

# Guidelines for Effective Reports and Graphs

Prepared for Student Affairs Professional Development Series  
April 2013

# Today's Agenda – How can I prepare more effective assessment reports?

- What is “effective?”
- A review of report structure
- Creating good graphics
- Maybe a quiz?



Annual Assessment Report Template  
Academic Year: 2012-2013

Name of Department:

Name of Contact Person:

Name of Person(s) completing report or contributing to the project:

*The suggested length of the assessment reports should be between 5 and 15 pages (You may produce a larger report for other constituents, but for the purposes of this report we ask you keep to the suggested length). Reports should follow this format in a narrative form. Please write the report as though you writing for an external audience.*

- Abstract
- Introduction and context for this year's report
- Methodology
- Findings/Results and Discussion
- Implications

Is that  
report on my  
desk  
somewhere?

I wonder if  
we will get  
out by 3?

I read that  
report didn't  
I?

I remember  
seeing the  
assessment  
report

I have to  
call Ellen...

I should  
have  
opened the  
attachment



**Information is often used indirectly in decision-making**, to orient to problems, think about issues, gain new ideas and perspectives, formulate problems, set the agenda for future policy actions.

Use is a result of **long-term percolation of concepts, theories and findings in the climate of informed opinion.**

Source: Feldman & March, 1981, Carol Weiss, 1980

# The Value of the Executive Summary or Abstract

- Distills the whole report into the top most important findings
- For the reader
  - Entices your readers to the full report
  - Limits the amount of information people need to remember (Rule of 4!)
- For you
  - Helps with structure, illuminating missing pieces
  - Provides you with the 'elevator pitch' for the provost or president

(This list of element is adapted with permission from Phil Koopman, "How to Write an Abstract," <http://www.ece.cmu.edu/~koopman/essays/abstract.html>.)

### **All abstracts include:**

1. A full citation of the source, preceding the abstract.
2. The most important information first.
3. The same type and style of language found in the original, including technical language.
4. Key words and phrases that quickly identify the content and focus of the work.
5. Clear, concise, and powerful language.

### **Abstracts may include:**

1. The thesis of the work, usually in the first sentence.
2. Background information that places the work in the larger body of literature.
3. The same chronological structure as the original work.

### **How not to write a abstract:**

1. Do not refer extensively to other works.
2. Do not add information not contained in the original work.
3. Do not define terms.

<http://writingcenter.unc.edu/handouts/abstracts/>

# Telling your data story with tables and graphs

## D. Findings/Results and Discussion

### 1. Describe the results

- Participant response rate (actual vs. invited)
- Relevant participant demographic data (gender, race/ethnicity, year in school, etc.)
- Share aggregate data or qualitative data (quotes, themes, etc.)

### 2. What did you learn from the assessment?

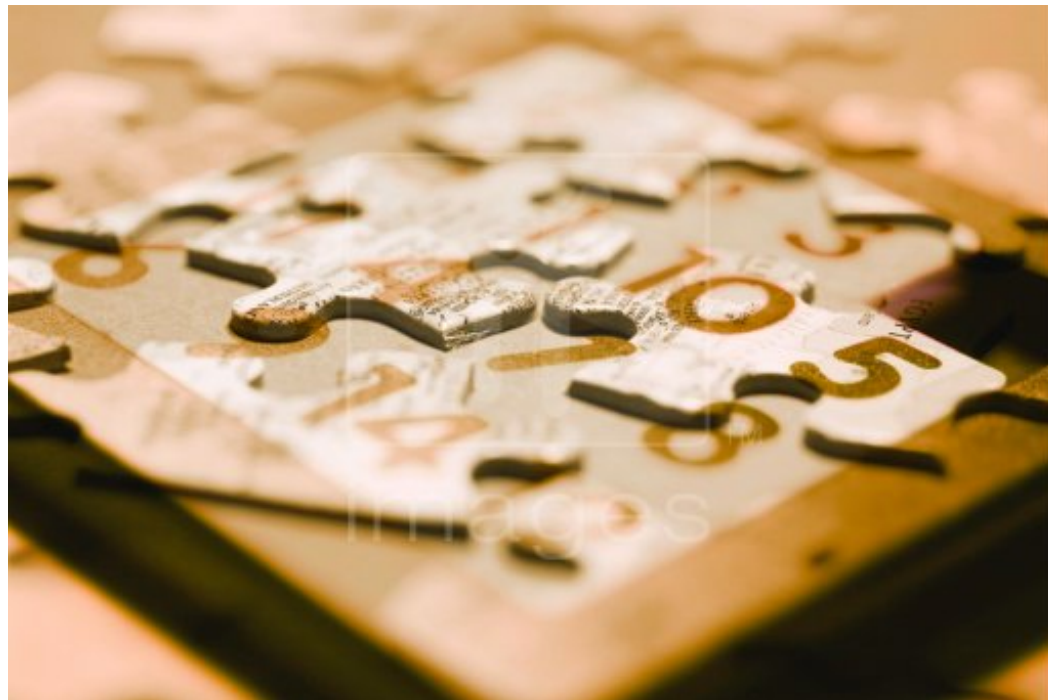
- Based on your analysis, what were the key findings? (Please provide in a bullet point format)
  - For qualitative data, share the top 3-5 themes that emerged
  - For quantitative data, share the 5-10 most important and useful findings
- How, if at all, did the results surprise you?
- What does this project contribute to the field or the Division of Student Affairs?
- Were there specific challenges or limitations to the project (sample selection, response rate, data collection, etc.) that may have affected the results or use of the results?



**“Often, to see a pattern is  
to understand the solution  
to a problem.”**

**- C. Ware**

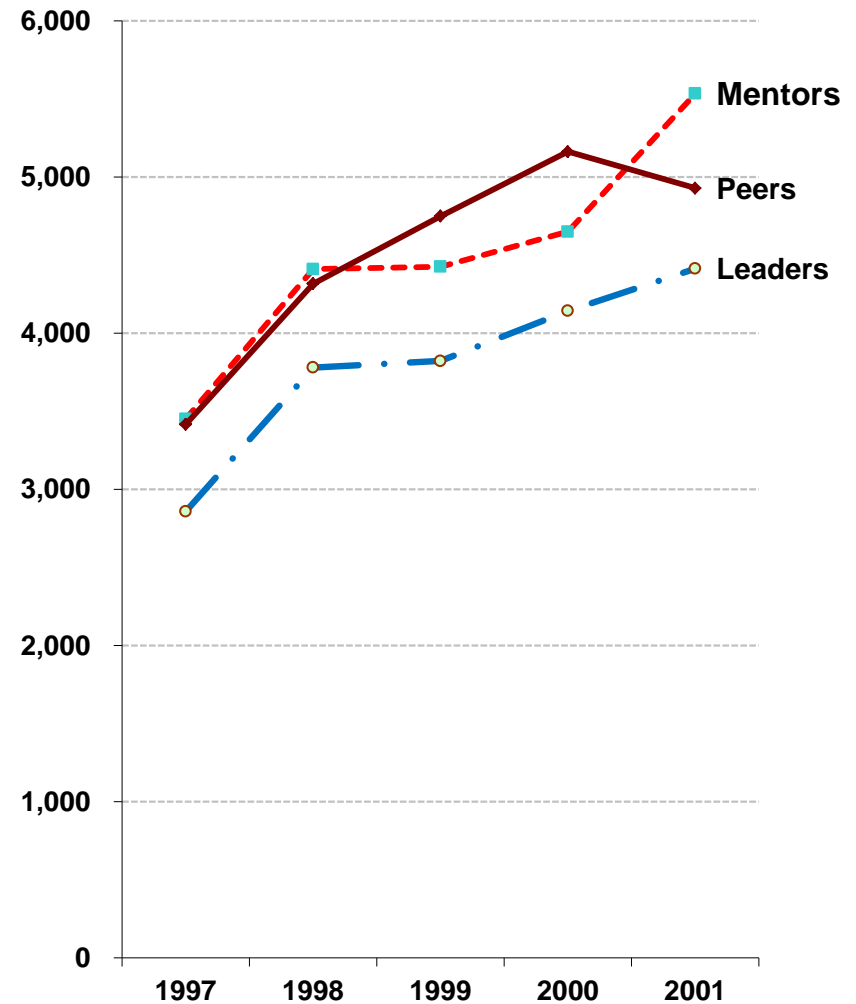
**“It is a psychological,  
not a moral fact that  
people are unwilling to  
expend energy,  
particularly if the  
outcome is unknown.”  
- S. Kosslyn**





# Table or Graph?

LAS New Program Development Schedule <i>02/22/2013 DRAFT</i>				
Enrollment Management & Marketing				
No.	College	New Program Name	Degree Level	Status and notes
1	LAS	Sustainable Urban Development	MS	Approved
2	LAS	MA Critical Ethnic Studies	MA	Not ready to send to CCP
3	LAS	MA Digital Humanities	MA	Not ready to send to CCP
4	LAS	MA Middle Eastern /Central Asia Studies	MA	Not ready to send to CCP
5	LAS	MA Forced Migration	MA	Not ready to send to CCP
6	LAS	MA Modern Languages -Arabic	MA	sent to CCP 1/14/13. 7 separate programs



# **“Tables make it easy to *look up* values.”**

**Few, 2004**

## **When to use tables (if any of these are true)**

- ☐ The document you produce will be used to look up individual values.
- ☐ It will be used to compare individual values.
- ☐ Precise values are required.
- ☐ The quantitative information to be communicated involves more than one unit of measure (can be put in multiple columns easily)
- ☐ Consider tables also when you have a small number of values to show the reader.

<b>Adult UG Enrll</b>	<b>2008</b>
American InterContinental University Online	16,062
Chicago State University	2,653
De Paul University	3,292
DeVry University	12,608
Governors State University	1,824
Northeastern Illinois University	3,881
Northern Illinois University	2,249
Roosevelt University	1,855
Southern Illinois U-Carbondale	3,597
University Of Illinois-Chicago	1,989
Total of Top Ten Institutions	50,010

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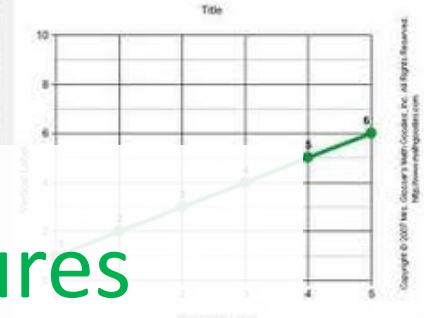
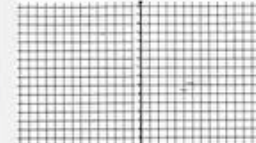
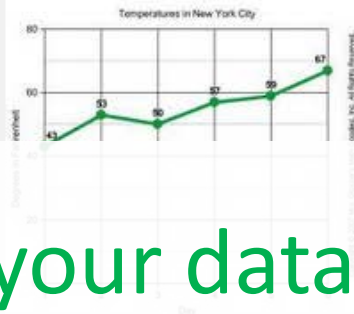
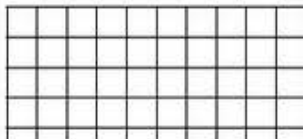
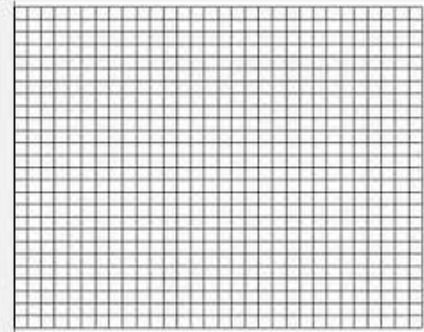
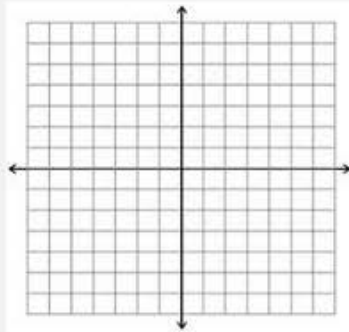
Strategies	Key Issues
Maintain base new student enrollment activities	<ul style="list-style-type: none"> <li>• Does the college have the staff in place to implement new marketing and recruiting initiatives next year?</li> </ul>
Improve prospect management to increase new student enrollment on campus and online	<ul style="list-style-type: none"> <li>• Does the college have the resources (staff and dollars) to do more follow-up with on campus and online prospects?</li> </ul>
Increase new student enrollment from the top five community college and city college feeders	<ul style="list-style-type: none"> <li>• Is the current the college model (advisors and recruiter) for recruiting at the community colleges working?</li> <li>• Do we need to develop a new model? (i.e. student ambassadors, targeted written communication, new events etc.)</li> </ul>

# Better

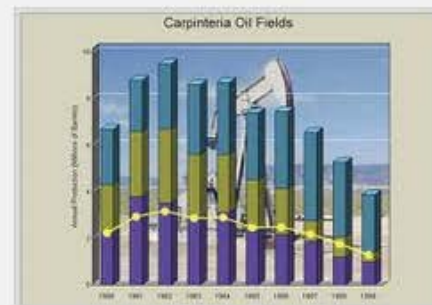
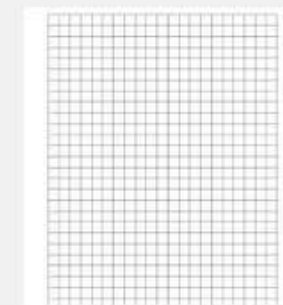
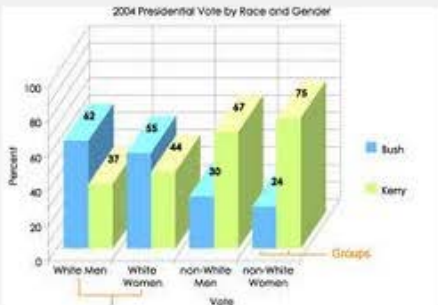
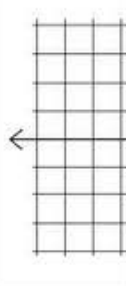
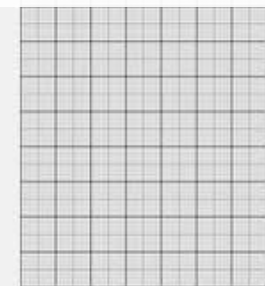
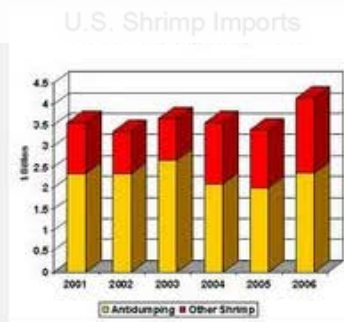
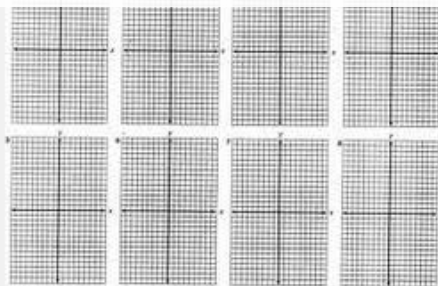
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# Telling your data story with pictures







## ***The 6 Design Principles for Graphical Excellence (Tufte)***

**The purpose of an evidence presentation is to assist thinking.**

**The principles of analytical design are derived from the principles of analytical thinking. These principles relate to both producing presentations and consuming presentations—after all, we're all in this together.**

**Show **comparisons**, contrasts, differences**

**Show **causality**, mechanism, structure, explanation**

**Show **multivariate** data—more than 1 or 2 variables**

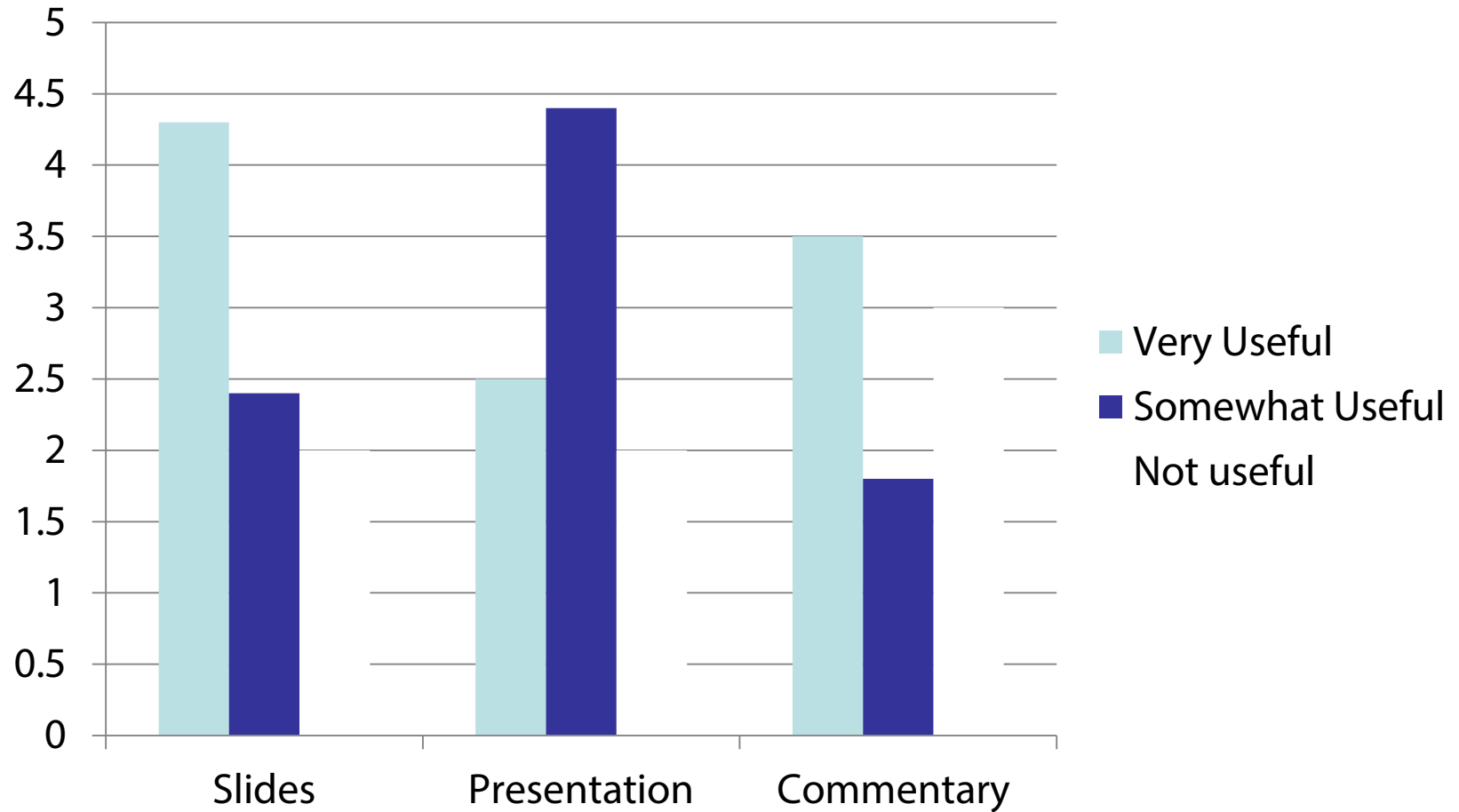
**Completely **integrate** words, numbers, images, diagrams.**

**Documentation**—take responsibility for the analysis, demonstrate credibility; give credit.

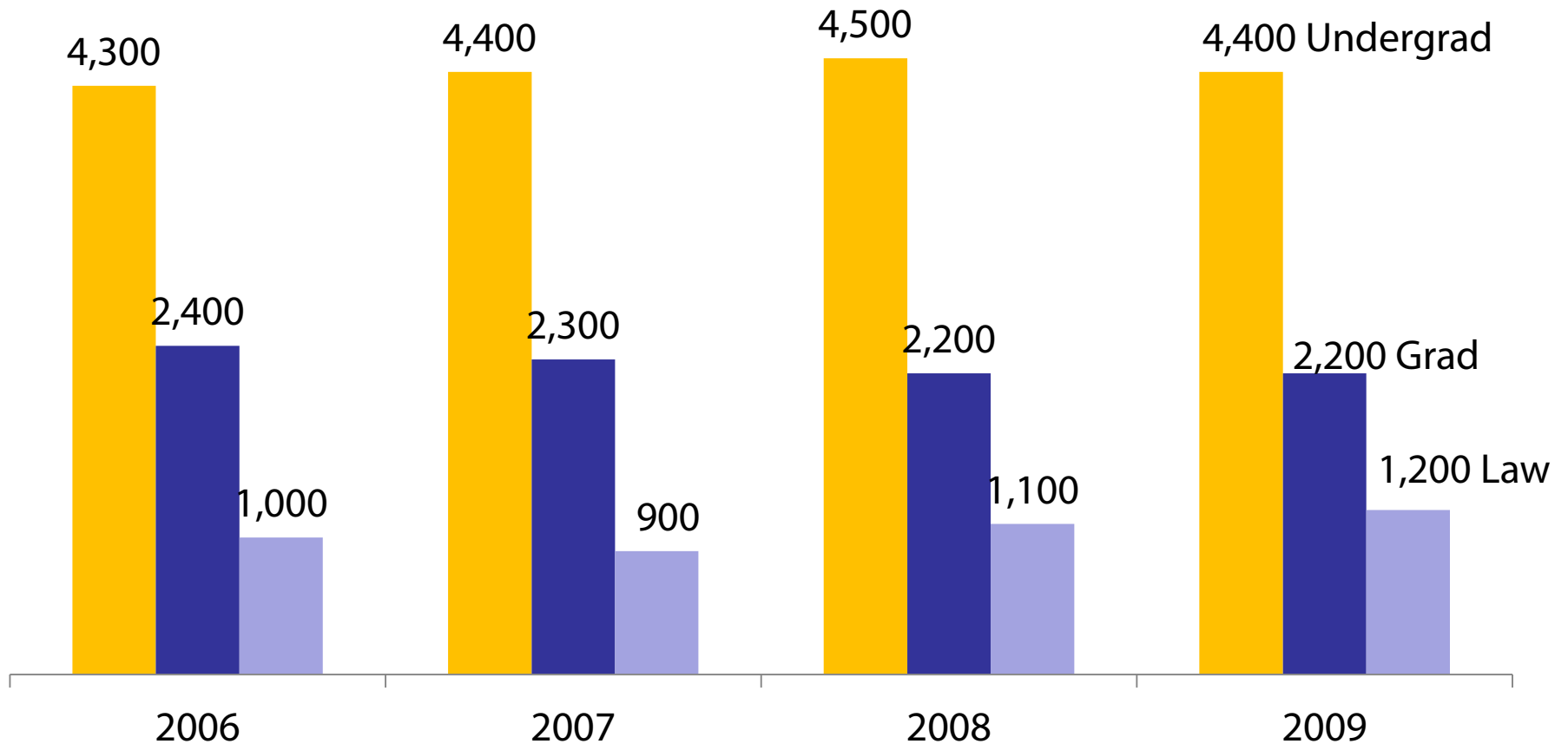
**Content** – **in the end, it is about the data** - Analytical presentations ultimately stand or fall depending on the quality, relevance, and integrity of their outcomes.

