PG Department of Studies & Research in Journalism and Mass Communication
St. Philomena's College (Autonomous)

Report of

National Level Faculty Development Programme (FDP)

Organized by:	PG Department of Journalism & Mass Communication, St. Philomena's College (Autonomous), Mysore
Theme:	"Social Science Research Methods: Exploring Theories, Practices, and Applications in Contemporary Studies"
Resource Persons:	Prof. Srinivas Melkote (5 sessions) and Dr. Mahesh Gundegal(1 session)
Dates:	February 13–19, 2025
Venue:	MBA Conference Hall and Virtual Mode
No. of Registered Participants:	85

Introduction

The PG Department of Journalism and Mass Communication at St. Philomena's College (Autonomous), Mysore, successfully organized a six-day National Level Faculty Development Programme (FDP) from February 13th to 19th, 2025. The FDP was designed to enhance the understanding of social science research methodologies, focusing on theoretical frameworks, research ethics, content analysis, sampling, and statistical methods.

The chief guest for the inaugural and valedictory functions was Rev. Dr. Lourdu Prasad Joseph, Rector, St. Philomena's Institutions. The sessions throughout the FDP were delivered by Prof. Srinivas Melkote, Emeritus Professor, Bowling Green State University, USA, except for Day 5, where Dr. Mahesh Gundegal provided practical insights into SPSS software for data analysis.

The FDP witnessed participation from 85 faculty members, research scholars, and industry professionals across 16 different states and union territories in India, including Karnataka, Tamil Nadu, Odisha, Bihar, Puducherry, West Bengal, Delhi, Rajasthan, Haryana, Uttar Pradesh, Maharashtra, Manipur, and Telangana. This diverse representation fostered rich academic discussions and knowledge exchange. The blend of virtual and in-person participation ensured that knowledge was shared beyond geographical boundaries, made the FDP truly inclusive.

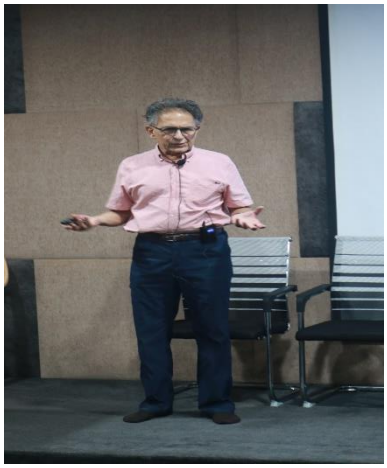
Objectives of the FDP:

1. To provide a comprehensive understanding of social science research methodologies.
2. To introduce participants to quantitative and qualitative research techniques, including content analysis, sampling, and statistical methods.
3. To enhance practical research skills through hands-on SPSS training.
4. To emphasize ethical considerations in academic research and data handling.
5. To encourage networking and collaboration among researchers, faculty members, and industry professionals.

Day to Day Report of FDP Sessions

Day 1: February 13, 2025 – Inaugural Function followed by session 1 - Epistemological Foundations of Research

The programme commenced with the inaugural function, presided over by Rev. Dr. Lourdu Prasad Joseph, Rector of St. Philomena's College. Prof. Srinivas Melkote delivered the keynote address, emphasizing the importance of social science research in contemporary academia.



The first session focused on epistemological foundations of research, covering:

- The history and evolution of research methodologies.
- Differences between positivist, interpretive, and critical research paradigms.
- The role of empirical observation and objectivity in social science research.

Day 2: February 14, 2025 – The second session focused on Research Techniques in Quantitative Methods covering:

- Introduction to quantitative research methodologies.
- Understanding positivistic assumptions in social sciences.

- Exploring the relationship between reliability and validity.
- Importance of structured data collection tools (surveys, experiments, and statistical tests).

