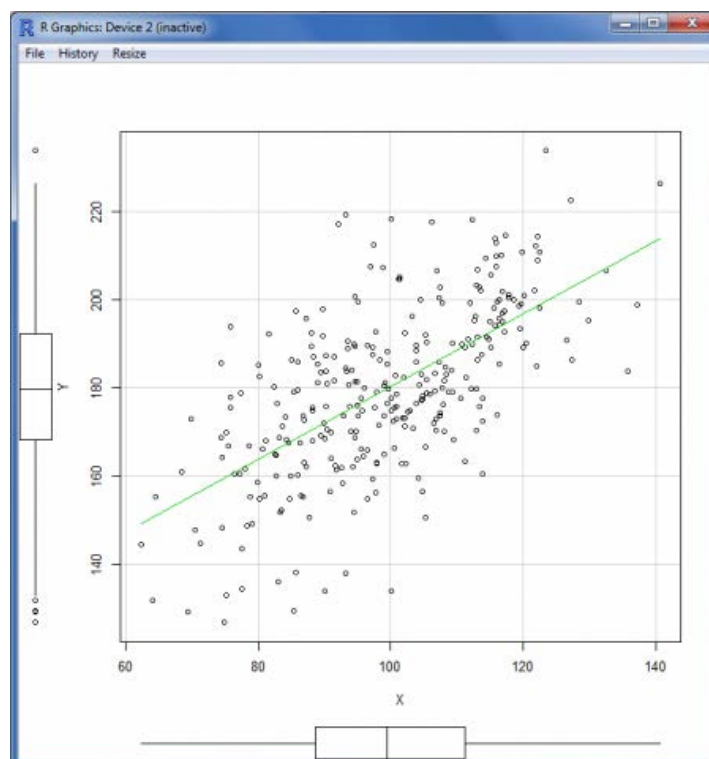
The next scatterplot shows the relationship between *X* and *Y*, as well as the groups of *Z* (low, medium, & high); with each of the three groups designated by different symbols and colors.
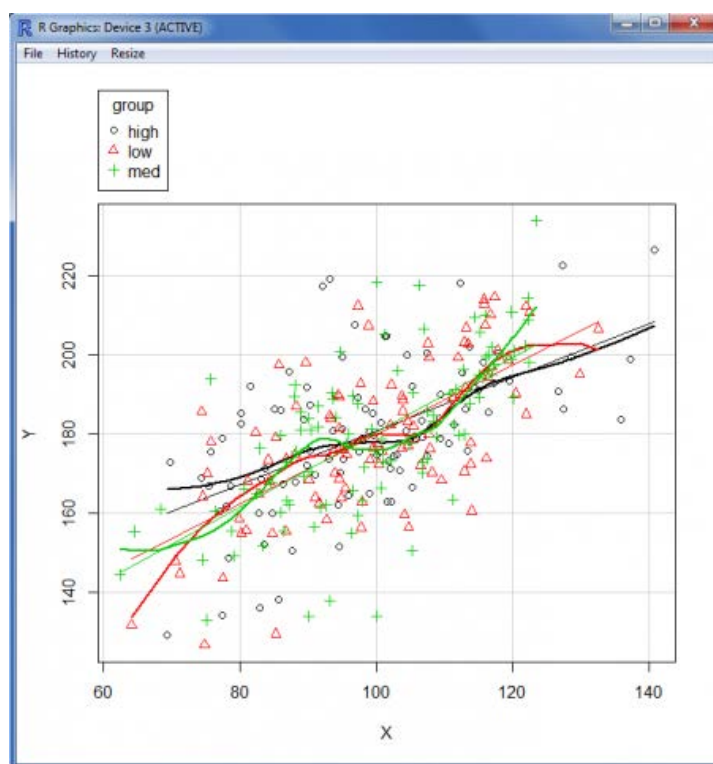


The important thing to notice in the plot above is that the relationship between *X* and *Y* is not affected by the groups (i.e. each of the groups displays essentially the same positive relationship between *X* and *Y*).