*Taken from E. Tufte, Beautiful Evidence, pp. 120-139.*

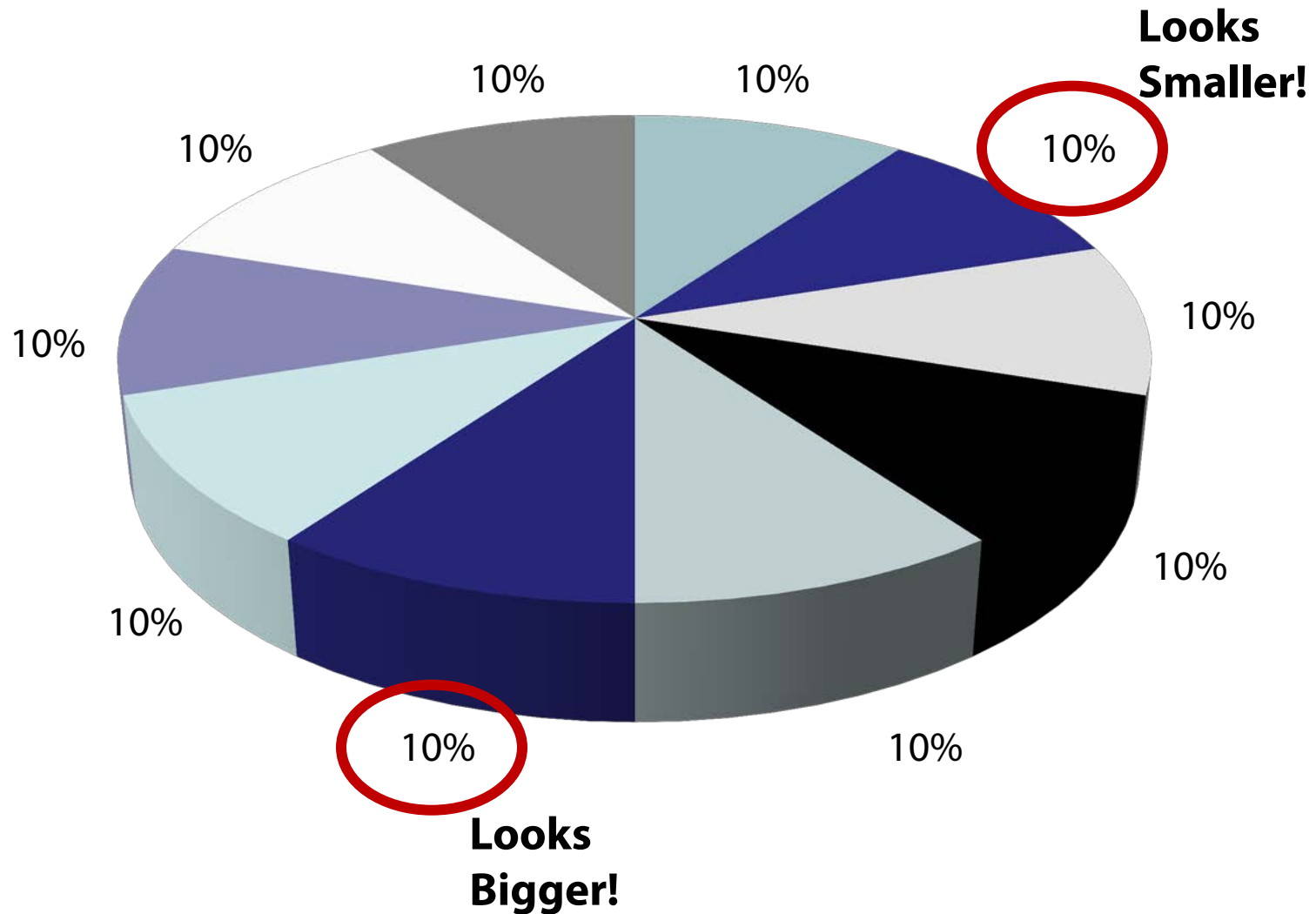
# Don't settle for the default settings



# Minimize chart junk



# ***No 3D Graphs!!***

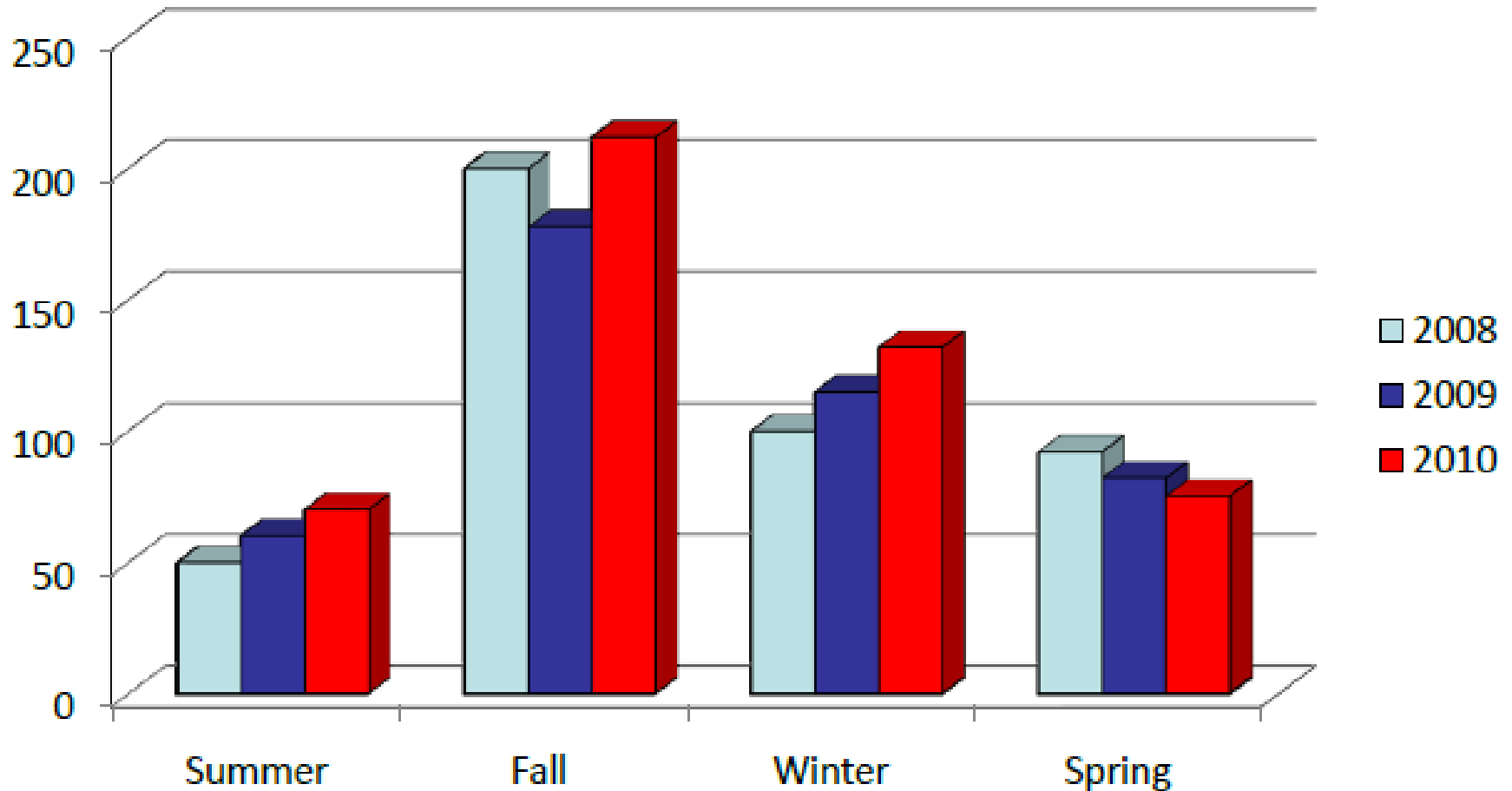


Consider saving the pie for dessert!

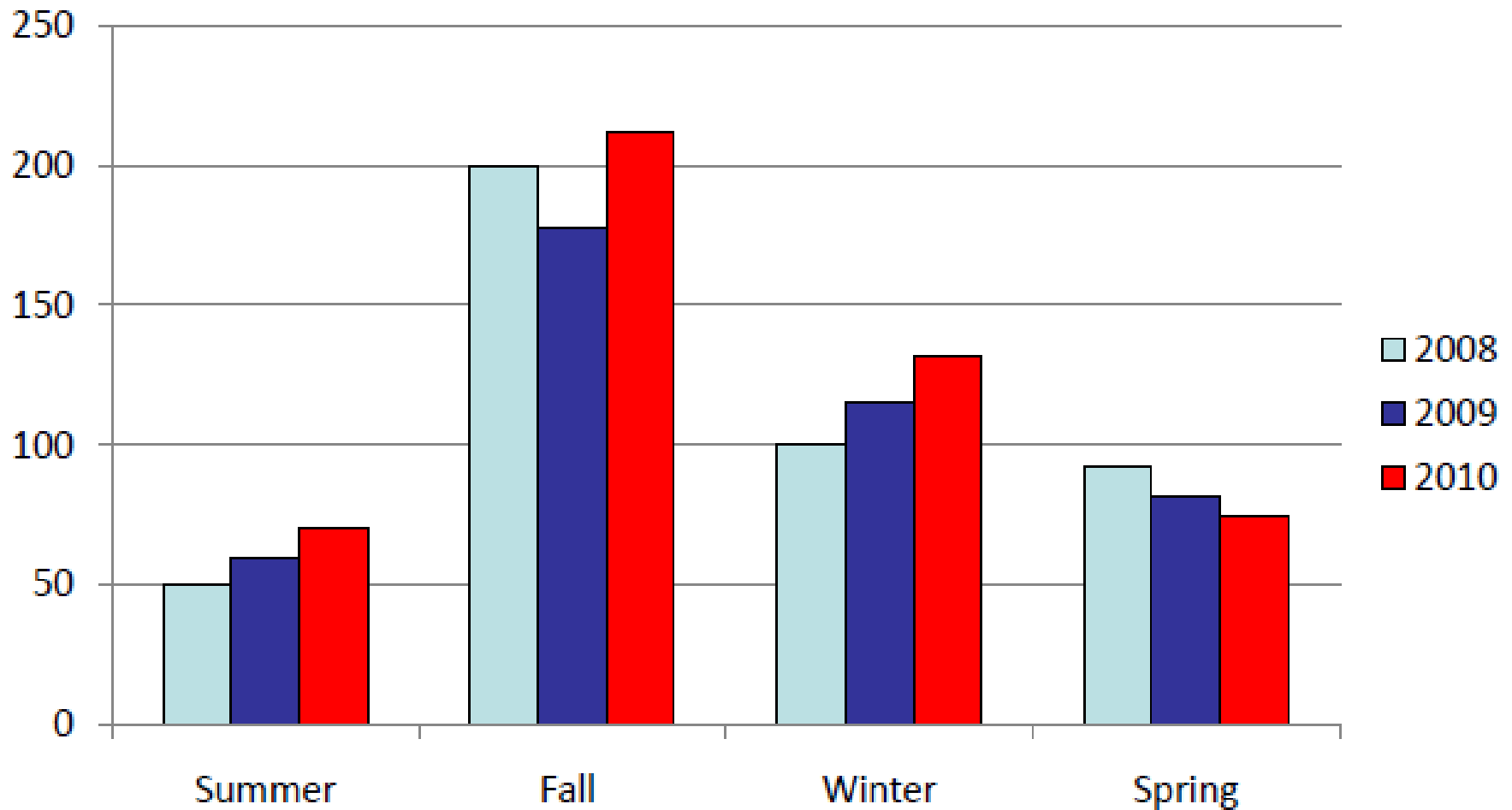




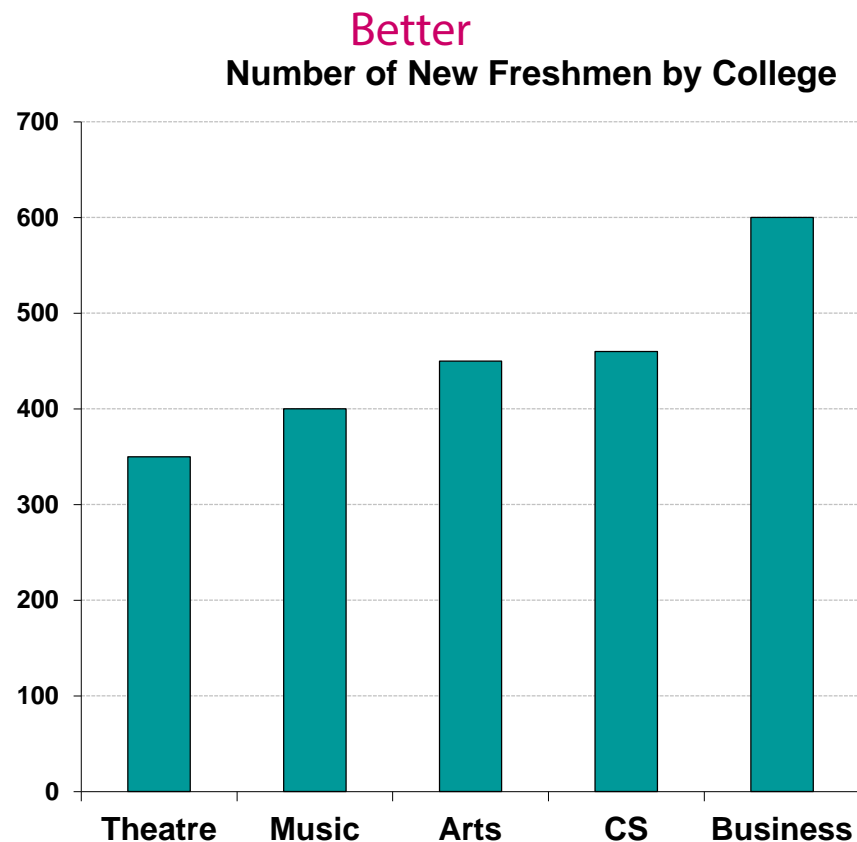
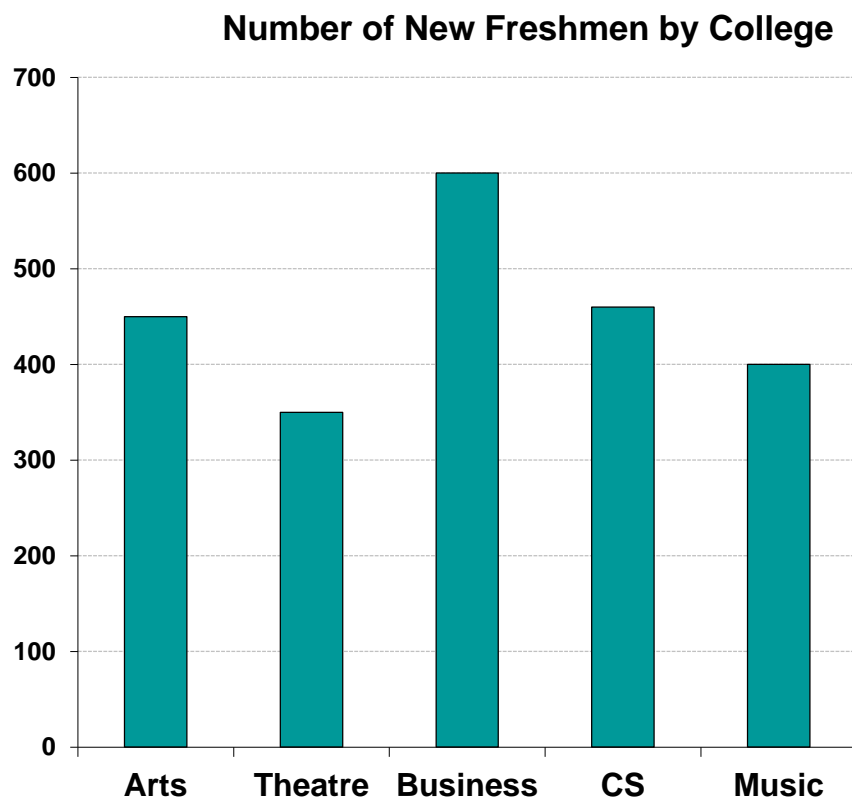
# *No 3D Graphs!!*