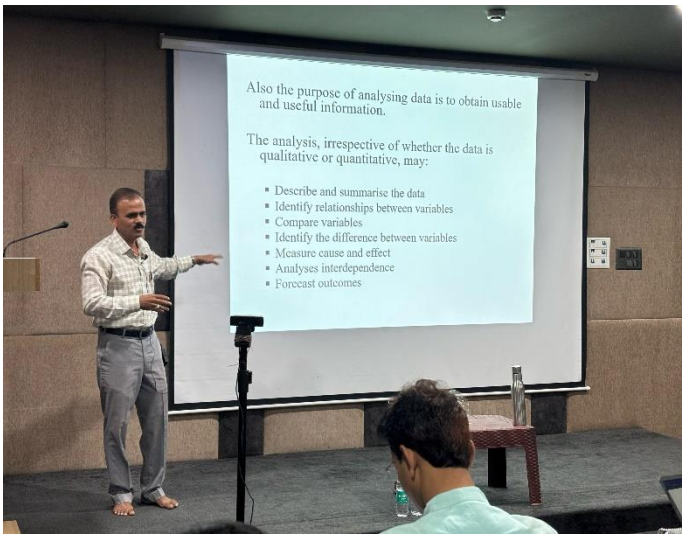
Day 3: February 15, 2025 – The third session focused on Research Design & Sampling Techniques covering:

- Elements of research design, including hypothesis formulation.
- Sampling methods: Probability vs. Non-Probability Sampling.
- Addressing sampling biases and errors to ensure data accuracy.

Day 4: February 17, 2025 – The fourth session focused on Ethics in Research & Content Analysis covering:

- Ethical principles in research: informed consent, privacy, and integrity.
- Case studies on historical research ethics violations (Tuskegee Experiment, Milgram Study).
- Introduction to content analysis as a research tool.
- Understanding manifest vs. latent content analysis.

Day 5: February 18, 2025 – The fifth session conducted by Dr. Mahesh Gundegal focused on Practical Training on SPSS covering:



- Hands-on training in SPSS for data analysis.
- Constructing structured questionnaires for data collection.
- Data entry, coding, cleaning, and basic statistical analysis in SPSS.

Day 6: February 19, 2025 –Data Analysis session & Valedictory Function was conducted which included,

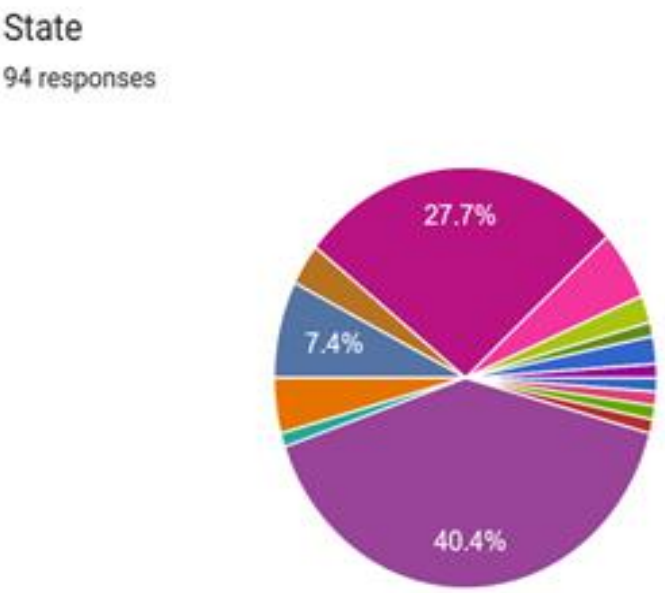
- Introduction to statistical techniques (descriptive and inferential statistics, correlation, regression analysis, hypothesis testing).
- Final discussion and Q&A session with participants.
- Valedictory function, presided over by Rev. Dr. Lourdu Prasad Joseph, Rector of St. Philomena's College.
- Distribution of certificates of participation to eligible attendees.

Key takeaways from the six-day event:

1. Understanding Epistemological Foundations
    - Gained in-depth knowledge of positivist, interpretive, and critical research paradigms.
    - Recognized the role of empirical observation and objectivity in social sciences.
2. Mastering Research Methodologies
    - Explored quantitative and qualitative research techniques.
    - Understood the importance of research design, hypothesis formulation, and operationalization of concepts.
3. Ethical Considerations in Research
    - Emphasized the significance of ethical research practices.
    - Discussed real-world case studies on research ethics violations and best practices.