The second example introduces some dependence among the groups and demonstrates the danger of failing to investigate the grouping variable's (*Z*) influence on the relationship between the primary variables of interest (*X* & *Y*).



```
> graphics.off()
> x1 <- rnorm(n, 50, 15); y1 <- -.6*x1 + rnorm(n, 50, 30); cor(x1,y1)
[1] -0.1737966
> x2 <- rnorm(n, 100, 15); y2 <- -.6*x2 + rnorm(n, 100, 30); cor(x2,y2)
[1] -0.3501427
> x3 <- rnorm(n, 150, 15); y3 <- -.6*x3 + rnorm(n, 150, 30); cor(x3,y3)
[1] -0.2370855
> X <- c(x1, x2, x3); Y <- c(y1, y2, y3); cor(X,Y)
[1] 0.4134739
> scatterplot(X,Y, smooth = FALSE)
> dev.new()
> scatterplot(X,Y, ellipse = FALSE, groups = group, legend.plot = TRUE)
> |
```

In the above (script) image, we can see that each of the three groups displays a negative correlation between *X* and *Y* (group 1: $r_{xy}$ = -0.17; group 2: $r_{xy}$ = -0.35; group 3: $r_{xy}$ = -0.24). However, if we fail to recognize (i.e. investigate) those groups, we see a positive relationship between *X* and *Y* ($r_{xy}$ = 0.41) when the groups are not taken into account.
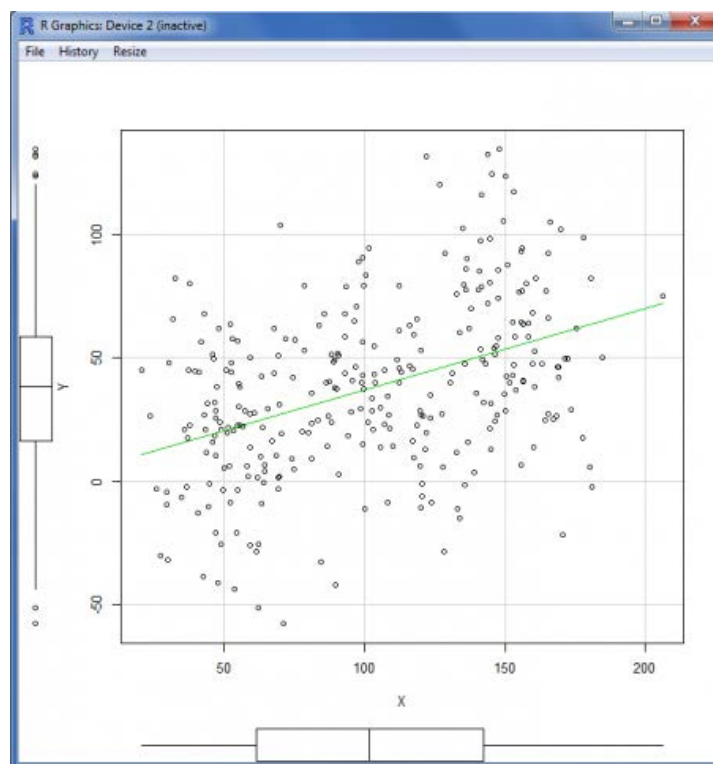
As can be seen above, the positive (overall) relationship between *X* and *Y* ($r_{xy}$ = 0.41), even graphically displayed, requires a keen eye and at least some suspicion to realize there may be clusters within the data.
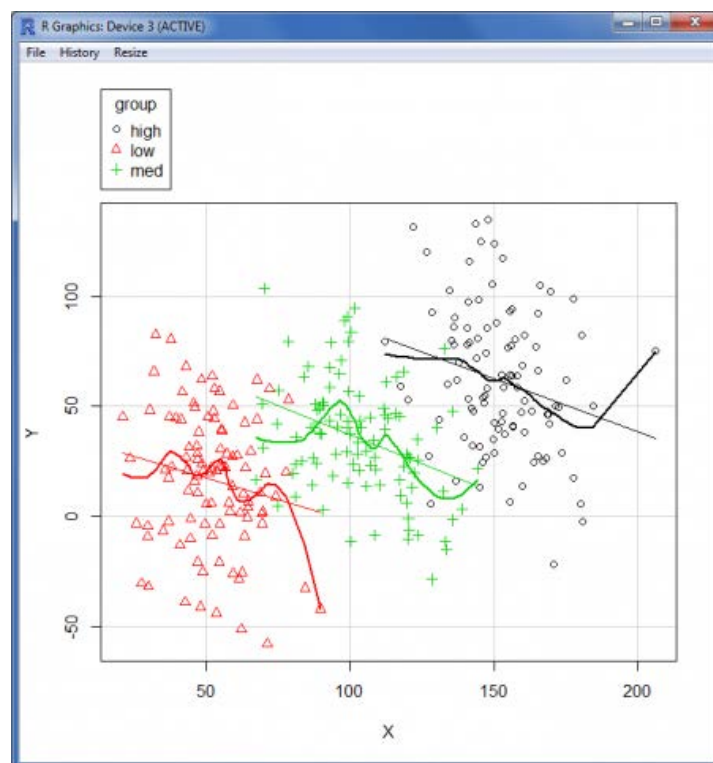