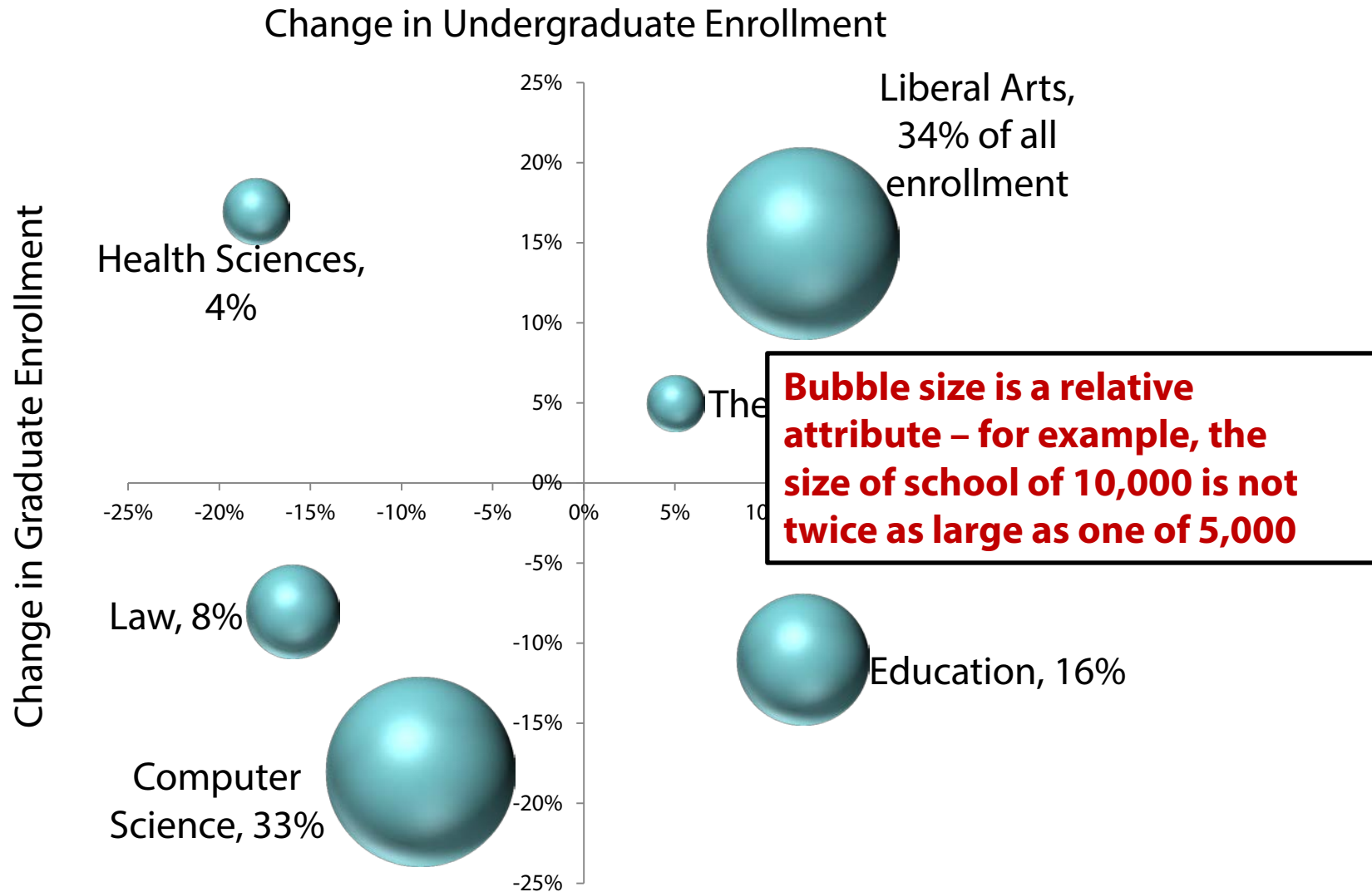
# Remove 3-D



**Orientation in 2D space** communicates relative size best for categorical variables.

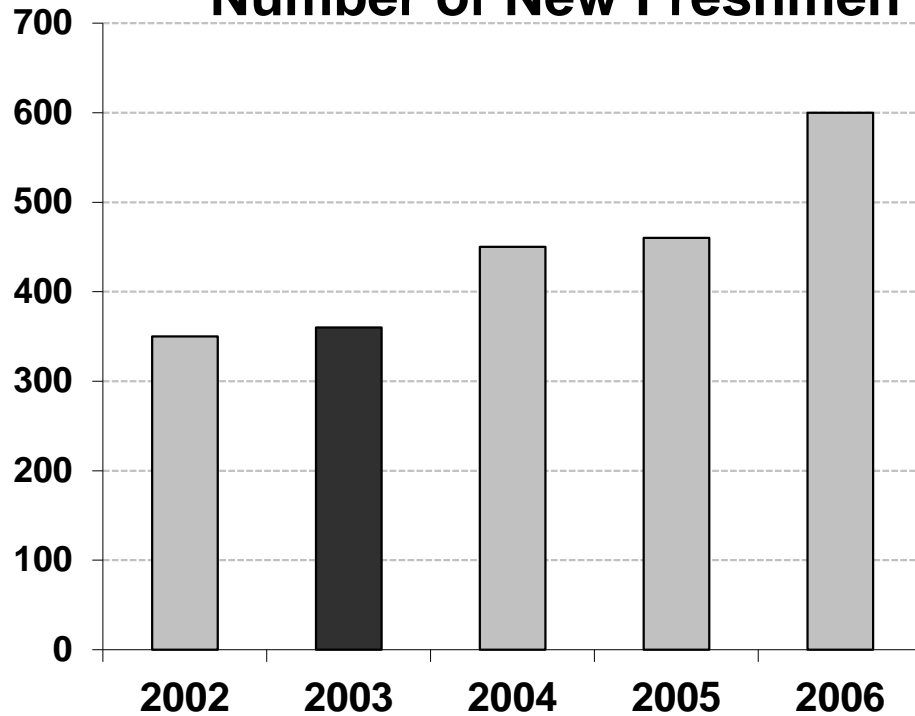


**Size** communicates relative quantitative information.

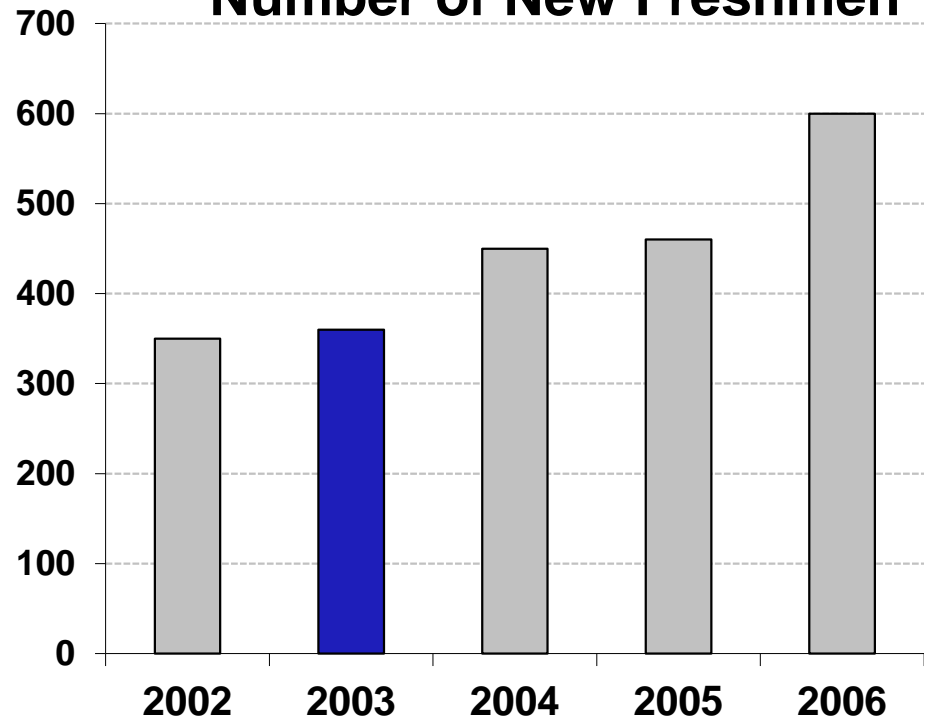


We are particularly aware of **differences** and **color**.

**Number of New Freshmen**



**Number of New Freshmen**

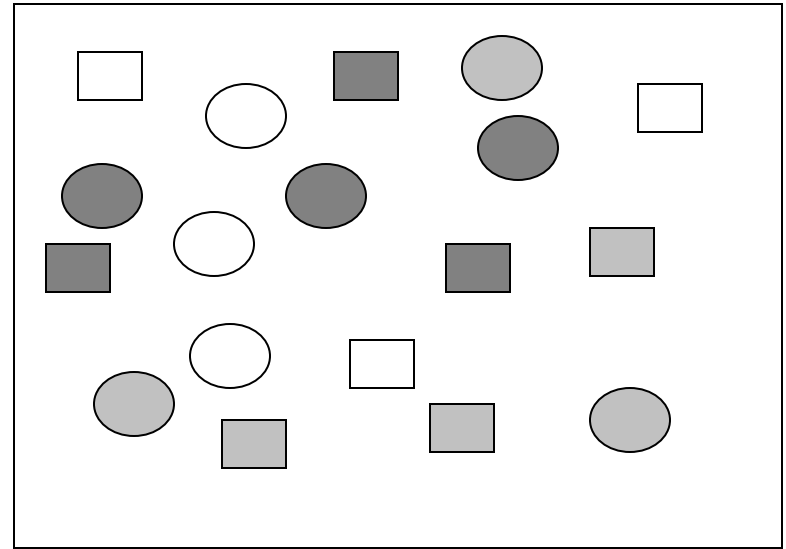
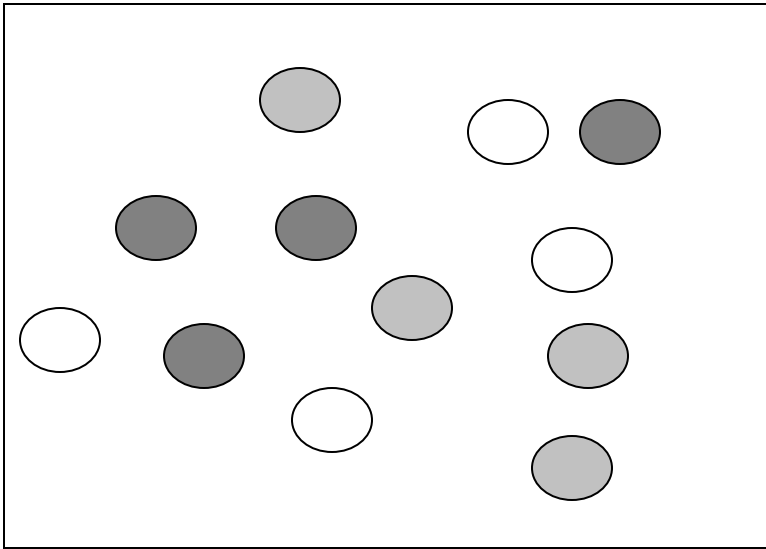


We see things in **context**

We see things in context.

We see things in context.

We process **one attribute** at a time.





# **Any good graphic should allow you to (Kosslyn)**

- 1) Connect with your audience
- 2) Direct the readers attention through the display
- 3) Promote understanding and memory

Source: Kosslyn, 2006

# **Connect with your audience**

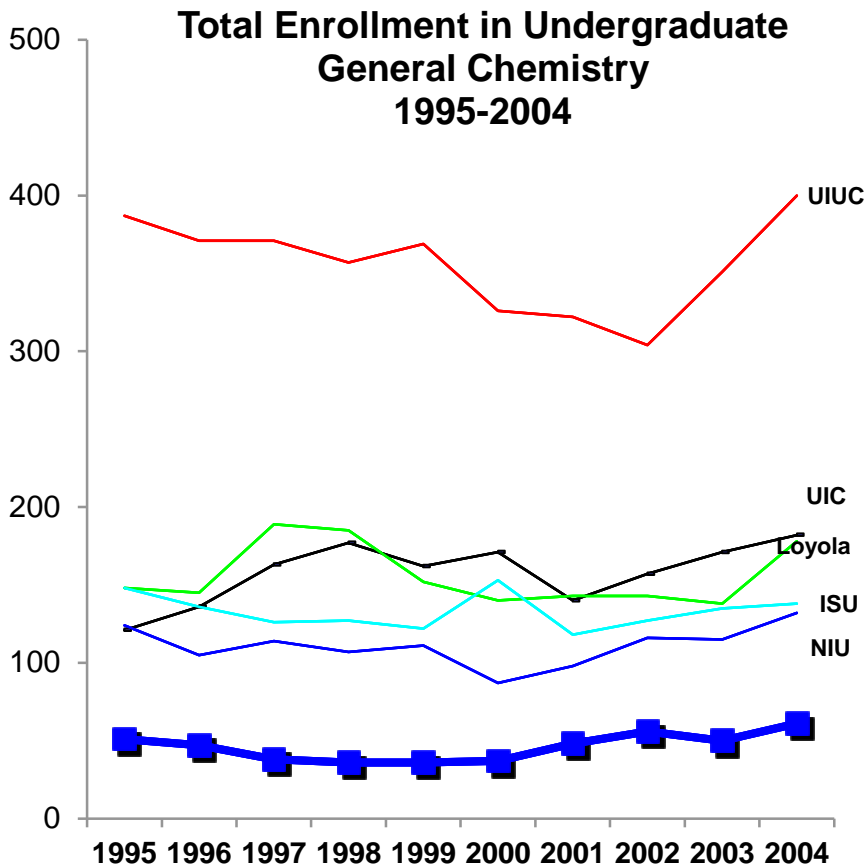
## **Principle of Relevance**

Communication is most effective when neither too much nor too little information is presented

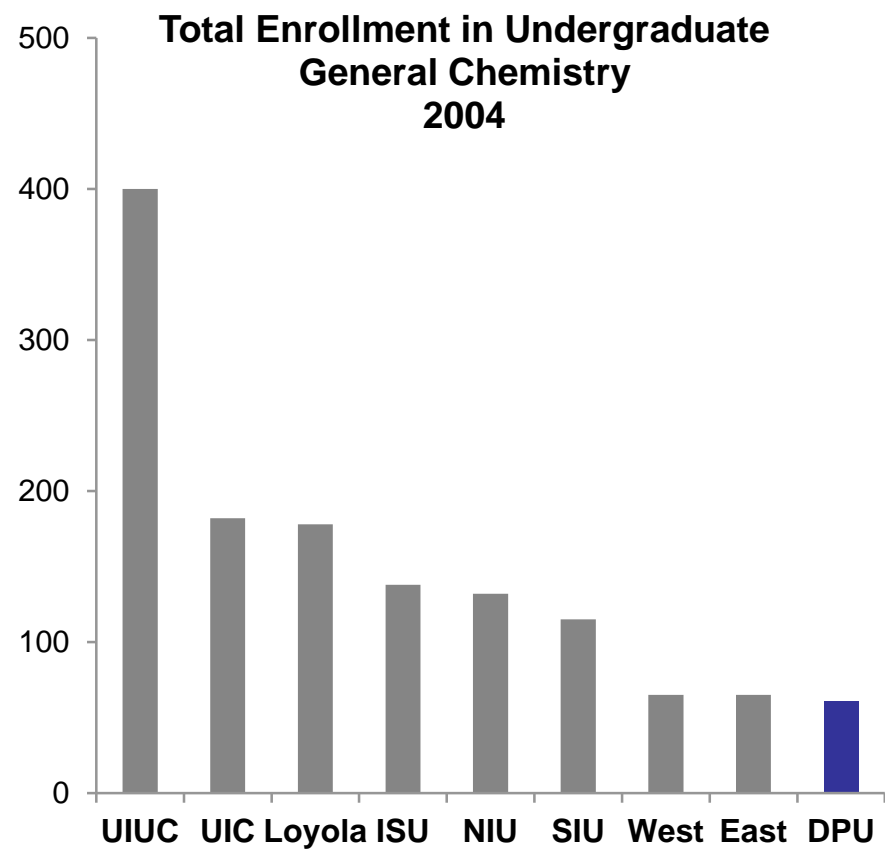
## **Principle of Appropriate Knowledge**

Communication requires prior knowledge of relevant concepts, jargon, and symbols.

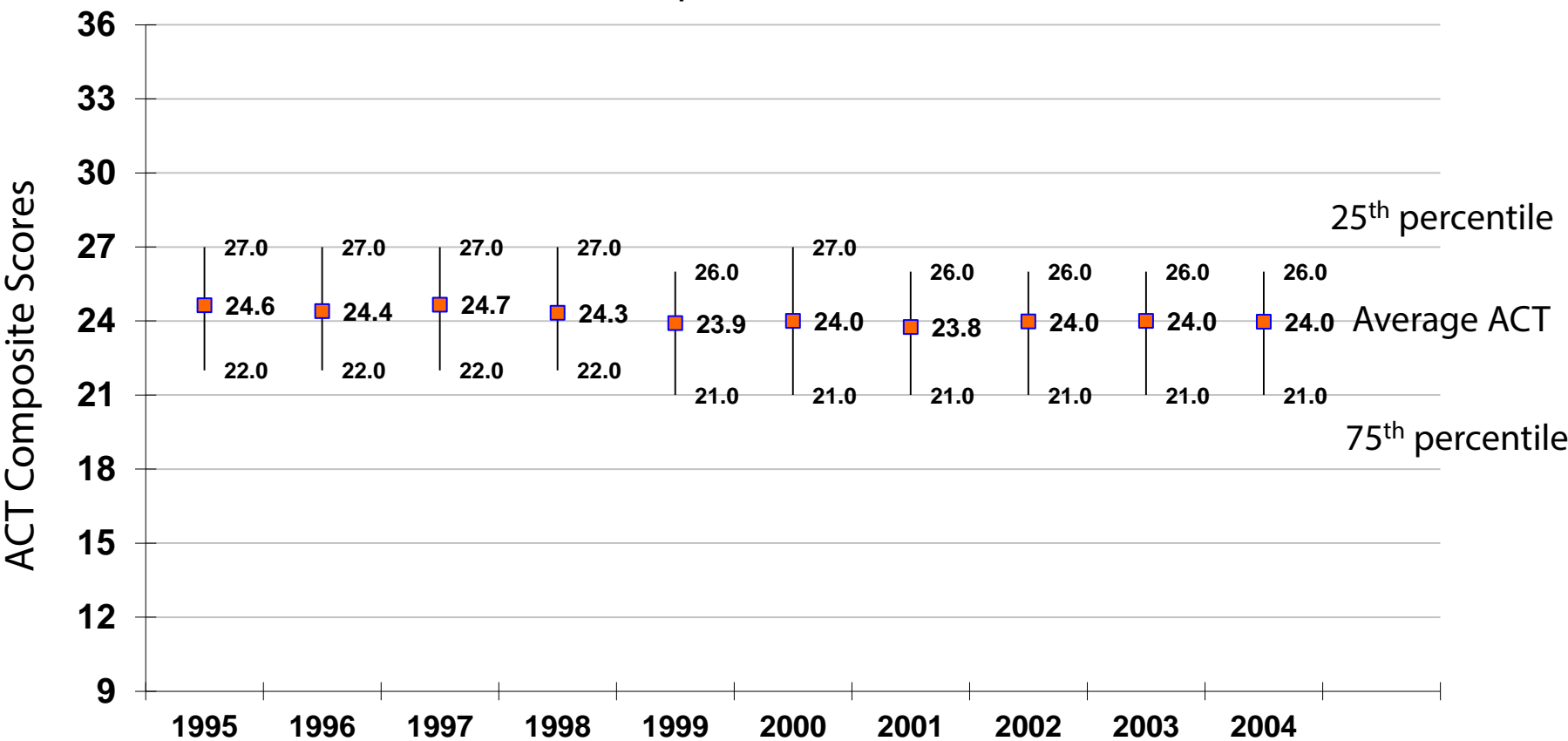
**DePaul has the 9<sup>th</sup> largest undergraduate chemistry enrollment in Illinois.**



**DePaul has the 9<sup>th</sup> largest undergraduate chemistry enrollment in Illinois.**



Freshman ACT Composite Scores Over Time



2008 Estimated Undergraduate Discounts

2008 Discount											
		ACRK									
		Low academic								High academic	
NDRK		1	2	3	4	5	6	7	8	9	
High need	6	52%	51%	55%	53%	53%	54%	58%	64%	68%	56%
	5	44%	44%	44%	49%	49%	53%	59%	55%	64%	51%
	4	35%	29%	37%	35%	36%	37%	47%	47%	53%	40%
	3	6%	8%	14%	17%	18%	27%	35%	38%	47%	27%
	2	3%	5%	4%	9%	17%	19%	31%	36%	45%	20%
Low need	2	3%	5%	4%	9%	17%	19%	31%	36%	45%	20%
Did not file	1	2%	2%	1%	5%	9%	18%	23%	35%	46%	13%
		25%	24%	26%	27%	31%	36%	43%	46%	53%	35%

A **tag cloud** or **word cloud** (or **weighted list** in visual design) is a visual depiction of user-generated [tags](#), or simply the word content of a site, typically used to describe the content of web sites. Tags are usually single words and are normally listed alphabetically, and the importance of a tag is shown with font size or color.<sup>[1]</sup> Thus, it is possible to find a tag alphabetically and by popularity. The tags are usually hyperlinks that lead to a collection of items that are associated with a tag.



06 africa amsterdam animals architecture art august australia autumn baby  
barcelona beach berlin birthday black blackandwhite blue boston bw  
california cameraphone camping canada canon car cat cats  
chicago china christmas church city clouds color concert d50 day  
dc december dog england europe fall family festival film florida  
flower flowers food france friends fun garden geotagged  
germany girl graffiti green halloween hawaii hiking holiday home  
honeymoon hongkong house india ireland island italy japan july june kids la  
lake landscape light live london losangeles macro me mexico mountain  
mountains museum music nature new newyork newyorkcity newzealand  
night nikon nyc ocean paris park party people portrait red  
river roadtrip rock rome san sanfrancisco scotland sea seattle show sky  
snow spain spring street summer sun sunset sydney taiwan texas  
thailand tokyo toronto travel tree trees trip uk urban usa  
vacation vancouver washington water wedding white winter  
yellow york zoo

# **Direct and Hold Attention**

## **Principle of Salience**

Attention is drawn to large perceptible differences.

## **Principle of Discriminability**

Two properties must differ by a large enough proportion or they will not be distinguished.

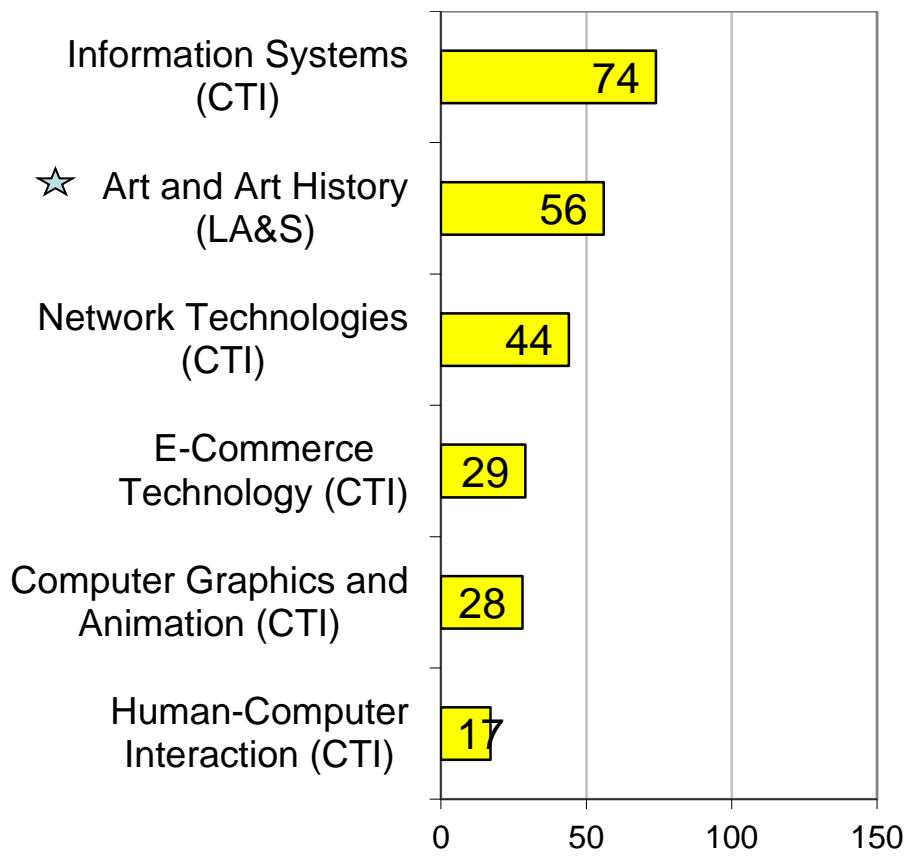
## **Principle of Perceptual Organization**

People automatically group elements into units which they then attend to and remember.