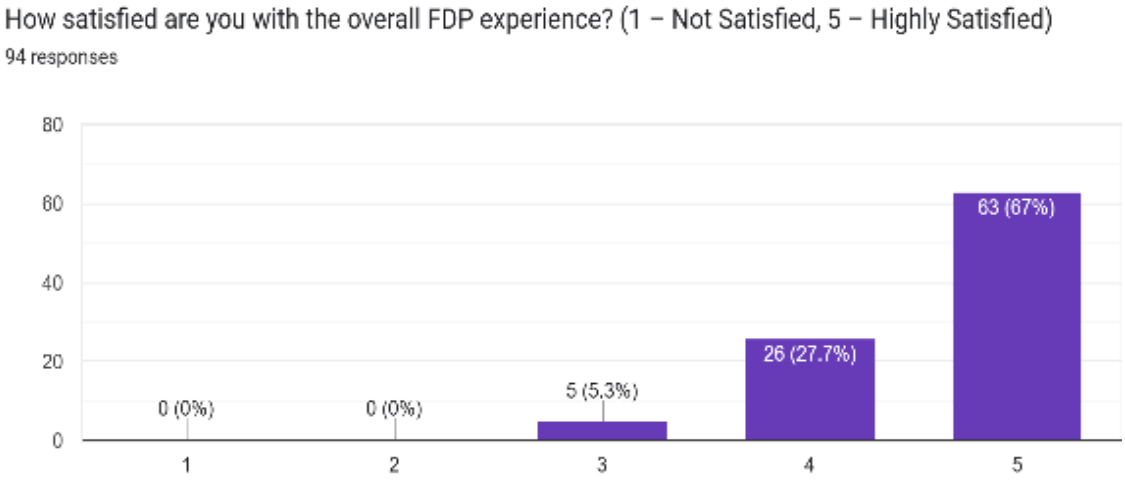
4. Application of Sampling Techniques
    - Learned the differences between probability and non-probability sampling methods.
    - Understood how to minimize biases and errors in sample selection.
5. Content Analysis as a Research Tool
    - Understood systematic techniques for analyzing media and textual content.
    - Differentiated between manifest and latent content analysis.
6. Practical Training on SPSS for Data Analysis
    - Acquired hands-on experience with SPSS software for data management and statistical analysis.
    - Learned to perform data entry, coding, cleaning, and hypothesis testing.
7. Effective Use of Statistical Methods
    - Explored descriptive and inferential statistical techniques.
    - Understood how to interpret correlation, regression analysis, and hypothesis testing for research.
8. Enhanced Academic Collaboration and Networking
    - Fostered meaningful discussions between faculty members, researchers, and industry professionals.
    - Encouraged interdisciplinary approaches to research and potential future collaborations.

Participants Feedback Analysis:



The Faculty Development Programme witnessed participation from all 28 states and 8 union territories of India, showcasing its pan-India impact and national relevance. With representation from remote regions like Ladakh and Lakshadweep to metro hubs like Delhi and Maharashtra, the program highlighted both accessibility and inclusivity.