The above image clearly shows the distinctly different nature of the data when the groups are identified. These last two images should clearly demonstrate Simpson's Paradox and the importance of being thorough when conducting initial data analysis. These examples show that it is possible to have the opposite opinion concerning the nature of a relationship between two variables when one does not establish the independence of a third variable. In other words, at first glance *X* and *Y* appear to be positively related ($r_{xy}$ = 0.41); but once we identify the groups we see that in fact the relationship is negative (group 1: $r_{xy}$ = -0.17; group 2: $r_{xy}$ = -0.35; group 3: $r_{xy}$ = -0.24).

The third example shows a slightly more extreme situation. Below, you can see that the relationship between *X* and *Y* is approximately the same as in the previous example ($r_{xy}$ = 0.43). However, each group displays a stronger relationship than in the previous example (group 1: $r_{xy}$ = -0.55; group 2: $r_{xy}$ = -0.44; group 3: $r_{xy}$ = -0.48).

```
R Console (64-bit)
File  Edit  Misc  Packages  Windows  Help
> graphics.off()
> x1 <- rnorm(n, 50, 15); y1 <- -.6*x1 + rnorm(n, 50, 20); cor(x1,y1)
[1] -0.5458653
> x2 <- rnorm(n, 100, 15); y2 <- -.6*x2 + rnorm(n, 100, 20); cor(x2,y2)
[1] -0.4354901
> x3 <- rnorm(n, 150, 15); y3 <- -.6*x3 + rnorm(n, 150, 20); cor(x3,y3)
[1] -0.4841001
> X <- c(x1, x2, x3); Y <- c(y1, y2, y3); cor(X,Y)
[1] 0.4317939
> scatterplot(X,Y, smooth = FALSE)
> dev.new()
> scatterplot(X,Y, ellipse = FALSE, groups = group, legend.plot = TRUE)
> |
```
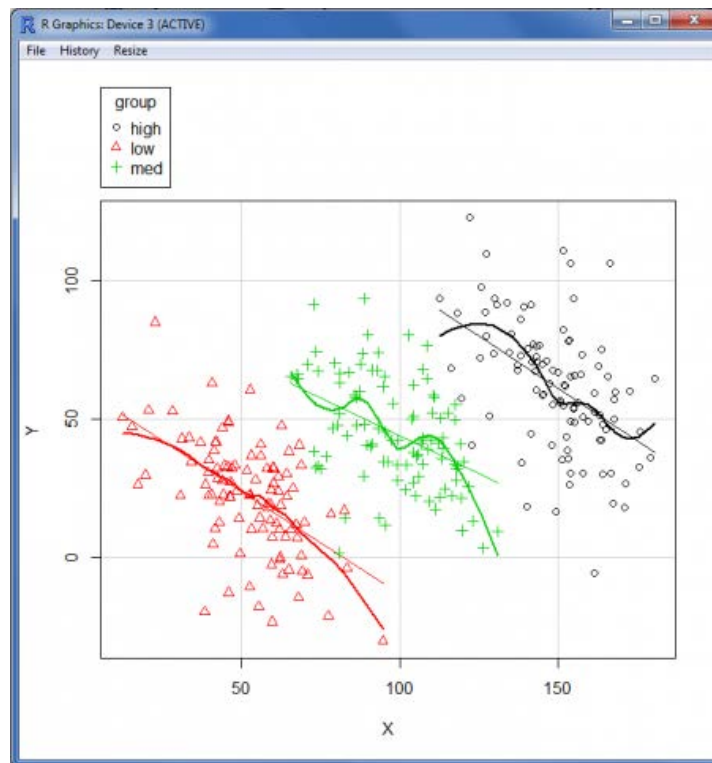
The scatterplot below does not explicitly identify the groups, but given their stronger relationships they are fairly easy to see.
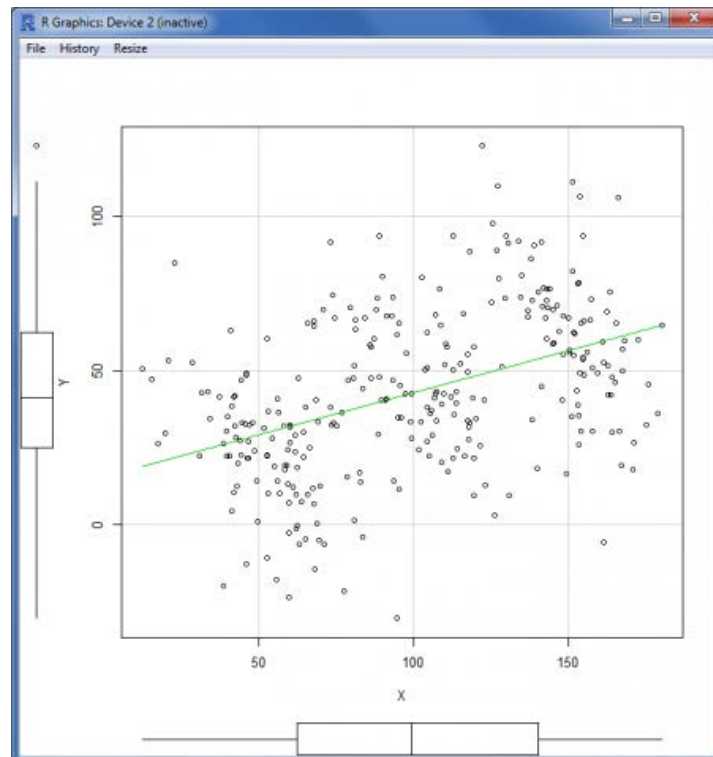


Next, we identify the groups explicitly and plot their (negative) relationships which are clearly in opposition to the overall (positive) relationship.

The fourth and final example shows an even more extreme situation. Below, you can see that the relationship between $X$ and $Y$ is approximately the same as in the previous example ($r_{xy} = 0.56$). However, each group displays a stronger relationship than in the previous example (group 1: $r_{xy}$ = -0.58; group 2: $r_{xy}$ = -0.74; group 3: $r_{xy}$ = -0.68).