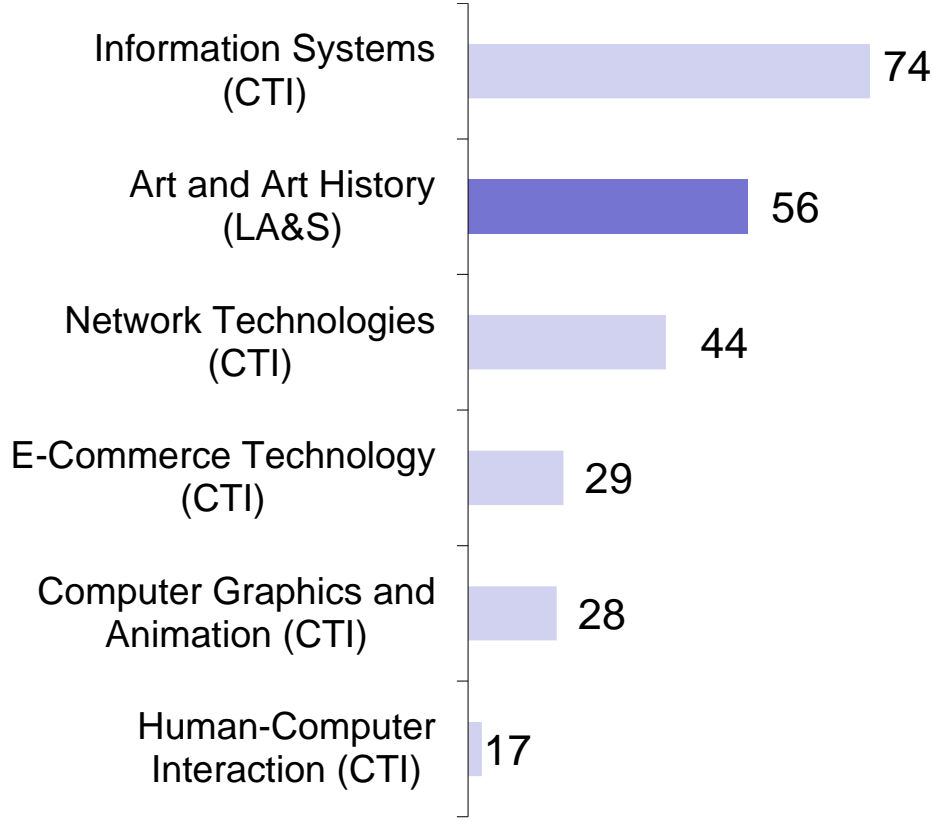


# Principle of Saliience

Greatest Number of Undergraduate Degrees Awarded in 2005

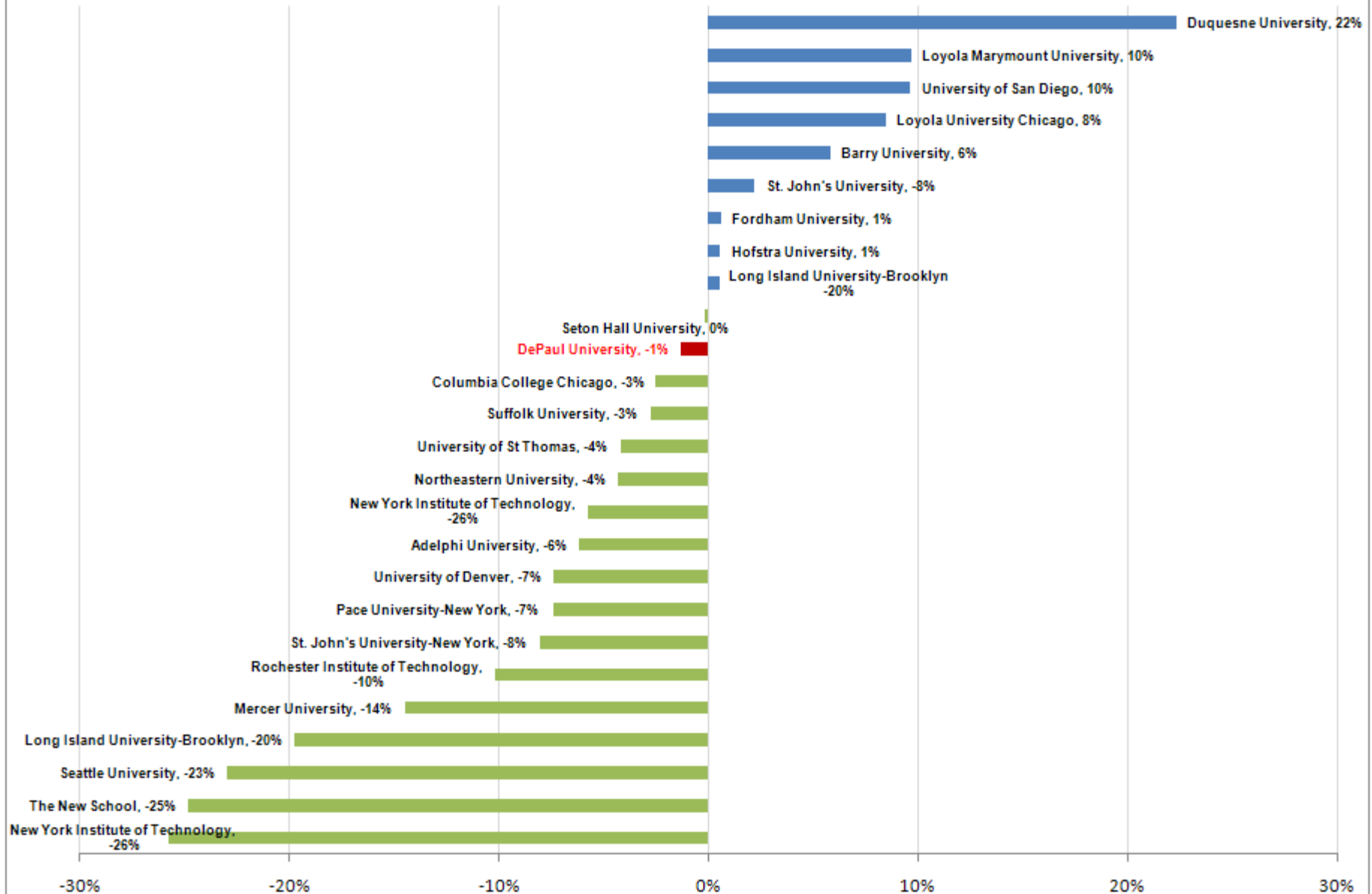


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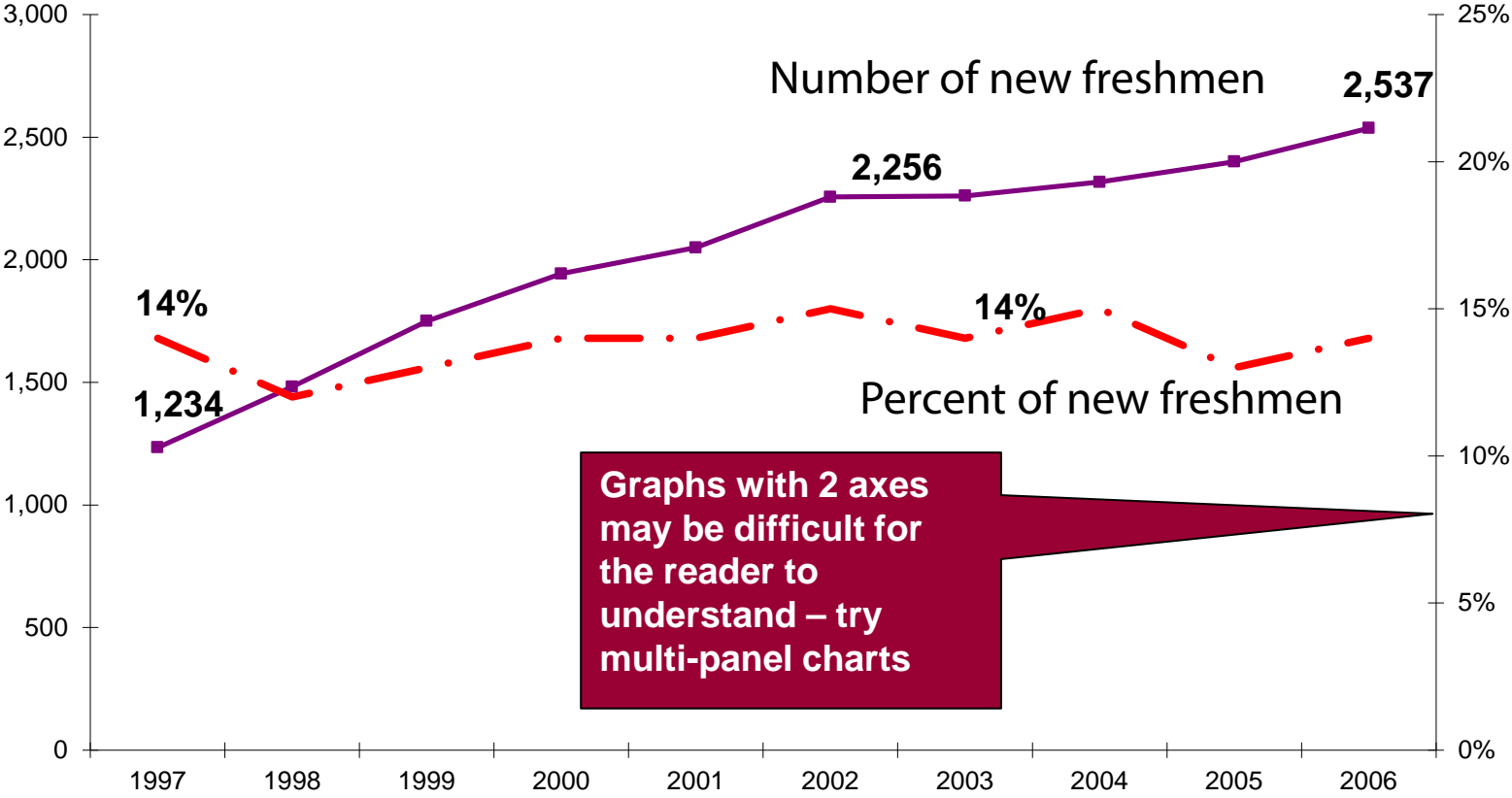


**Remember to start the scale at 0 – don't use default scale**

## Change in Gap: Difference of 2008 Rates from 2004 Rates

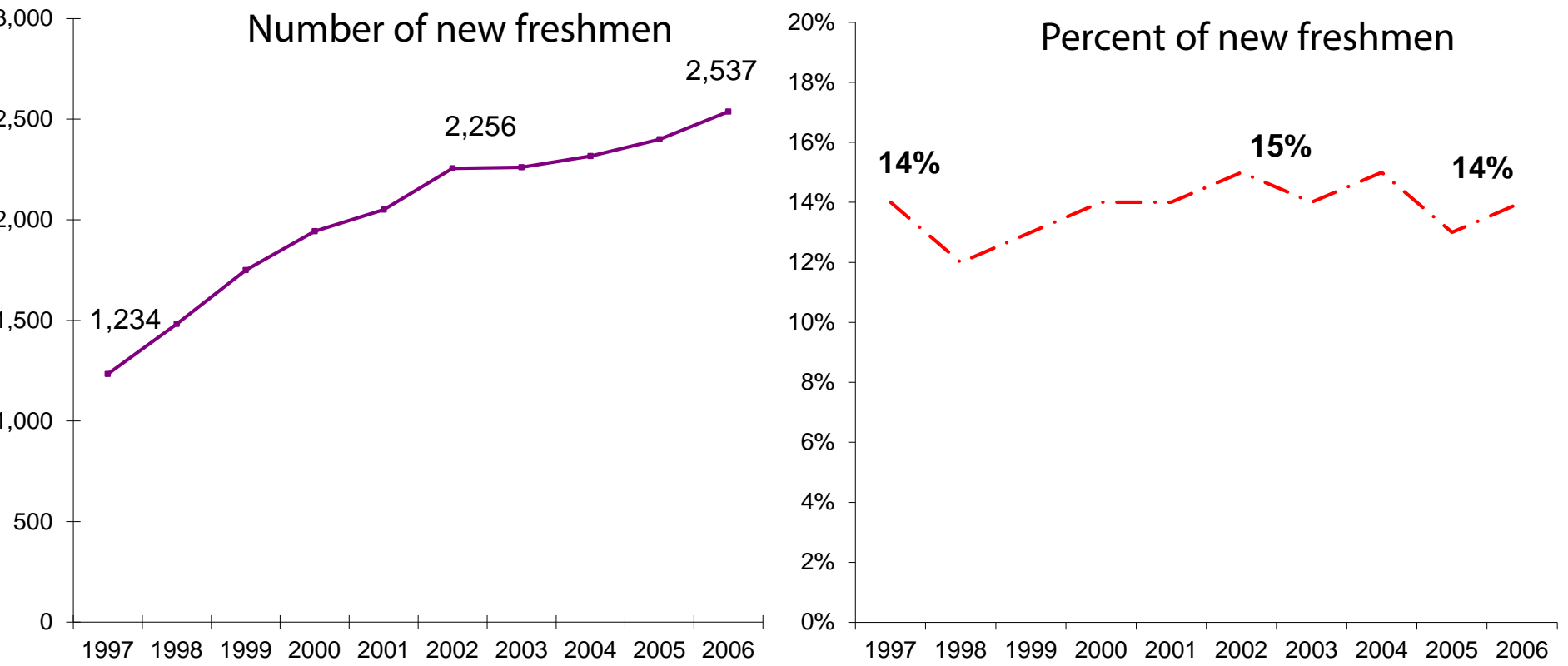


Hispanic students made up 14% of the freshman class in 2006, compared to 15% in 2002.

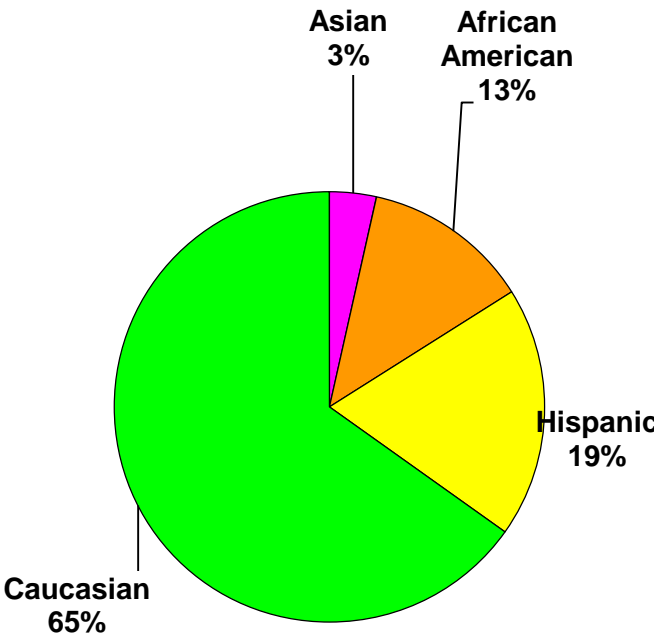


# Principle of Discriminability

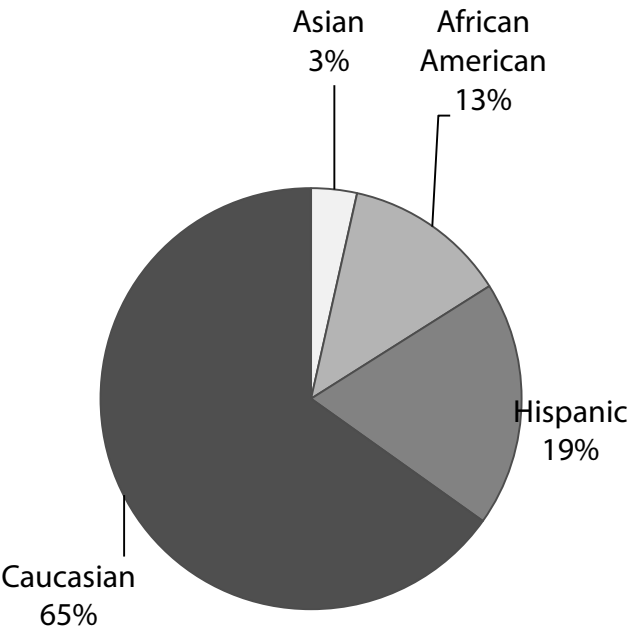
Although the number of freshmen has grown over the past five years, Asian students made up about 14% of the freshman class in 1997 and in 2006.



Principle of Discriminability



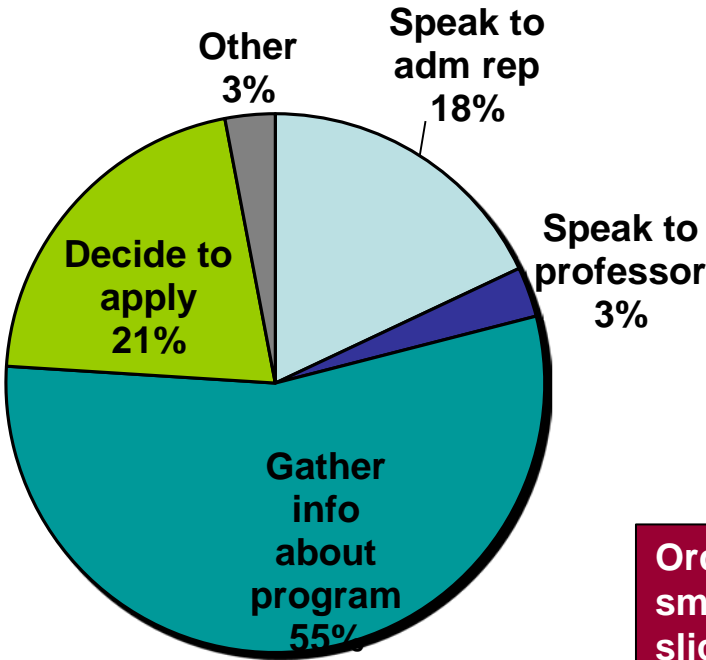
The color version



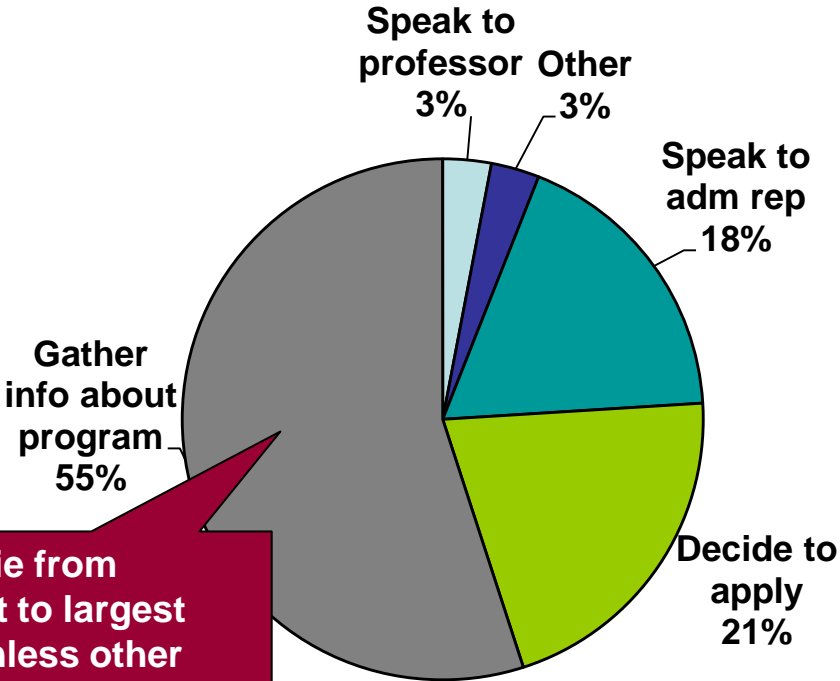
The black and white version

# Principle of Perceptual Organization

What did you hope to accomplish at the Information Session?



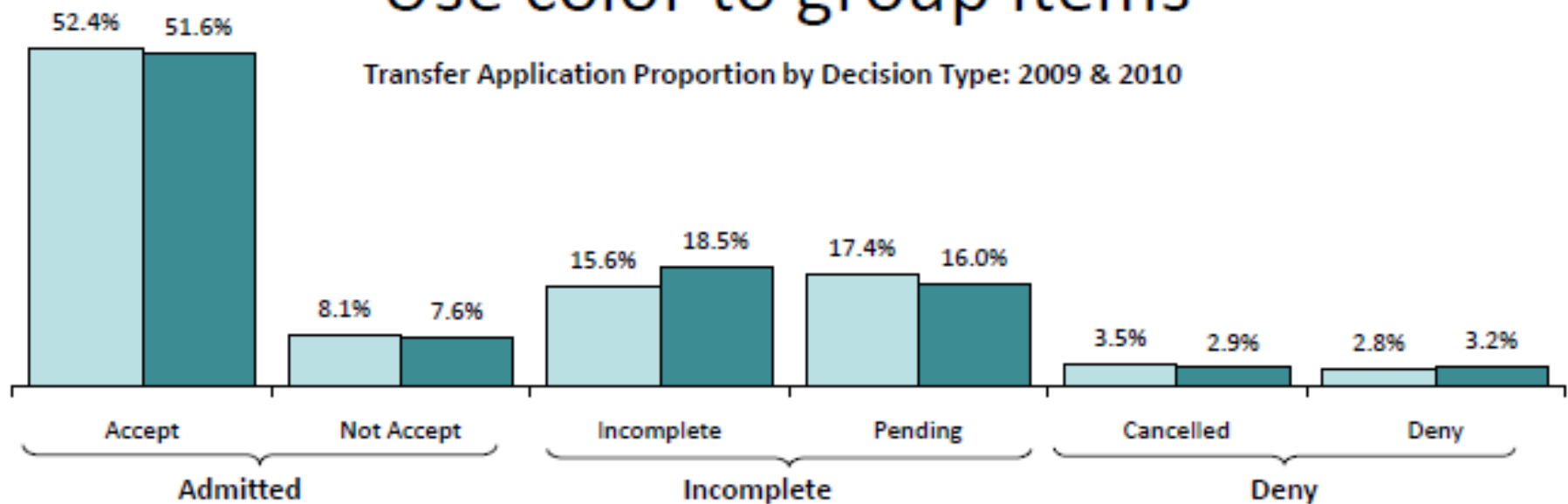
What did you hope to accomplish at the Information Session?