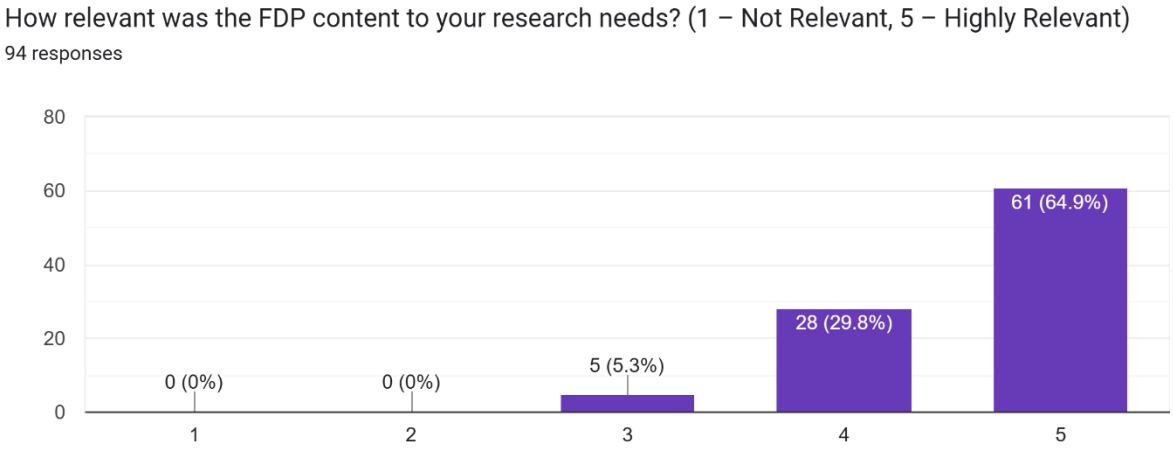
1. Overall Satisfaction:



The bar chart represents participant satisfaction levels with the Faculty Development Programme (FDP) based on 94 responses. The rating scale ranges from 1 (Not Satisfied) to 5

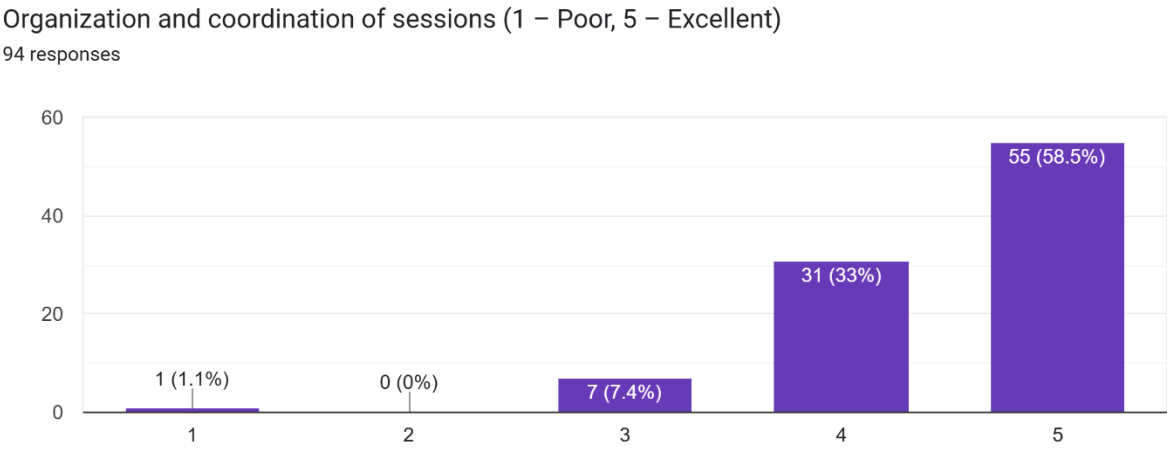
(Highly Satisfied). 87% rated the FDP as Highly Satisfied, with 27.7% rated it as Satisfied. This means nearly 95% of respondents had a positive experience and none of the participants rating dissatisfaction it could be said that the overall response was overwhelmingly positive.

2. Relevance of the FDP



The bar chart represents participant feedback on the relevance of the Faculty Development Programme (FDP) content to their research needs, based on 94 responses. The rating scale ranges from 1 (Not Relevant) to 5 (Highly Relevant). 64.9% of participants rated the FDP content as Highly Relevant, while 29.8% rated it as Relevant. This means nearly 95% of respondents found the content useful for their research needs. With only 5.3% rating it as Neutral and 0% rating it as Not Relevant, the overall response was overwhelmingly positive, indicating that the FDP successfully addressed research requirements.