This time, the overall scatterplot shows how the clusters of data are distinct enough to be clearly recognizable.
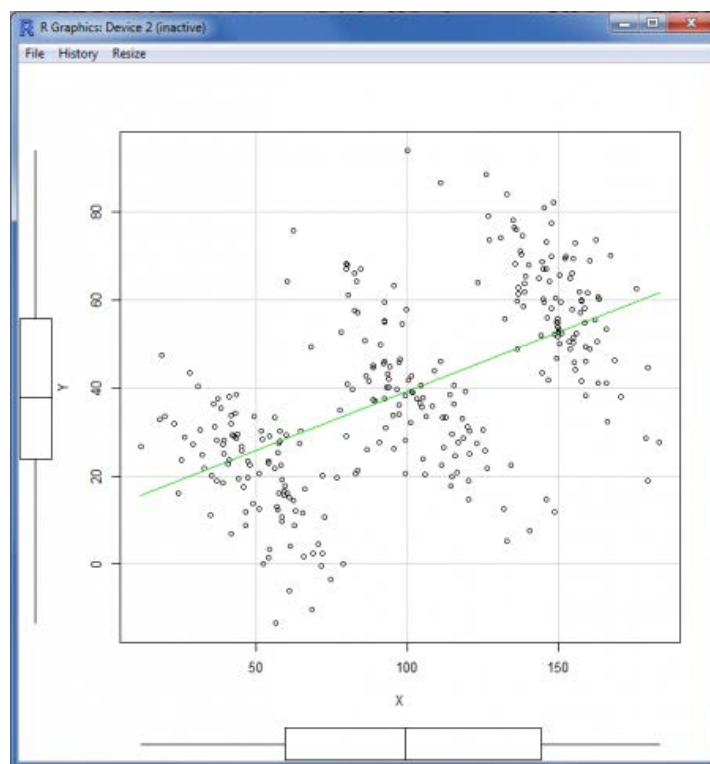
And finally, we identify the groups or clusters explicitly and can see they all display a moderate negative relationship.
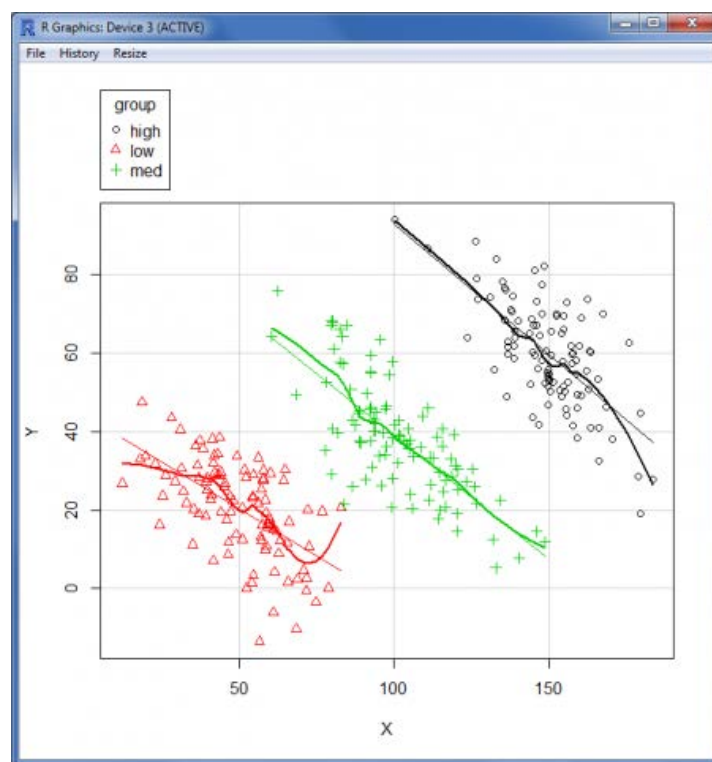


The script available on the RSS Introduction to R short course page includes two even more extreme examples. That script is available [here](#).