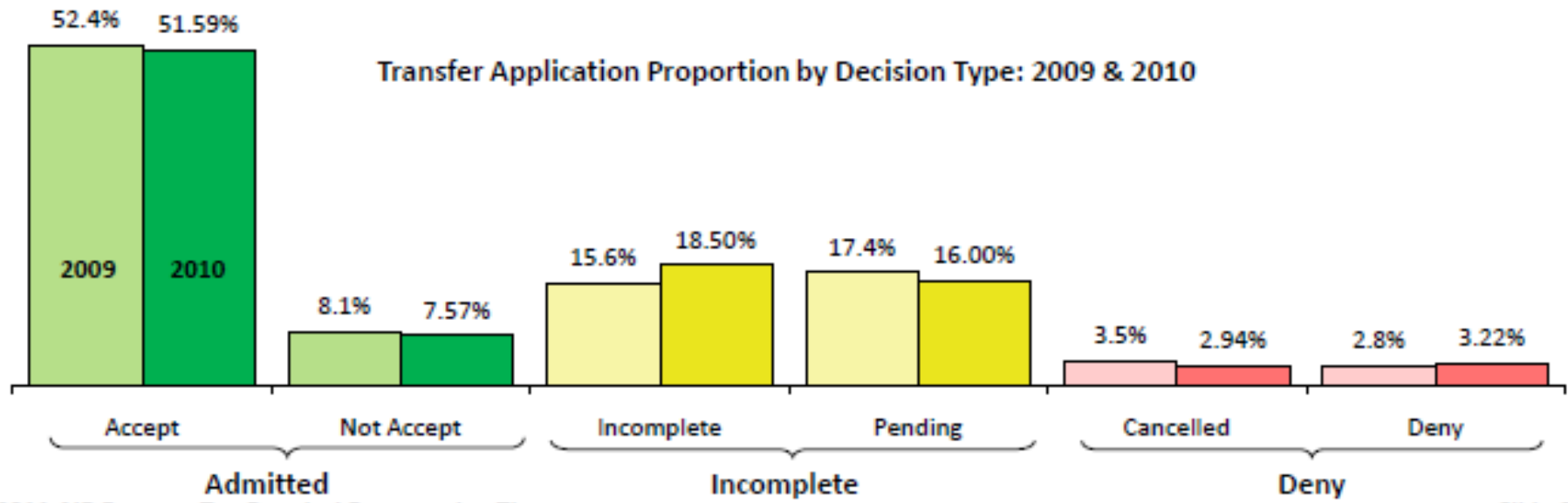
Order pie from smallest to largest slice, unless other order is more meaningful to reader

# Use color to group items

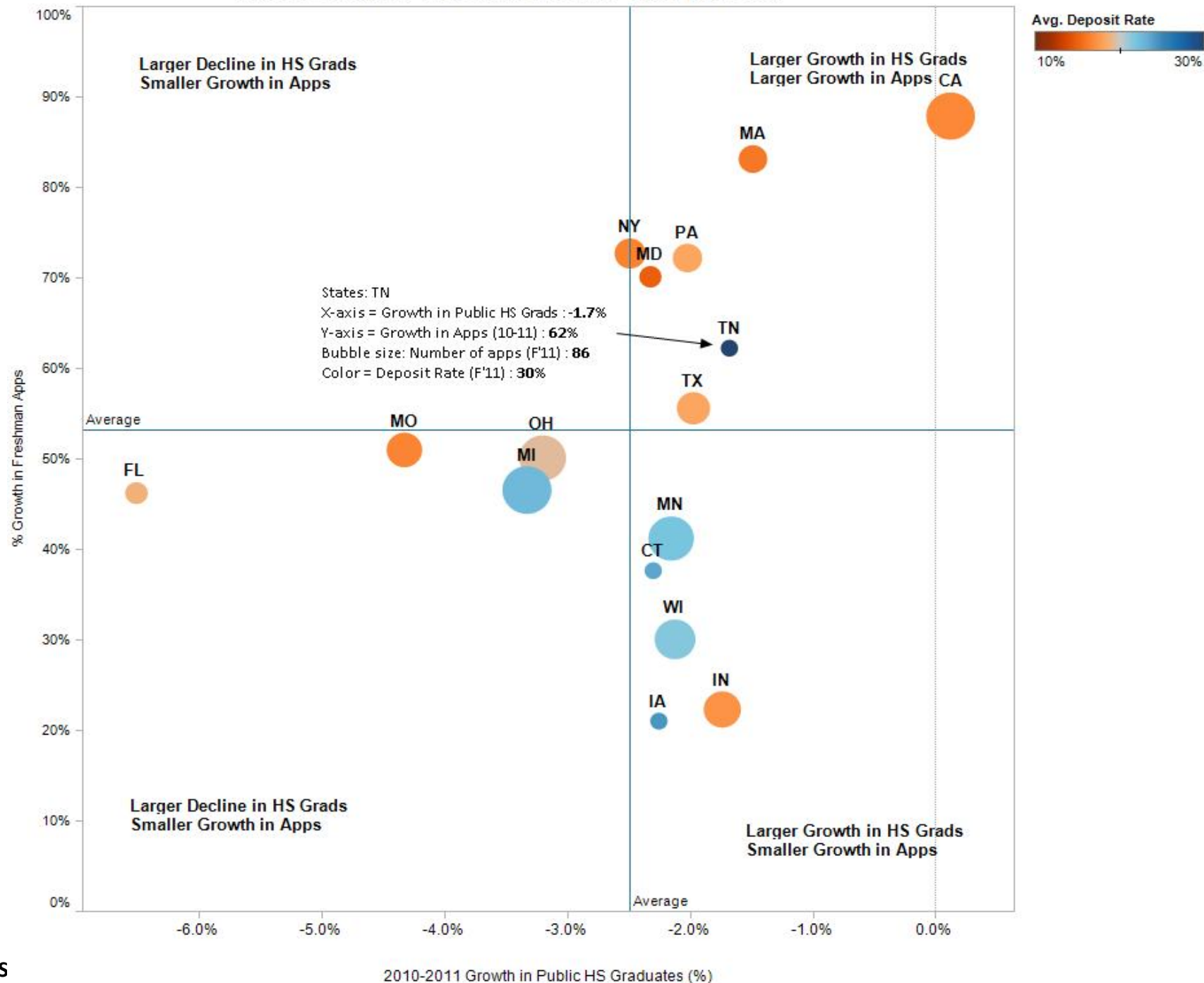
Transfer Application Proportion by Decision Type: 2009 & 2010



Transfer Application Proportion by Decision Type: 2009 & 2010

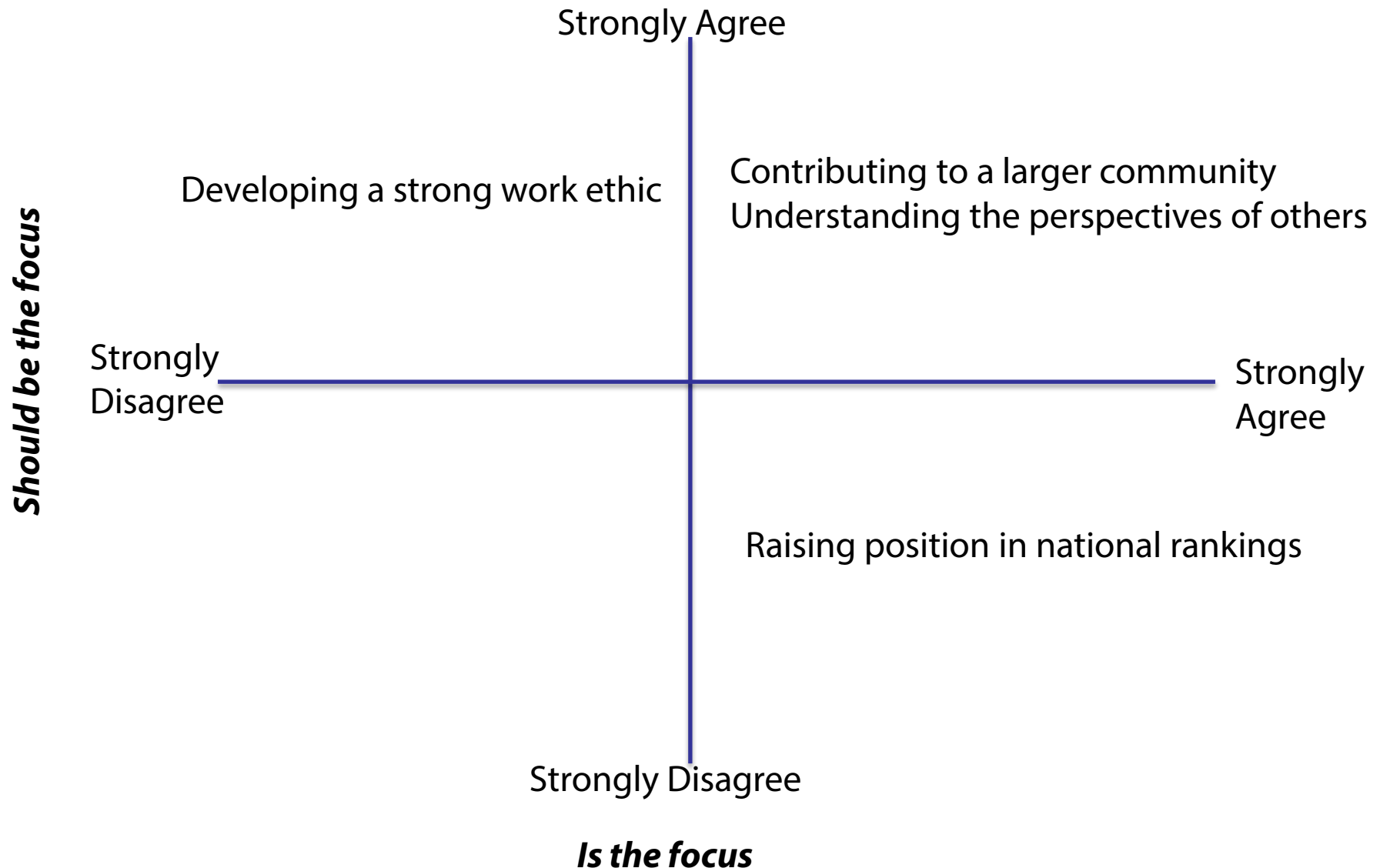


# Market Potential & Penetration Top Feeder States (Fall 2011)

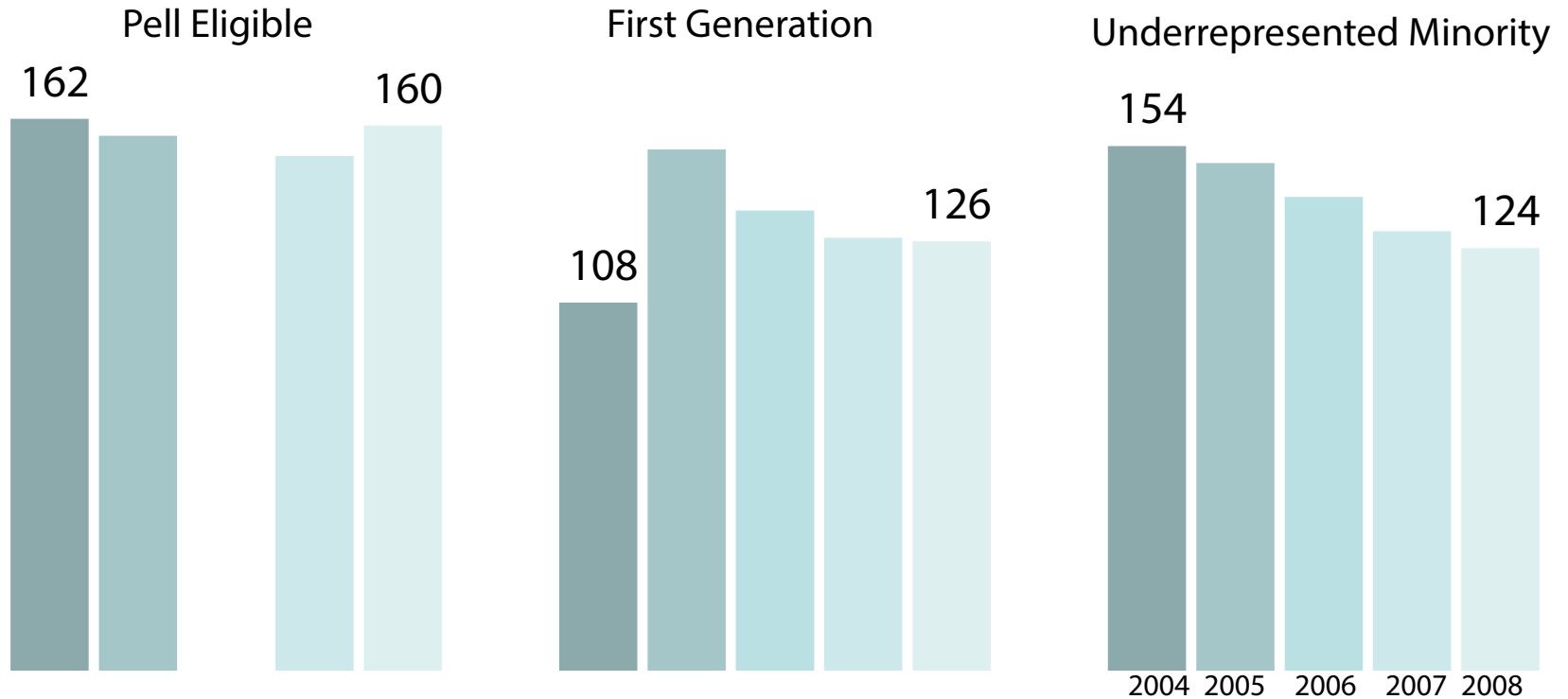




# What is the focus of this hypothetical institution?



## Enrolled CPS Freshmen by Mission Student Factors Fall 2004 - Fall 2008



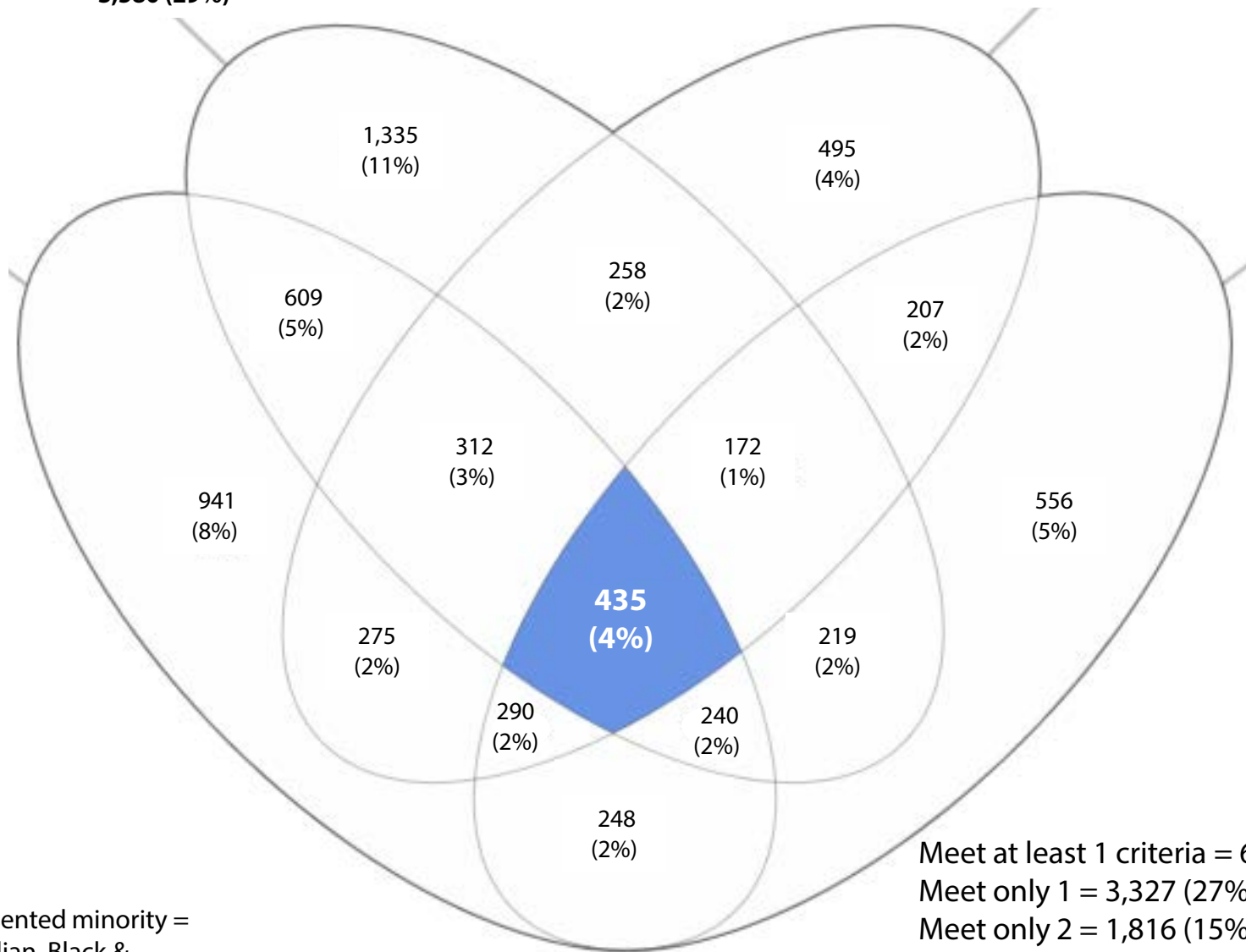
# 2004-2008 Enrolled Freshmen (n=12,331)

**First  
Generation  
3,580 (29%)**

**Underrepresented  
Minority  
2,444 (20%)**

**Pell  
3,350  
(27%)**

**Chicago  
2,367 (19%)**



Under-represented minority =  
American Indian, Black &  
Hispanic

Meet at least 1 criteria = 6,592 (53%)  
Meet only 1 = 3,327 (27%)  
Meet only 2 = 1,816 (15%)  
Meet only 3 = 1,014 (8%)  
**Meet all 4 = 435 (4%)**

# **Promote Understanding and Memory**

## **Principle of Compatibility**

A message is easiest to understand if its form is compatible with its meaning.

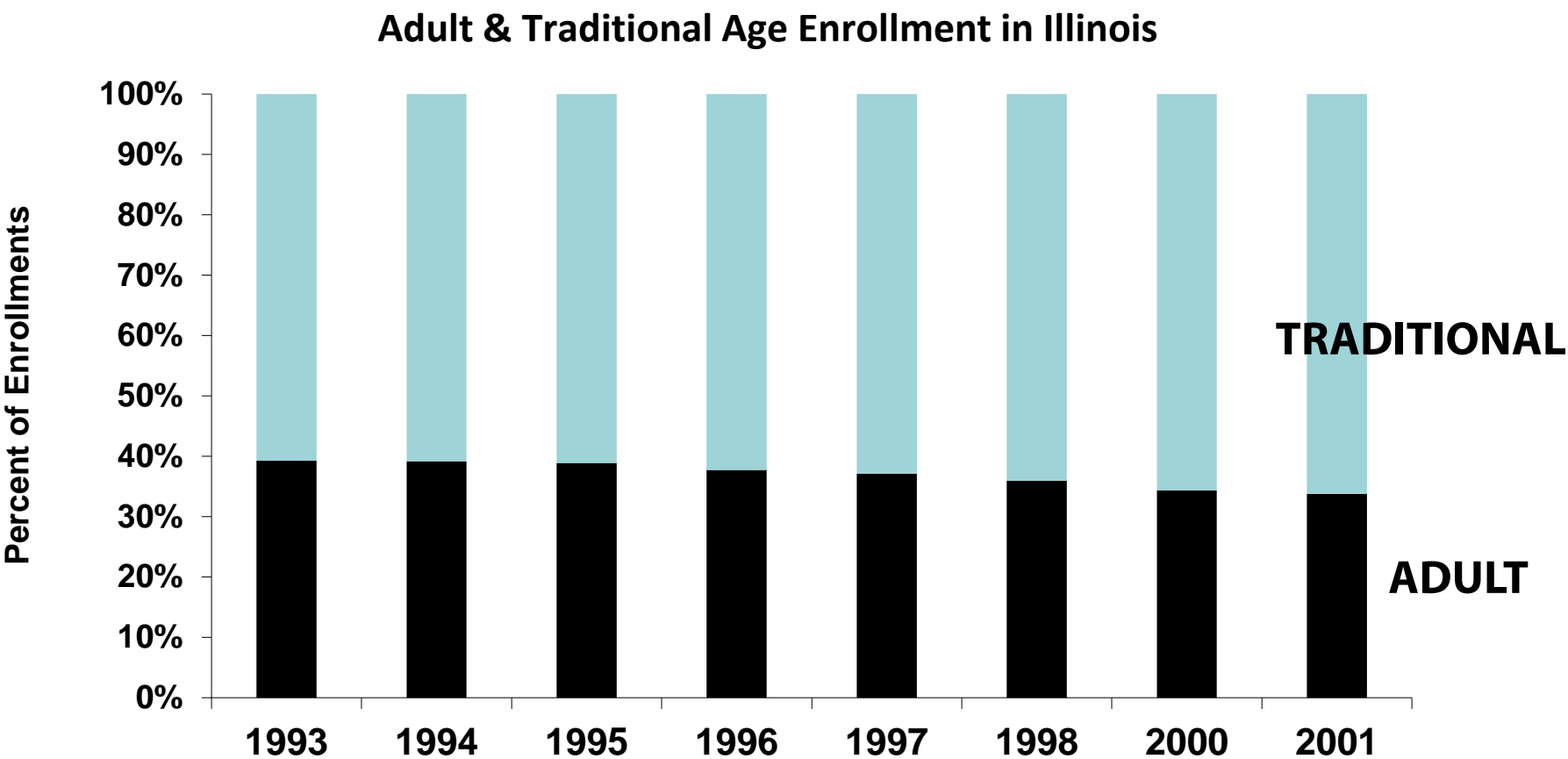
## **Principle of Informative Changes**

People expect changes in properties to carry information.