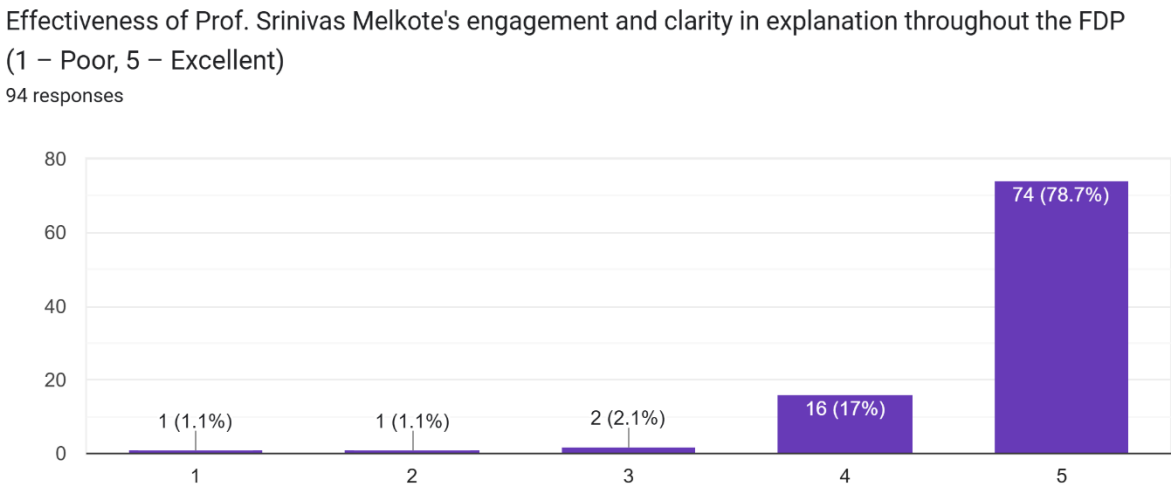
3. Organization & Coordination



The bar chart represents participant feedback on the organization and coordination of sessions in the Faculty Development Programme (FDP), based on 94 responses. The rating scale ranges from 1 (Poor) to 5 (Excellent). 58.5% of participants rated the organization and coordination as Excellent, while 33% rated it as Good. This means nearly 91.5% of respondents had a

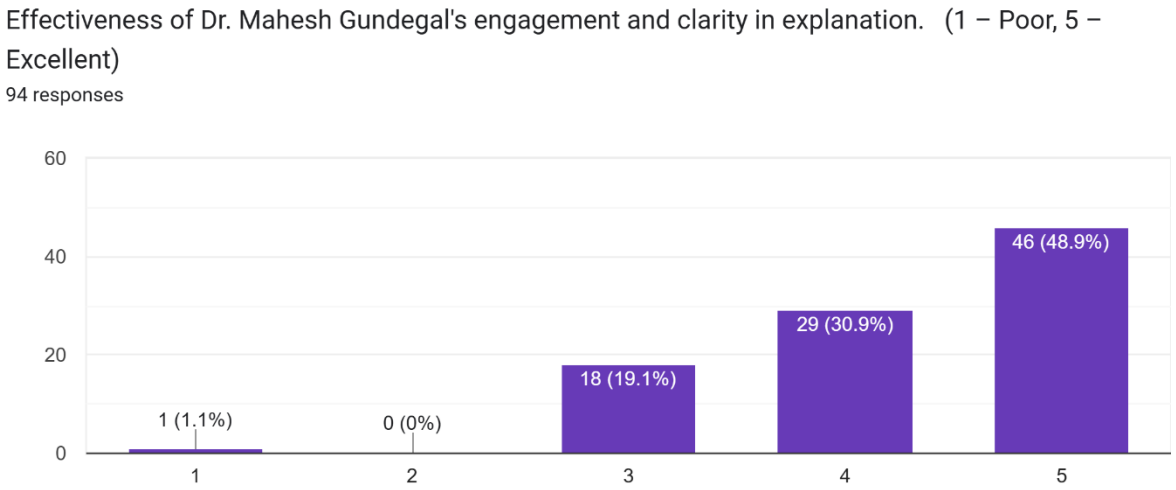
positive experience with the session coordination. A small 7.4% rated it as Neutral, and only 1.1% rated it as Poor, with 0% rating it as 2. These results indicate that the majority of participants were satisfied.