## Conclusions

It is important to recognize that the contrived examples used in this article are extreme in how much different the relationship between *X* and *Y* is when accounting for the groups versus not accounting for the groups. Also, in these examples, the group variable was at least recognized and was included in the data collection; often clusters are discovered in patterns of data without prior knowledge of their presence. Therefore, it is extremely important for data analysts to thoroughly investigate and *know* their data intimately. Fortunately, there is a solution (in **R**). Package [Simpsons](#) contains a function called 'Simpsons' which tests two continuous variables for the presence of

subpopulations (i.e. groups). The function operates by testing whether subpopulations display the same direction and approximate magnitude of relationship as the entire set of cases. The user of the function can supply a suspected grouping variable (e.g., gender / sex) or not. The package also contains functions for summarizing and plotting the results of the 'Simpsons' function. If clusters are recognized in the data, then it may be necessary to collect more / new data simply to explain the clusters. Simpson's paradox is an extreme type of problem, but it should be realized that less extreme situations can (and often do) occur – where the change in relationship may not be as drastic a change as those used in the examples above (i.e. from negative to positive or vice versus). It is also worth noting that even though Robinson (1950) was concerned with clusters among continuous data; Simpson (1951) was interested in contingency tables (i.e. not necessarily continuous variables) and demonstrated the phenomena in that context. Oddly, the paradox is most recognized as Simpson's and not Robinson's.

Until next time; *Happy Festivus...*

# References / Resources

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## Columns, December 2012

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# Training

By Claudia Lynch, *Benchmarks    Online* Editor

**D**o you need training on widely used computer programs including those used in statistical analysis? If so, this monthly *Benchmarks Online* column is for you.

## Statistical Analysis

Instructor-led courses are offered only by special request. Please contact an RSS member or Claudia Lynch if you are interested in taking such a class or wish to have someone offer a class for your students. **SPSS and SAS courses are now offered *online* only.** RSS staff will be still be available for consultation on those topics, however. Another class available online is *Introduction to R*.  Make sure and check out the **RSS Matters** article *Statistical Resources* in the July issue of *Benchmarks Online*.

**Special classes** can always be arranged with the RSS staff. Also, you can *always* contact the RSS staff for one-on-one consultation. **Please read the FAQ before requesting an appointment though.**

## Especially for Faculty and Staff Members

In addition to the online statistical courses, which are available to students, faculty and staff, staff and faculty members can take courses offered through the Human Resources Department (they have a new comprehensive training curriculum), and the Center for Learning Enhancement, Assessment, and Redesign (CLEAR). Additionally, the Center for Achievement and Lifelong Learning (CALL) offers a variety of courses, usually for a small fee.

**EIS training** is available and expanding. Please see the article *EIS Training Available Online for New Faculty & Staff* in the August, 2011 issue of *Benchmarks Online* for further information.

## Microsoft E-Learning

Microsoft E-Learning courses are available for **faculty and staff** via our UNT-Microsoft Campus Agreement. Please contact Claudia Lynch at lynch@unt.edu for instructions on accessing this training. If you haven't accessed the training since last year you will need to get a new access code. UNT, UNTHSC and UNTSYSTEM e-mail addresses are now able to access Microsoft E-Learning.

## Microsoft IT Academy

All **students, faculty and staff** within the UNT System now have access to online learning via the Microsoft IT Academy. See this article in the July issue of *Benchmarks Online* for more information.

## Microsoft Outlook Tutorials and much more

The Enterprise Messaging and Directory Services Group has all sorts of useful information on their website, including tutorials and FAQs. The home page displays a list of their newest tutorials with tutorial topic pages displaying the most accessed pages. You can search the site for whatever you're interested via a Search Box on the left-hand side of the page.

## Central Web Support

Consult Central Web Support for assistance in acquiring "Internet services and support." As described on their [website](#):

CWS provides Internet services and support to UNT faculty, staff and students. Services include allocating and assisting departments, campus organizations and faculty with web space and associated applications. Additionally, CWS assists web developers with databases and associated web applications, troubleshooting problems, support and service.

## CLEAR

CLEAR offers courses especially for Faculty Members. A list of topics and further information can be found [here](#).