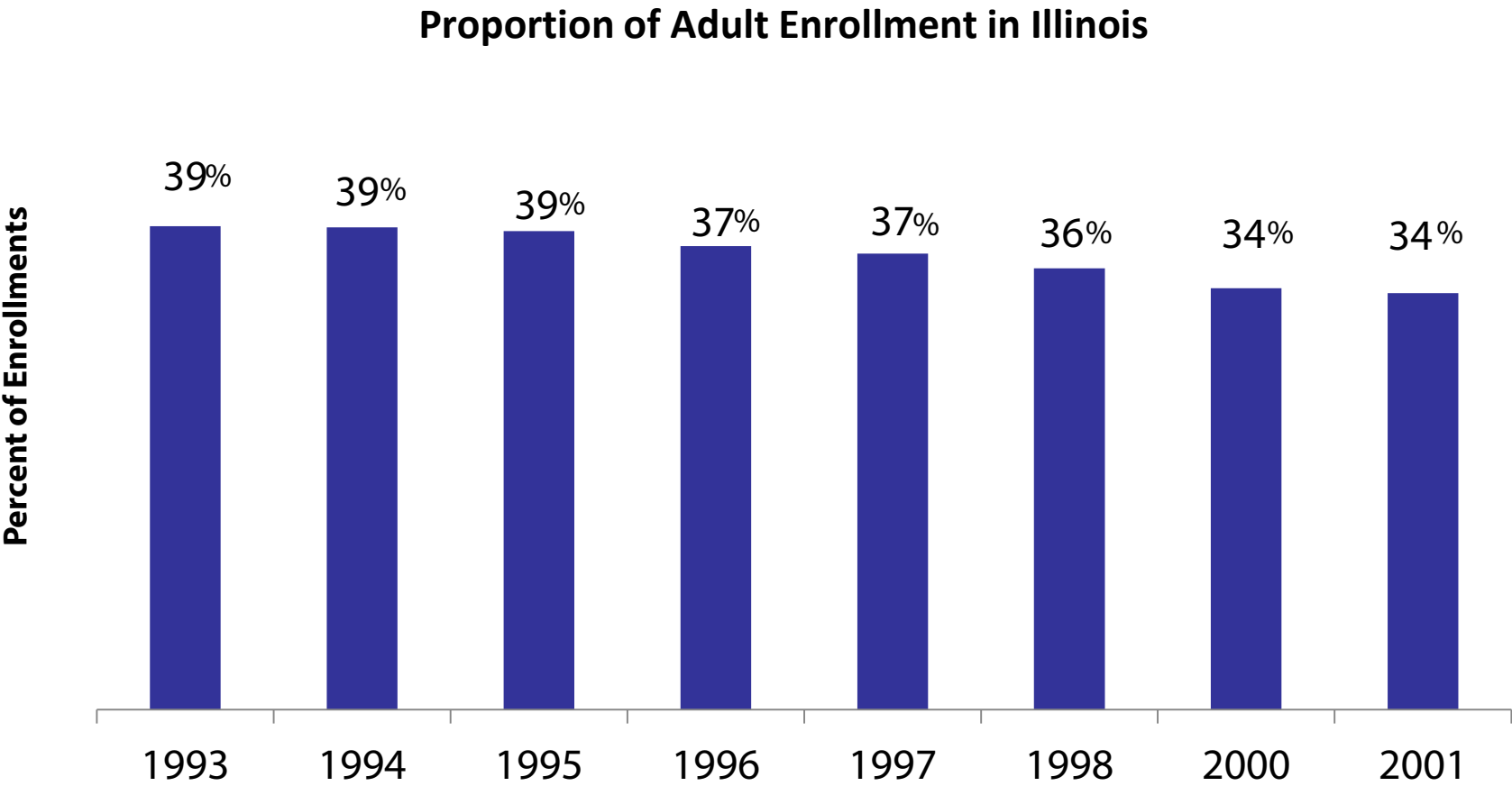
## **Principle of Capacity Limitations**

People have a limited capacity to retain and process information and will not understand a message if too much information must be retained or processed.

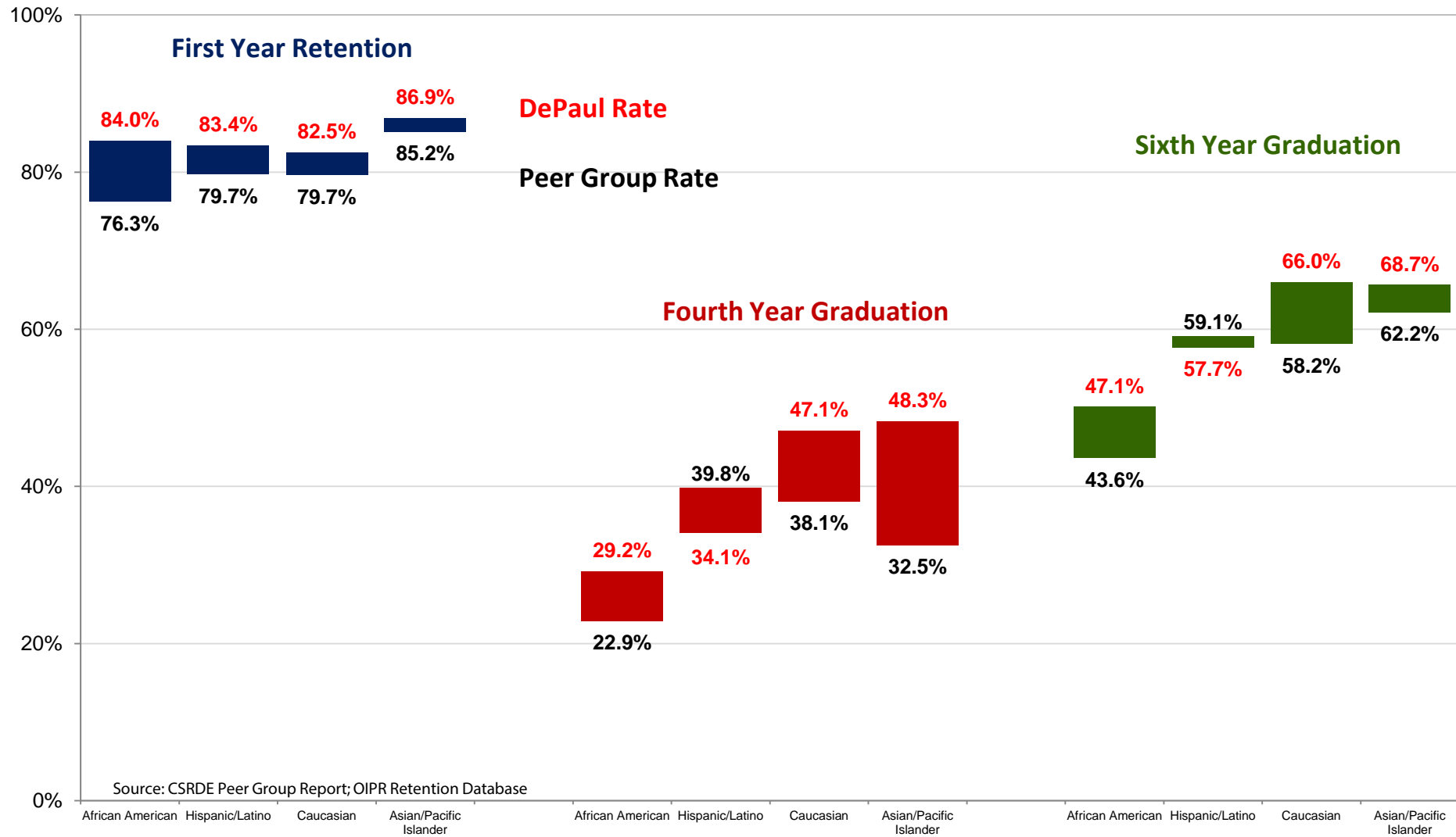
**Like national trends for the mid- to late 1990's, Illinois adult enrollment has declined, -12% from 1993 to 2001.**



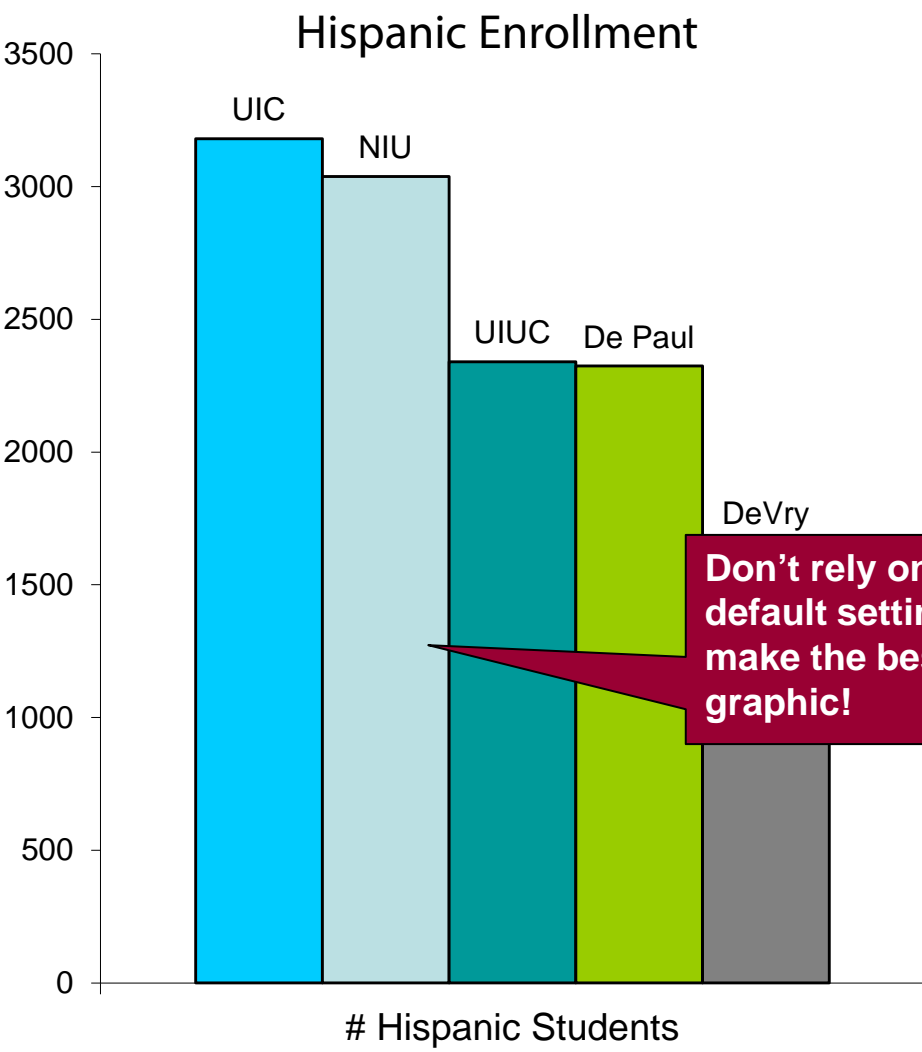
In Illinois, market share for adult learners has dropped from 39% to 34% from 1993 to 2001.



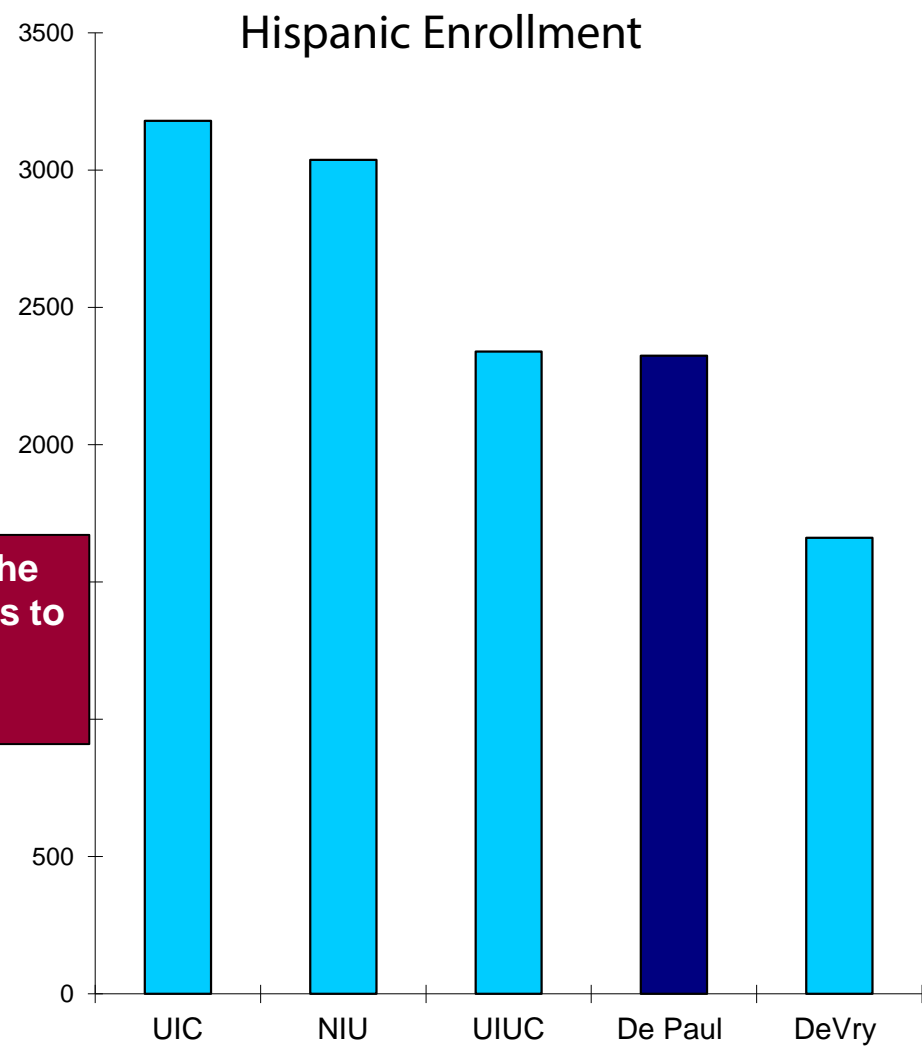
# Retention/Graduation Rate Comparisons by Race: DePaul and Selected Peer Group



# Principle of Informative Change



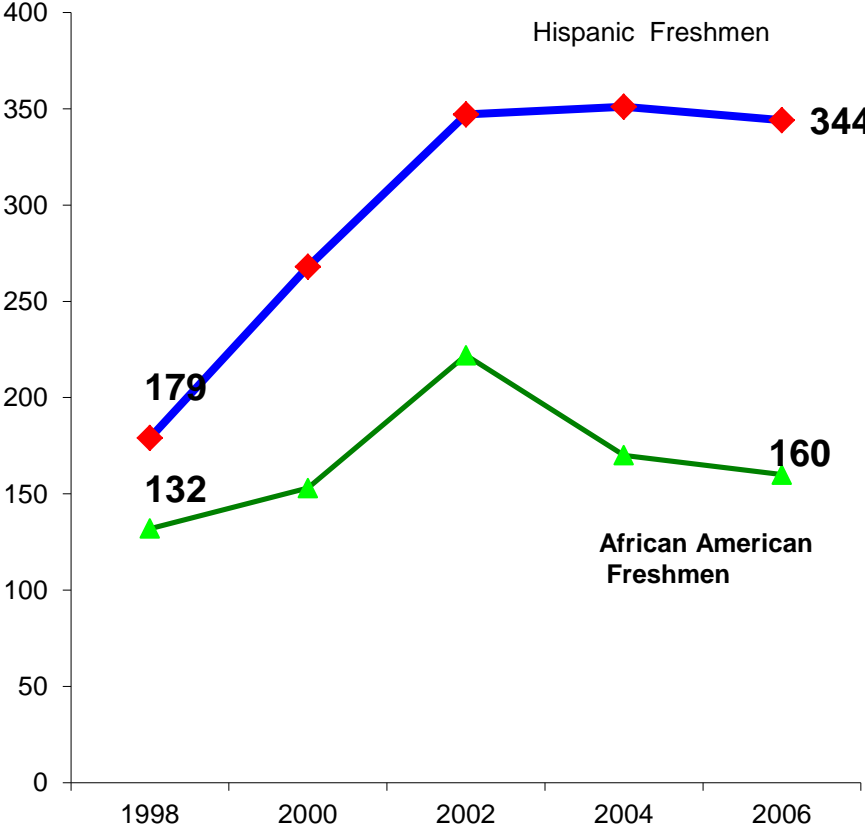
Don't rely on the default settings to make the best graphic!