4. Effectiveness of Prof. Srinivas Melkote



The bar chart represents participant feedback on the effectiveness of Prof. Srinivas Melkote's engagement and clarity in explanation throughout the FDP, based on 94 responses. The rating scale ranges from 1 (Poor) to 5 (Excellent). 78.7% of participants rated Prof. Melkote's engagement as Excellent, while 17% rated it as Good. This means nearly 95.7% of respondents had a positive experience regarding his clarity and engagement. Only 2.1% of participants rated it as Neutral, and a very small 1.1% each rated it as Poor (1) and Slightly Poor (2). These results indicate that the majority of participants found Prof. Melkote's sessions highly effective.

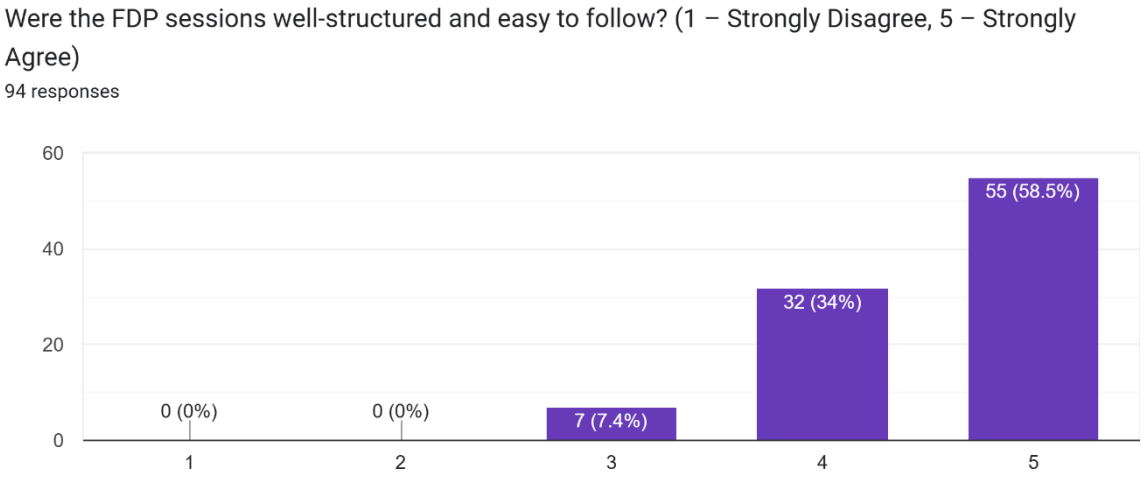
5. Effectiveness of Dr. Mahesh Gundegal



The bar chart represents participant feedback on the effectiveness of Dr. Mahesh Gundegal's engagement and clarity in explanation throughout the FDP, based on 94 responses. The rating scale ranges from 1 (Poor) to 5 (Excellent). 48.9% of participants rated his engagement and clarity as Excellent, while 30.9% rated it as Good. This means nearly 80% of respondents had a positive experience. 19.1% rated it as Neutral, while only 1.1% rated it as Poor and 0% rated it as Slightly Poor (2). While the majority of participants found Dr. Gundegal's sessions effective, the higher neutral response (19.1%) suggests some scope for improvement in engagement or clarity.