**Blackboard Learn 9.1 Migration and Bootcamp**

Remember, faculty will ***not have access*** to Vista courses after **December 31, 2012** -- **Blackboard Learn 9.1 Migration** *http://bbmigration.unt.edu/* -- Any student data you'll need from Fall 2012 and the previous semesters should be downloaded immediately: *Steps for Downloading Student Data*

**Blackboard Spring 2013 Bootcamp -** 16 Sessions, January 27 - May 23. Chilton 245

Course Code:   UO13BC   *http://clear.unt.edu/sites/default/files/2013_Spring_Bootcamps.pdf*

## Ed2go

Ed2go are courses that are offered, for a fee, to UNT faculty, staff and students as well as the general public. According to the CALL [website](#):

> CALL has partnered up to provide online learning on a variety of topics. From standardized test preparation to database programming to training for libraries and their staff, there's a variety of areas from which to choose in online learning.
>
> The online minicourses, provided in conjunction with Ed2go, are standardized 12-lesson modules released over a six week period. (Courses are active for eight weeks to provide some flexibility). Each module features a quiz. Lessons are instructor-led and course participants and instructor communicate through a course discussion board. Lessons can be downloaded and saved. At the end of the course there is a final quiz. A passing grade opens a window that allows students to print out a course completion certificate.
>
> All courses are $89, and UNT faculty, staff and students may receive a $10 discount.

For additional information surf over to [http://www.ed2go.com/unt/](http://www.ed2go.com/unt/)

**Ed2go has a new blog!** Click on the logo on the right to find out more information on  company news, videos, career advice and tips from ed2go instructors.

## Information Security Awareness

The UNT Information Security team offers Information Security Awareness [courses](#) to all UNT faculty and staff. Topics to be covered will include workstation security, sensitive data handling, copyright infringement issues, identity theft, email security, and more.

**It is a policy requirement that ALL staff take an information security course at least once a year.**

Please contact [Gabe Marshall](#) in ITSS Information Security if you have any questions, or would like more information about the online training. **Either attending a live class or going through the online training will count towards your training requirement.** You can also request a customized course to be taught for your department.

## Alternate Forms of Training

Many of the General Access Labs around campus have tutorials installed on their computers. See [http://www.gacl.unt.edu/](http://www.gacl.unt.edu/) for a list of labs and their locations. The Willis Library, for example, has a [list of Tutorials and Software Support](#). The Library Instructional Unit also offers workshops and training, including "tech skills" training. Visit their websites for more information: [http://www.library.unt.edu/library-instruction](http://www.library.unt.edu/library-instruction)

The [Training Website](#) has all sorts of information about alternate forms of training. Computer Based Training (CBT) and Web-based training are some of the alternatives offered, although due to the rising costs of training, shrinking budgets and changing technology, computer-based training at UNT is in a state of transition. For up-to-date

information on CBT at UNT, see the CBT website.

## Info~Tech, UNT's new IT Research Partner

Info~Tech has replaced Gartner Core Research Services as UNT's IT research partner. For more information see the August *Campus Computing News* article.

## State of Texas Department of Information Resources

Another possible source of training for staff and, perhaps, faculty members is the Texas Department of Information Resources. A look at their Education and Training website reveals some interesting possibilities.

## New Horizons Computer Learning Centers

New Horizins is a DIR vendor, which means that state agencies, like UNT, get special pricing for their services negotiated at the State level (click here for more information about DIR vendors).  New Horizons offers courses at their own facilities in Dallas and Fort Worth, but will arrange for onsite training as well.

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# Staff Activities

**D**ue to organizational changes with regard to the dissolution of CITC into IT Shared Services (ITSS) and University Information Technology (UIT), it has been decided that only staff activities for UIT will continue to be be reported in this column. ITSS staff activities will be handled by ITSS Communications.

# Transitions

## No longer working in UIT:

- **Keifer Stone**, MMS Tech, Microcomputer Maintenance (part-time).

- **Sean Bell**, CSS Tech, Classroom Support Services (part-time).

- **Elizabeth Hahn**, CSS Tech, Classroom Support Services (part-time).

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