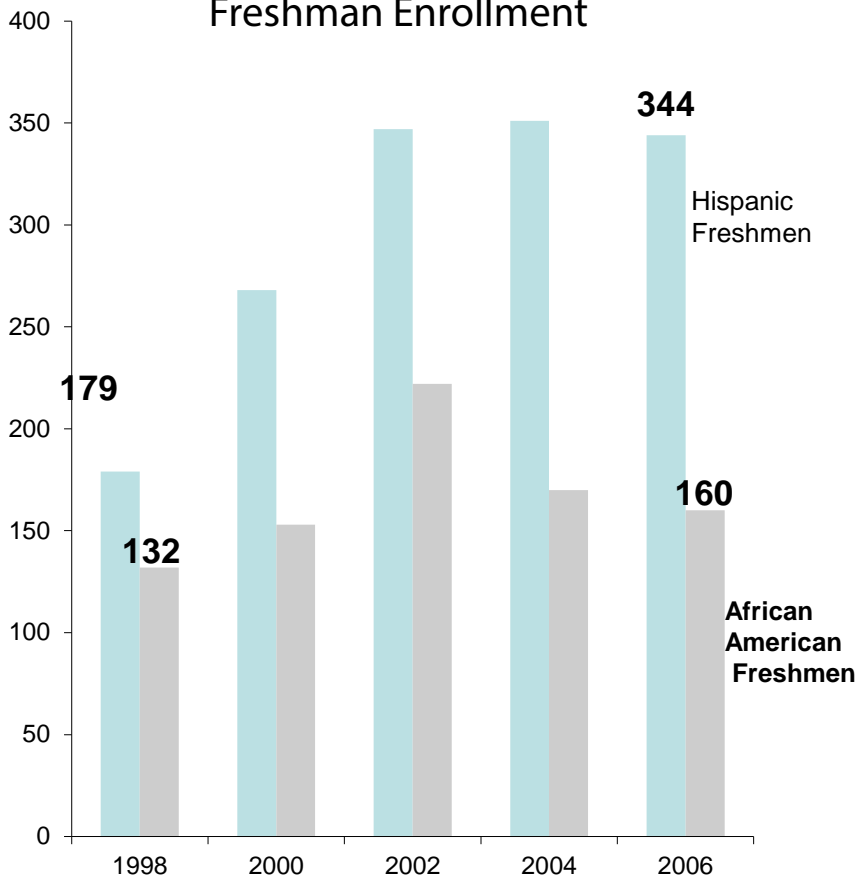


# Principle of Capacity Limitations

## Hispanic and African American Freshman Enrollment

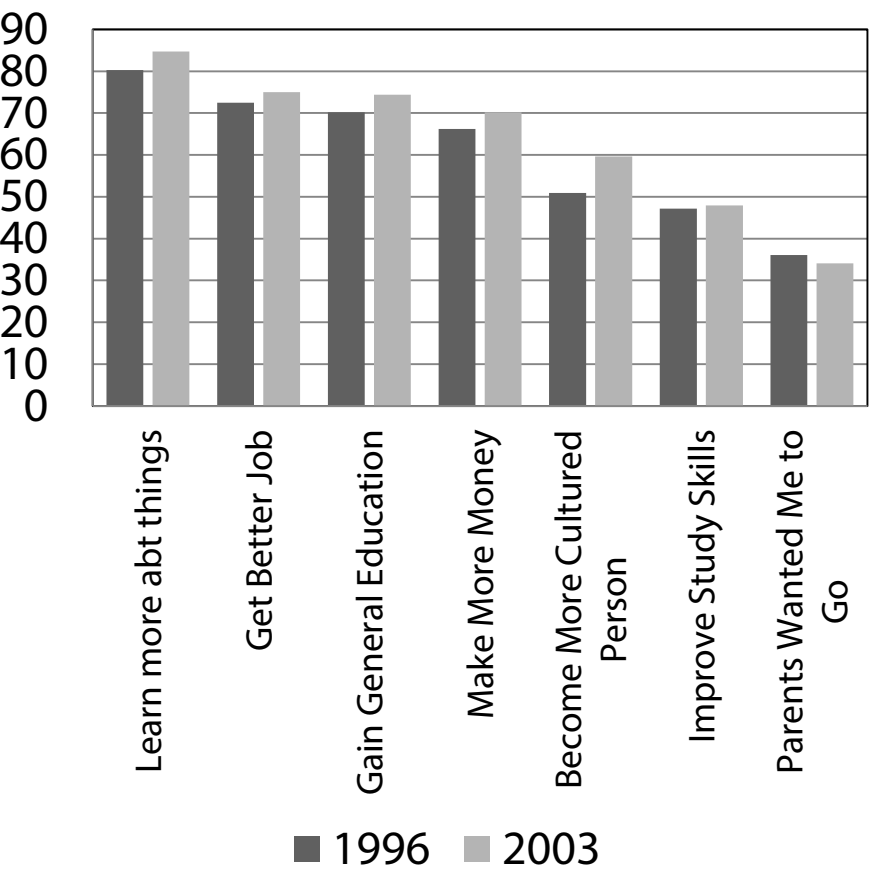


## Hispanic and African American Freshman Enrollment

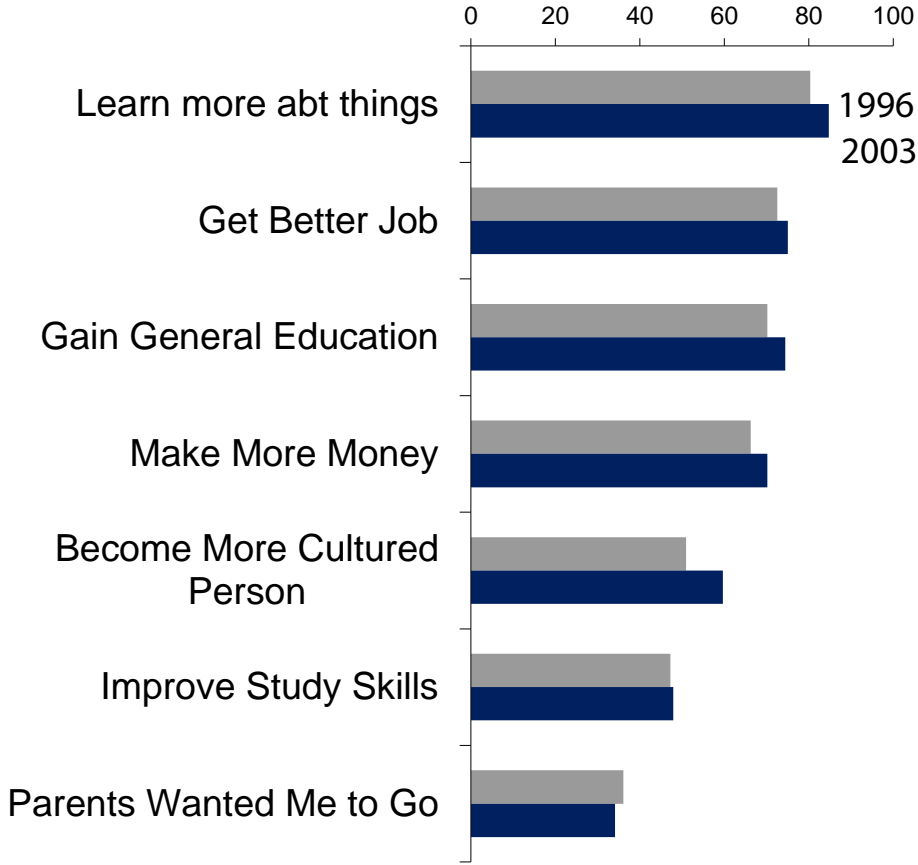


# Principle of Capacity Limitations

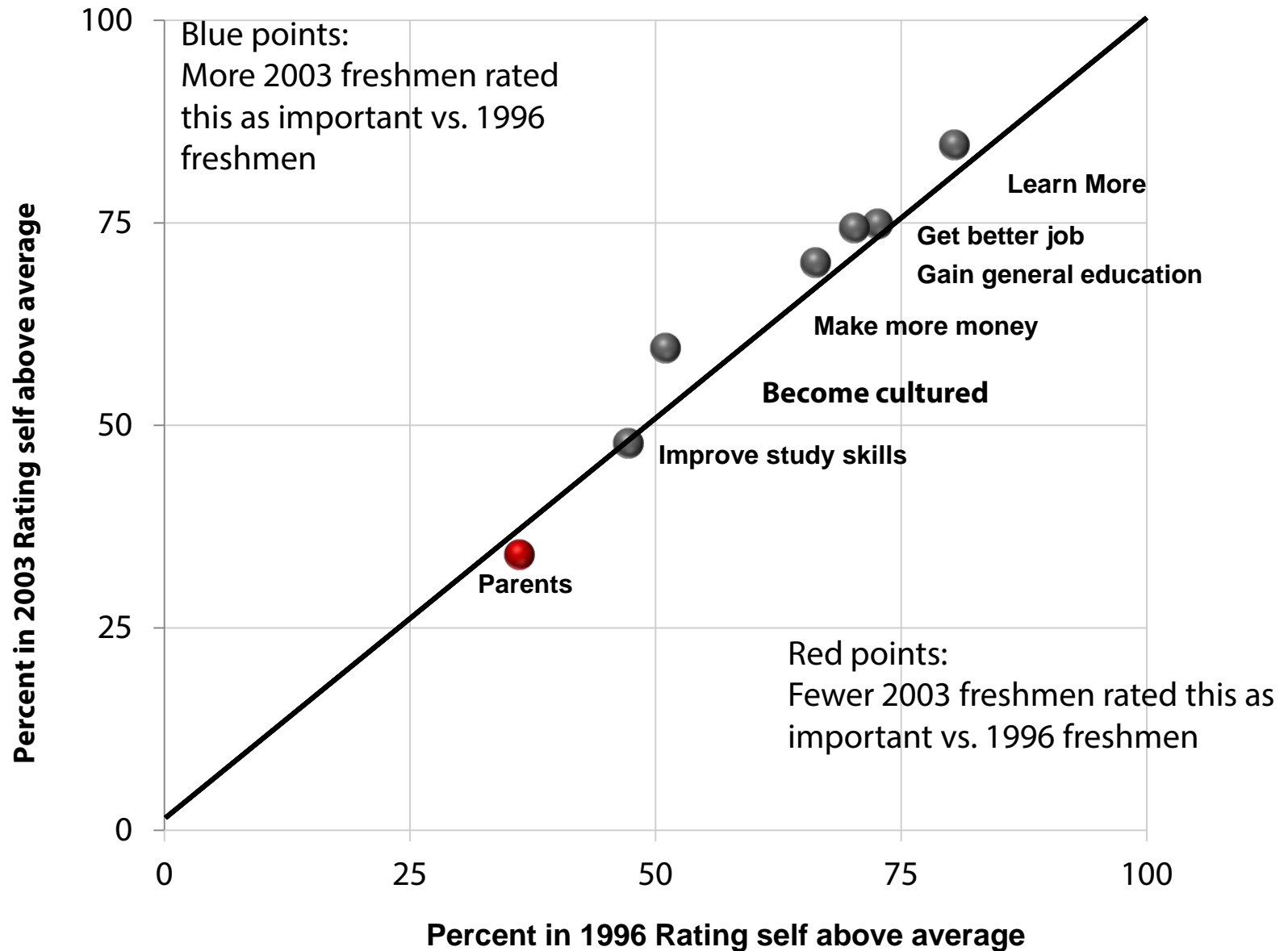
Very Important Reasons at least 30% of Freshmen  
Gave for Going to College  
CIRP Survey Results



Very Important Reasons at least 30% of Freshmen  
Gave for Going to College  
CIRP Survey Results



# Percent of 1996 & 2003 Freshman Reasons For Attending College (CIRP)

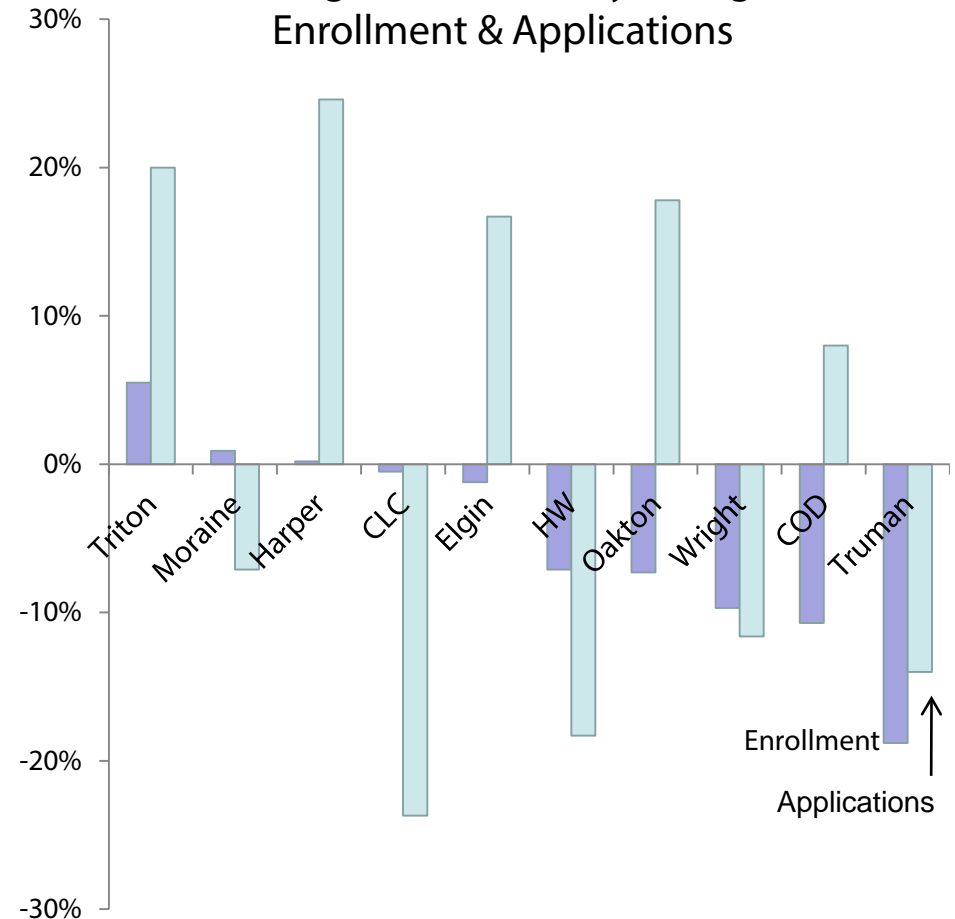


## Change in Community College Enrollments & Applications

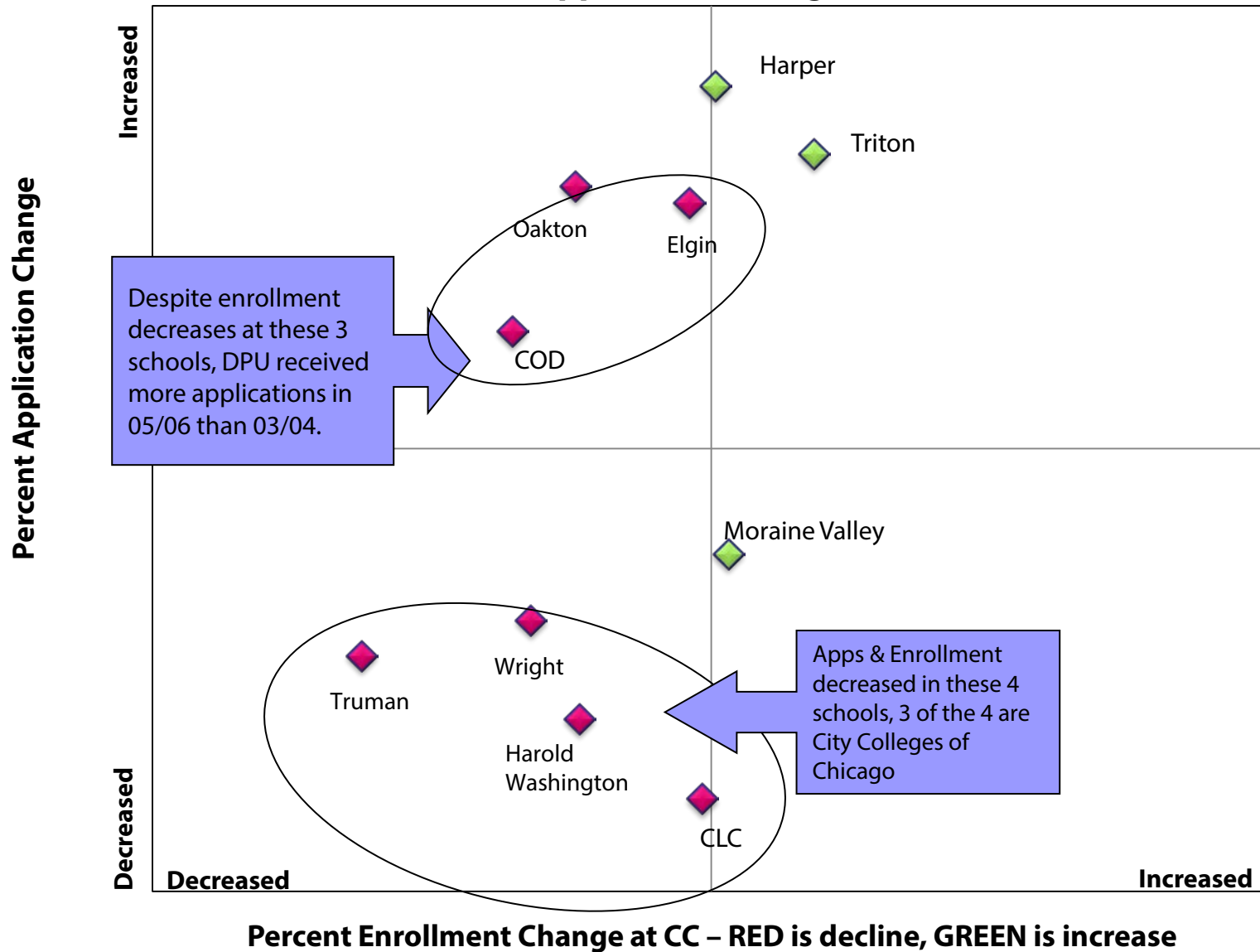
*Percent Change  
Fall 2003 to 2005*

	<u>Enrollment</u>	<u>Apps</u>
Triton	6%	20%
Moraine Valley	1%	-7%
Harper	0%	25%
CLC	-1%	-24%
Elgin	-1%	17%
Harold Washington	-7%	-18%
Oakton	-7%	18%
Wright	-10%	-12%
COD	-11%	8%
Truman	-19%	-14%
<b>Total</b>	<b>4%</b>	<b>12%</b>

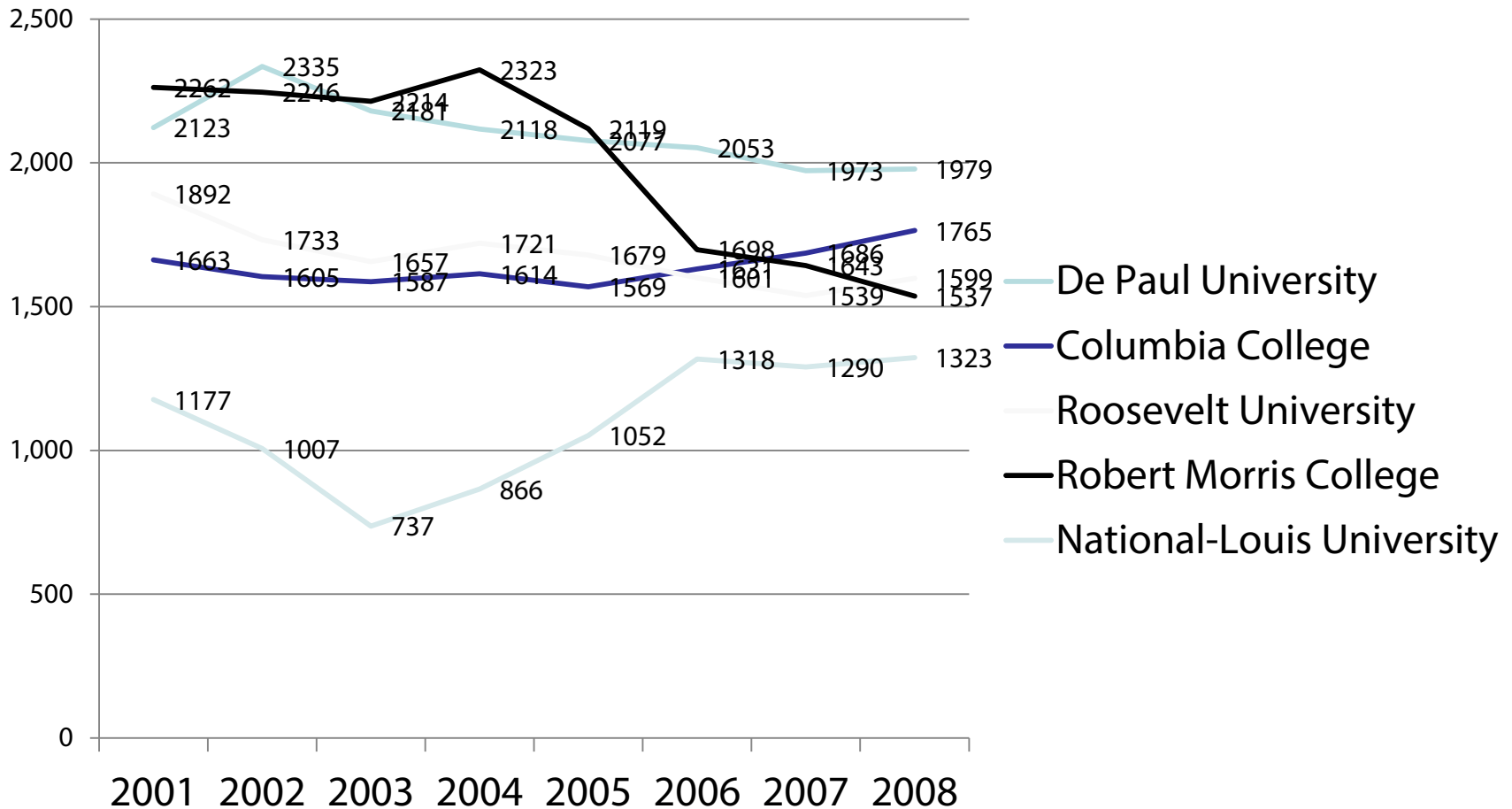
## Change in Community College Enrollment & Applications



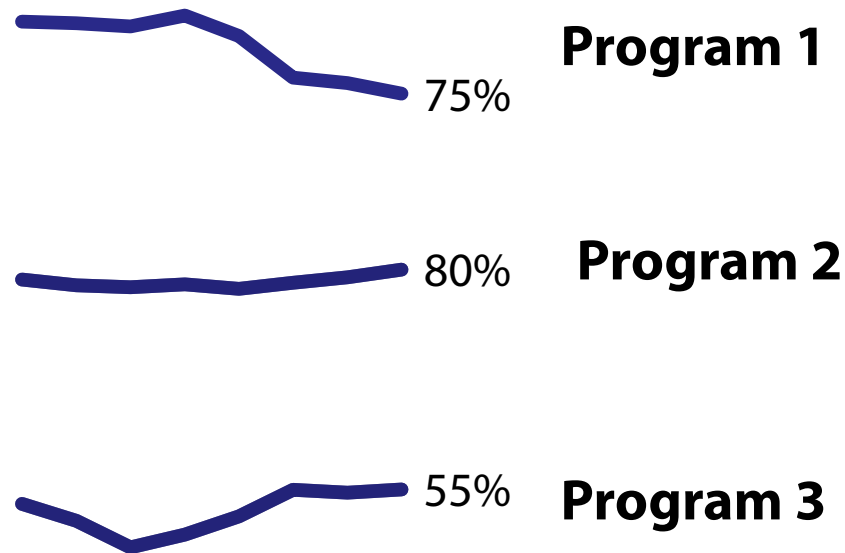
## Top 10 Community College Feeders by Enrollment and Application Change












# African American Enrollment at Illinois NFP Private Institutions



# Percent of students meeting learning outcome over time

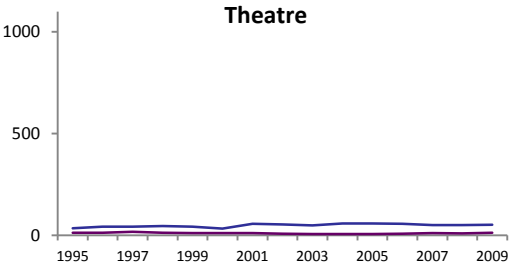
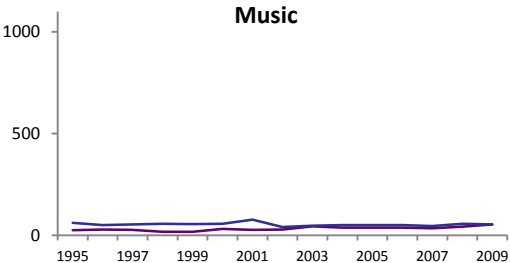
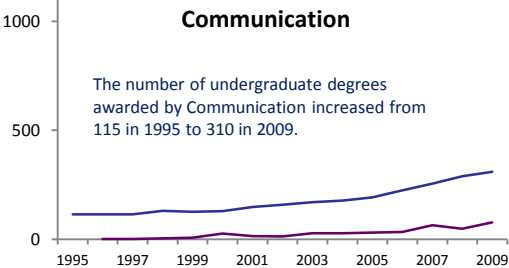
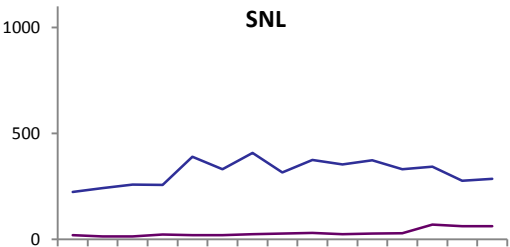
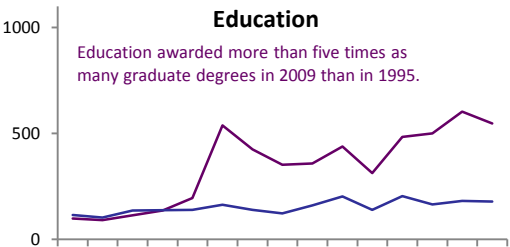
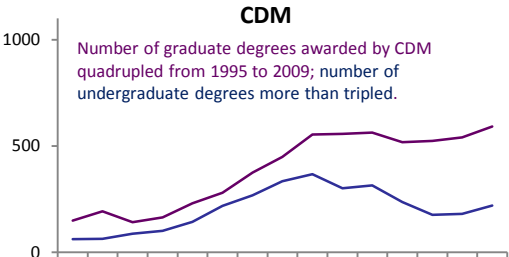
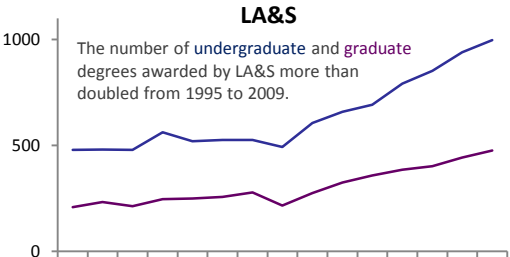
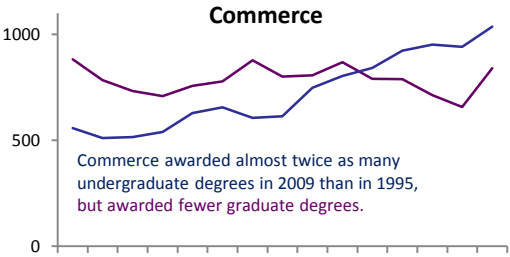


# Largest Master's Degree Programs in 2009

Program	2009 Degrees	1995 Degrees	% Change	1995 Rank	1995-2009 Degree Trend
Finance (MS and MBA programs)	198	283	-30%	1	
Teaching and Learning: Elementary Education	181	20	805%	19	
Information Systems	122	31	294%	13	
Computer Science	119	77	55%	5	
Business Information Technology	102	0	N/A	---	
Public Service Management	81	36	125%	10	
Language, Literacy & Specialized Instruction	70	0	N/A	---	
Software Engineering	68	0	N/A	---	
Human Services Counseling	67	22	205%	16	
Generalist Nursing	62	0	N/A	---	



Degrees Awarded, 1995-2009



Undergraduate degrees -blue  
Graduate degrees - purple

# 8 Principles

## Connect with audience

### **Principle of Relevance**

Communication is most effective when neither too much nor too little information is presented

### **Principle of Appropriate Knowledge**

Communication requires prior knowledge of relevant concepts, jargon, and symbols.

## Direct and hold attention

### **Principle of Salience**

Attention is drawn to large perceptible differences.

### **Principle of Discriminability**

Two properties must differ by a large enough proportion or they will not be distinguished.

### **Principle of Perceptual Organization**

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RUTH



GERARD



RICHARD



QUIZMASTER JOE KELLY



CLAUDE



HARVE



JOAN



BLUE NETWORK • SUNDAY EVENING



JACK

**Question 1: Name 4 things that can be changed to make this a better table.**

% completing pgm assmt by Ethnic1	2011	2012
American Indian/Alaskan Native	43	33
Asian/Pacific Islander	55	58
NA	60	50
Black	23	31
Hispanic	44	62
White	72	79
Grand Total	65	68

% completing pgm assmt by Ethnic1	2011	2012
American Indian/Alaskan Native	43	33
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Grand Total	65	68

## Better

Percent Completing Program Assessment by Race/Ethnicity	2011	2012
White	72	79
Hispanic	44	62
Asian/Pacific Islander	55	58
Unreported	60	50
American Indian/Alaskan Native	43	33
African American/Black	23	31
Total Percent Completing	65	68

# Question 2: When do you choose a table over a graph?

UGRD enrolls by location and college

	CCOMM	CLASS	COMMU	CSH	SCTI	SED
00 LOOP	4,075	3,567	1,324	1,798	2,509	
LPC	486	8,732	1,278	4,662	1,510	
NAPERVILLE				10		
OAKFST/STH						
OFFCAMPUS		24		7	23	
OHARE				2		
ONLINE	127	283	223	281	1,030	
OVERSEAS						
STDYABROAD	76	259	11	1	6	
<b>Total</b>	<b>4,764</b>	<b>12,865</b>	<b>2,836</b>	<b>6,761</b>	<b>5,078</b>	
LOOP	4,273	2,735	1,392	1,707	2,663	
PC	504	8,404	1,301	4,120	1,640	
APERVILLE				7		
OKFST/STH						
FCAMPUS	38	14		25	8	
RE				1		
NE	18	492	475	336	1,314	
SEAS						
ABROAD	117	128		1	15	
	4,950	11,773	3,168	6,197	5,640	
	4,315	2,194	1,334	1,453	2,567	
LE	441	7,553	1,273	3,766	1,602	
STH						



# **“Tables make it easy to *look up* values.”**

**Few, 2004**

## **When to use tables (if any of these are true)**

- ☐ The document you produce will be used to look up individual values.
- ☐ It will be used to compare individual values.
- ☐ Precise values are required.
- ☐ The quantitative information to be communicated involves more than one unit of measure (can be put in multiple columns easily)
- ☐ Consider tables also when you have a small number of values to show the reader.

# Question 3: Who is this man and why is he important?





## ***The 6 Design Principles for Graphical Excellence (Tufte)***

**The purpose of an evidence presentation is to assist thinking.**

**The principles of analytical design are derived from the principles of analytical thinking. These principles relate to both producing presentations and consuming presentations—after all, we're all in this together.**

**Show **comparisons**, contrasts, differences**

**Show **causality**, mechanism, structure, explanation**

**Show **multivariate** data—more than 1 or 2 variables**

**Completely **integrate** words, numbers, images, diagrams.**

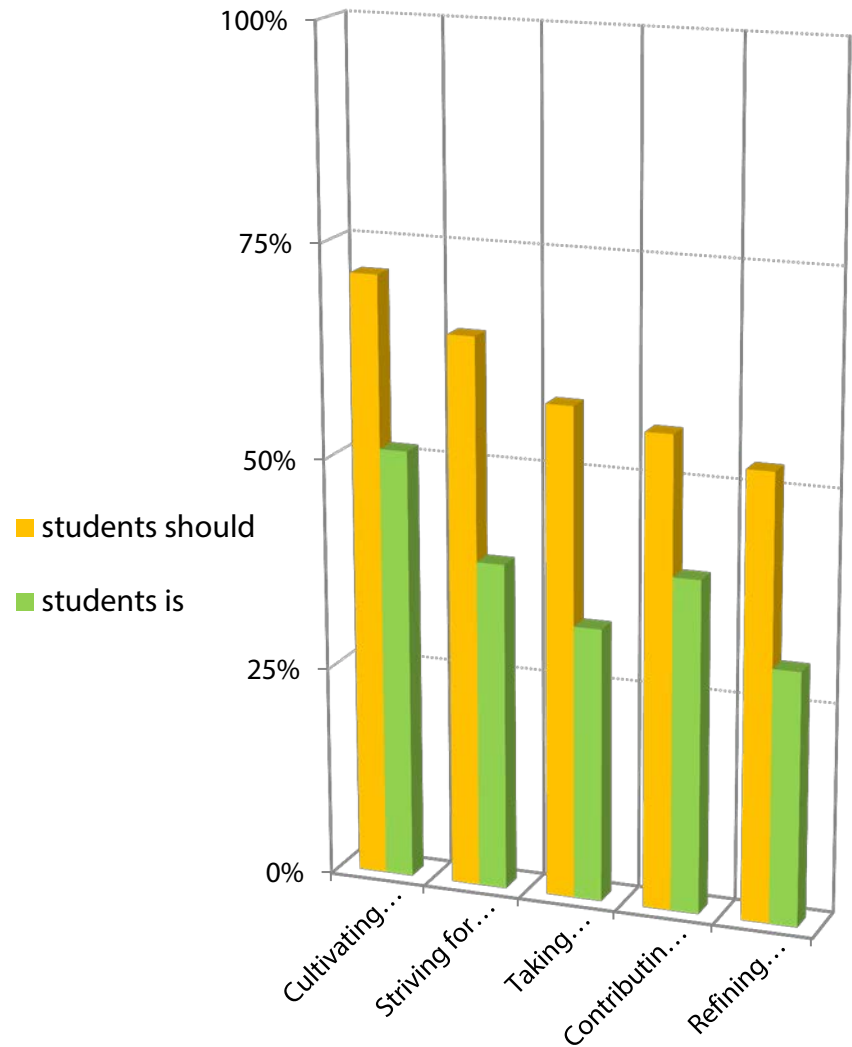
**Documentation**—take responsibility for the analysis, demonstrate credibility; give credit.

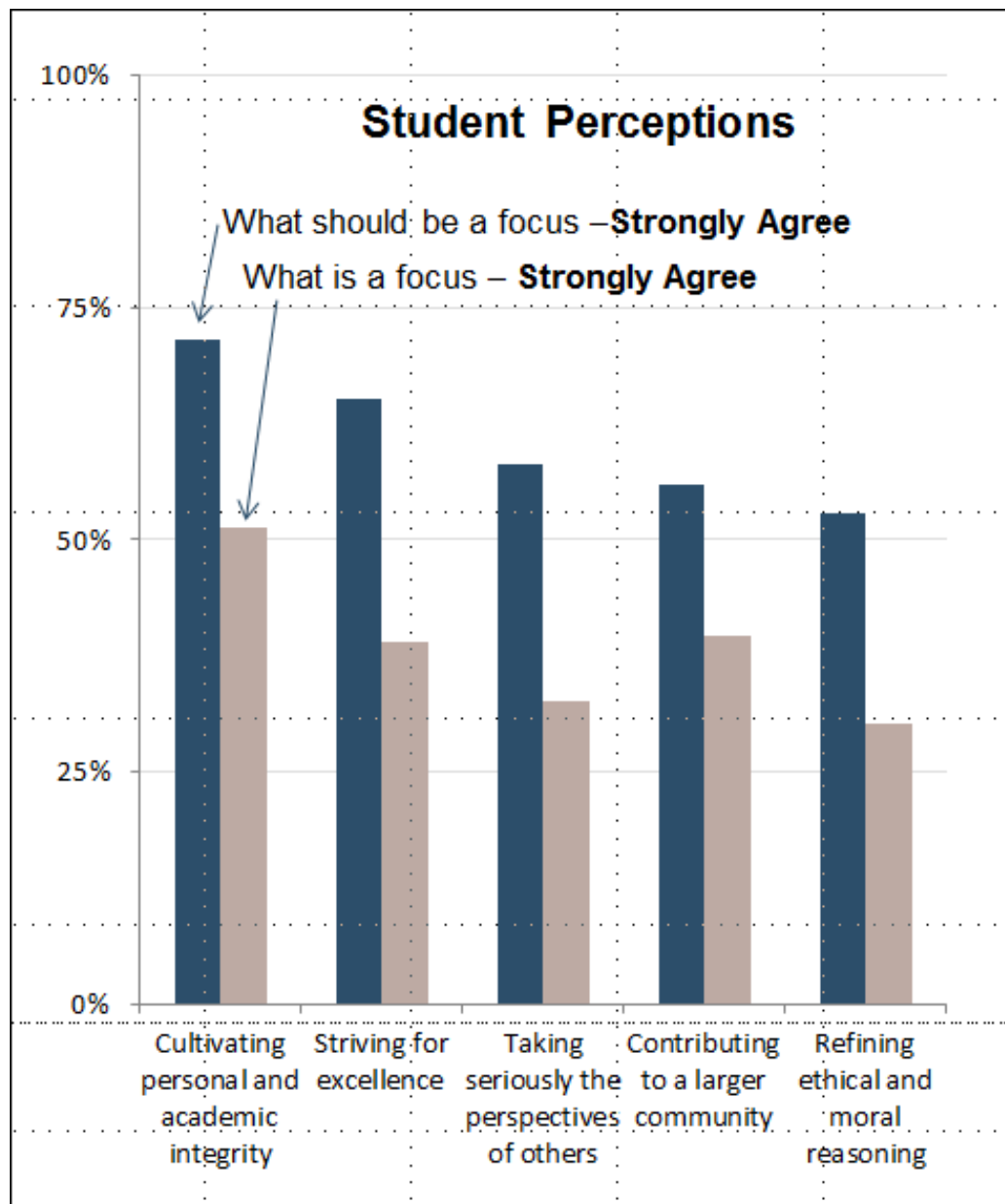
**Content** – **in the end, it is about the data** - Analytical presentations ultimately stand or fall depending on the quality, relevance, and integrity of their outcomes.

*Taken from E. Tufte, Beautiful Evidence, pp. 120-139.*

# Question 4: What are 3 ways to improve this graph?

Student Perceptions





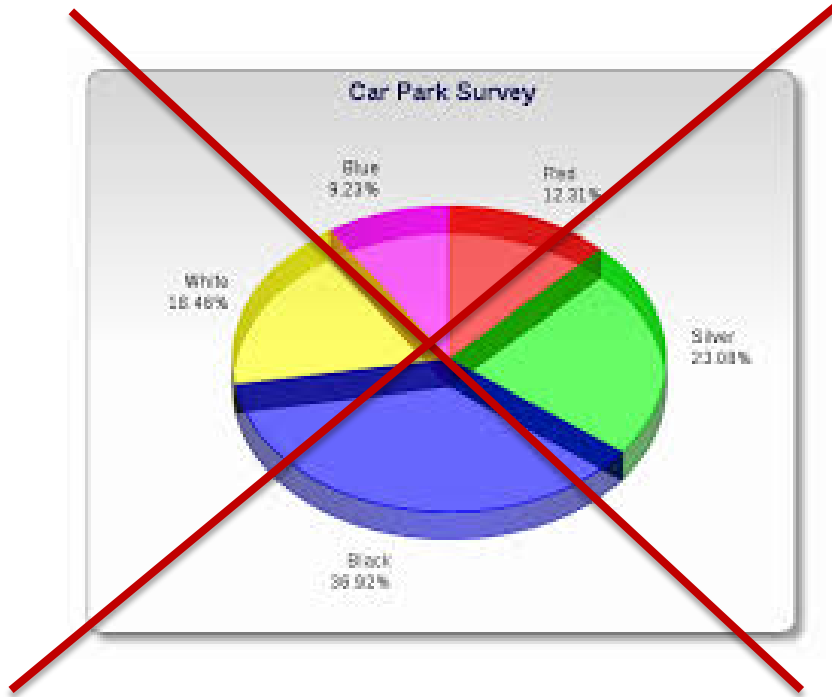
## **Question 5: Complete this sentence:**

**“Consider saving the \_\_\_\_\_ for dessert.”**

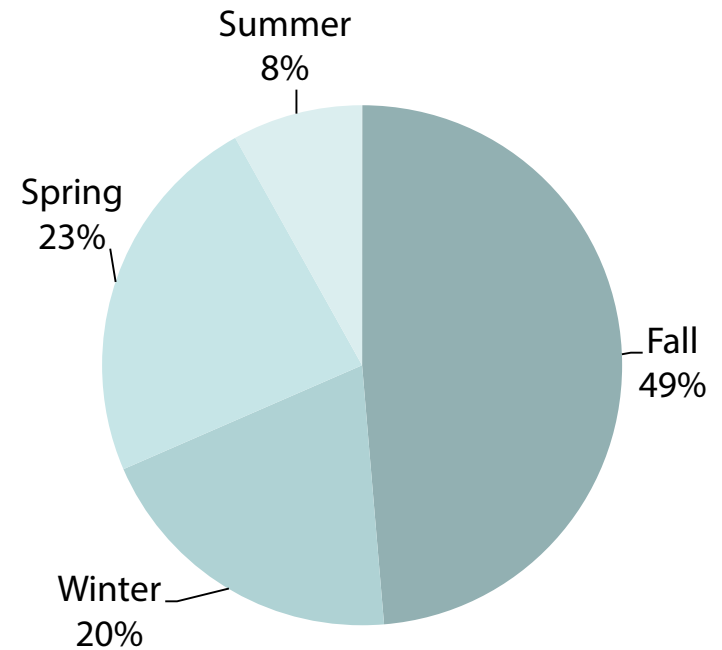
**“Consider saving the**



**for dessert.”**



**200 Annual Program Participants**

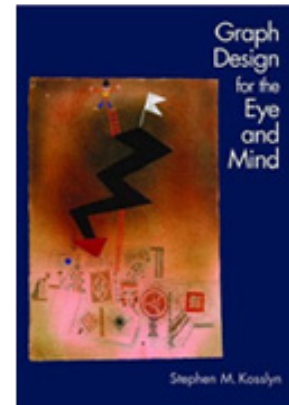


# Question 6: What are Stephen Kosslyn's 3 overarching principles?

Sometimes I get sick of theory. It's hard to know whether the stories we spin should be taken seriously. One way to do a reality check is to see whether a theory leads to specific applications. The fact that science leads to technology is one of its major strengths, and if a theory is correct, I believe that something applied should follow from it.

This book explores some applications that follow from cognitive neuroscience, particularly in the domains of perception and memory. The book presents a set of principles, based on empirical findings, for presenting information effectively in graphs. I not only make use of information about the number of elements that can be held in mind at once, the size labels must be in order to be read easily, and so forth, but also exploit implications of some relatively subtle effects arising from the range of spatial frequency channels in vision, the separation of the "what" and "where" visual pathways, and the like.

The first edition, *Elements of Graph Design*, was published by W. H. Freeman & Co. in 1994, but when it went out of print in 2004, I decided to use it as the foundation for the present book, which differs from that one in five ways: The principles underlying my recommendations have been revised and reorganized; I have updated the review of research on graphic communication; I have integrated the relevant science of perception and cognition into the text (rather than relegating it to endnotes); I have corrected errors that were present in the earlier edition; and, finally, the book has been redesigned visually for easier reading.



**Graph Design for the  
Eye and Mind**  
2006  
Oxford University Press

<http://isites.harvard.edu/icb/icb.do?keyword=kosslynlab&pageid=icb.page250941>

# Kosslyn's 8 Principles

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### **Principle of Informative Changes**

People expect changes in properties to carry information.

### **Principle of Capacity Limitations**

People have a limited capacity to retain and process information and will not understand a message if too much information must be retained or processed.

**Good design principles are linked to the way the brain attends to, processes and remembers information.**

# Bonus Round: Match the quotes with the authors!

1. Steven Kosslyn

Use is a result of **long-term percolation of concepts, theories and findings in the climate of informed opinion (paraphrase)**

2. Colin Ware

***“Tables make it easy to *look up* values.”***

3. Stephen Few

***“It is a psychological, not a moral fact that people are unwilling to expend energy, particularly if the outcome is unknown.”***

4. Edward Tufte

***“Often, to see a pattern is to understand the solution to a problem.”***

5. Carol Weiss

**Graphical excellence is substance, statistics, and design.**



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***"Often, to see a pattern is to understand the solution to a problem."***

Graphical excellence is substance, statistics, and design.

## Things to consider when constructing the final assessment report

- ☐ I have a good abstract which includes
  - ☐ A full citation
  - ☐ Answers to all the relevant questions
  - ☐ The most important information
  - ☐ The same type and style of language as my full report
  - ☐ Key words and phrases that identify important ideas
  - ☐ Powerful concise language
  - ☐ No jargon or acronyms
- ☐ I had a peer review/proof it
- ☐ I could share this with the President's Office
- ☐ For tables – look-up values are required/preferred
  - ☐ I sorted numbers in logical order
  - ☐ I removed all unnecessary lines and grids
  - ☐ I followed design guidelines for good tables
- ☐ For graphs
  - ☐ I chose 2D graphs, no matter what my friends at Microsoft said
  - ☐ I used order, color, placement effectively to help readers know what's important
  - ☐ I tried to follow Kosslyn's 8 principles
    - ☐ connected with the reader,
    - ☐ directed them through the graph,
    - ☐ and helped them understand and remember the information

# Useful References

## Theories of Using Information

- Kalsbeek, D.H. (1992) Exploring Information Use as a User Construct: Case Studies of Information Use in the Enrollment Management Policy Process. Unpublished doctoral dissertation, Saint Louis University.
- Dervin, B. (1983) Information as a user construct: The relevance of perceived information needs to synthesis and interpretation. In Spencer Wood and Linda Reed (eds.) Knowledge structure and use: implications of synthesis and interpretation. Philadelphia, PA: Temple University Press.
- Feldman, M. and March, J. (1981) Information in organizations as signal and symbol. *Administrative Science Quarterly*, 26, 171-186.
- Kirst, M. (2000). Bridging Education Research and Education Policymaking *Oxford Review of Education*, Vol. 26, Nos. 3~4.
- Weiss, C. (1977). Research for policy's sake: The enlightenment function of social research. *Policy Analysis* 3(4), 531-546.
- Weiss, C. with M. Bucuvalas (1980) *Social Science Research and Decision Making*. New York: Columbia University Press.

## Effective Reporting and Graphical Displays

- Bers, T., and Seybert, J. (1999). *Effective Reporting*. AIR, Number Twelve, Resources in Institutional Research, Tallahassee, FL.
- Few, S. (2004). *Show me the numbers: Designing tables and graphs to enlighten*. Oakland, CA: Analytics Press.
- Kosslyn, S. (2007). *Clear and to the Point 8 Psychological Principles for Compelling PowerPoint Presentations*. New York, NY: Oxford University Press.
- Kosslyn, S. (2006). *Graph Design for the Eye and Mind*. New York, NY: Oxford University Press.
- Patton, M.Q. (2002). *Utilization-Focused Evaluation Checklist*. Western Michigan University, Evaluation Checklist Project.  
[www.umich.edu/evalctr/checklists/ufecchecklists.htm](http://www.umich.edu/evalctr/checklists/ufecchecklists.htm)
- Sanders, L. and Filkins, J. (2009). *Effective reporting*. Second Edition. Tallahassee, FL Association for Institutional Research.
- Shea, M. (2004). *The Value of Utilization-Focused Evaluation*. SMARTRISK Point of View Document. [www.smartrisk.ca/ContentDirector.aspx?tp=838&dd=2](http://www.smartrisk.ca/ContentDirector.aspx?tp=838&dd=2).
- Tufte, E. (2007). *Beautiful Evidence*. Cheshire, CT: Graphics Press.
- Tufte, E. (2004). *The Cognitive Style of PowerPoint*. Cheshire, CN: Graphics Press LLC.
- Tufte, E. (2001). *The Visual Display of Quantitative Information*. 2<sup>nd</sup> Edition. Cheshire, CN; Graphics Press LLC.
- Ware, C. (2008). *Visual Thinking*. Burlington, MA: Elsevier/Morgan Kaufmann Publishers, Inc.

## Dashboards

- Few, S. (2010). *Information Dashboard Design*. Sebastopol, CA: O'Reilly.
- Free Range Thinking. (2009). *The Science of Site Seeing*. Nov. 2008. [http://www.agoodmanonline.com/pdf/free\\_range\\_2008\\_11.pdf](http://www.agoodmanonline.com/pdf/free_range_2008_11.pdf)
- Juice Analytics Inc. *A Guide to Creating Dashboards People Love to Use*. October 2009. [http://www.juiceanalytics.com/registration/dashboard\\_design/](http://www.juiceanalytics.com/registration/dashboard_design/).
- Kosslyn, S. (2006) . *Graph Design for the Eye and Mind*. New York, NY: Oxford University Press.
- Tufte, E. (2001). *The Visual Display of Quantitative Information*. Second Edition. Cheshire, CT: Graphics Press.
- Tufte, E. (2009). *Tufte on Dashboards*. [http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg\\_id=0000bx](http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=0000bx)