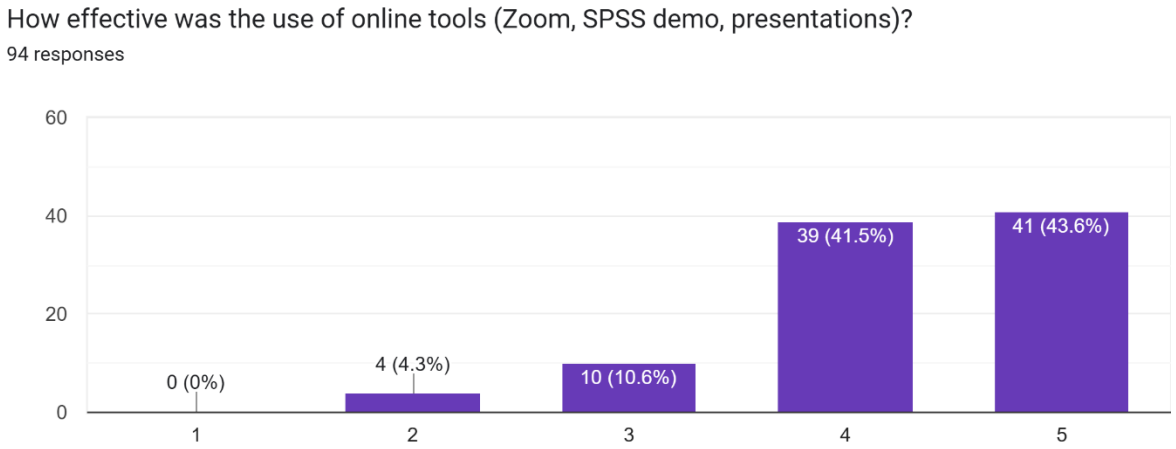
6. Structuring of FDP Sessions

The bar chart below represents participant feedback on whether the FDP sessions were well-structured and easy to follow, based on 94 responses. The rating scale ranges from 1 (Strongly Disagree) to 5 (Strongly Agree). 58.5% of participants strongly agreed that the sessions were well-structured and easy to follow. 34% agreed, making the total positive response 92.5%. 7.4% remained neutral. No participants disagreed. The overwhelmingly positive feedback indicates that the FDP sessions were effectively organized and presented in a clear and accessible manner.



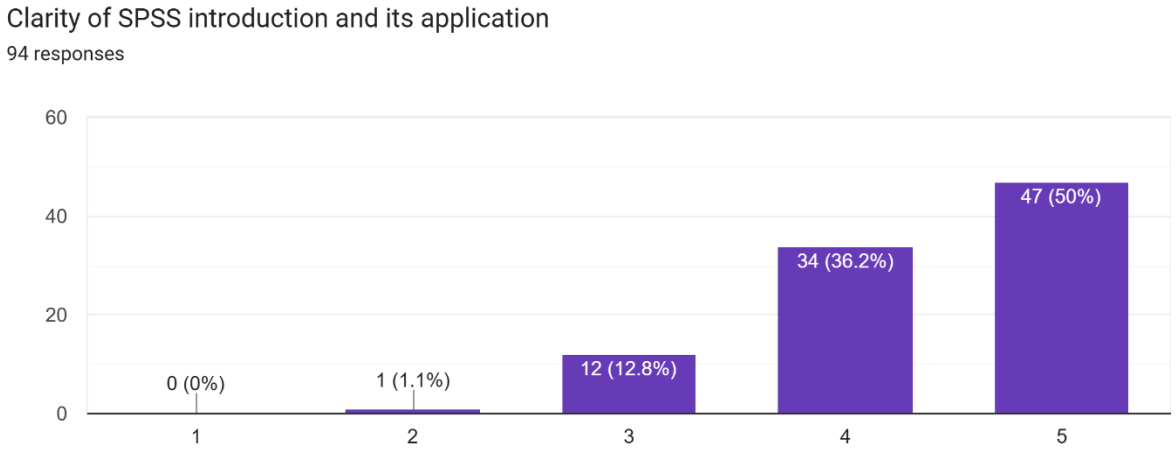
7. Effectiveness of Online tools used

The bar chart represents participant feedback on the effectiveness of online tools (Zoom, SPSS demo, presentations) used in the FDP, based on 94 responses. The rating scale ranges from 1 (Not Effective) to 5 (Highly Effective). 43.6% of participants rated the online tools as highly effective. 41.5% found them effective. 10.6% gave a neutral rating. 4.3% rated them as slightly ineffective. No participants rated them as completely ineffective. Overall, 85.1% of the respondents found the use of online tools effective, indicating that digital platforms were well-integrated and contributed positively to the FDP experience.



8. Clarity of SPSS & its application

The bar chart represents participant feedback on the clarity of the SPSS introduction and its application in the FDP, based on 94 responses. The rating scale ranges from 1 (Not Clear) to 5 (Highly Clear). 50% of participants rated the clarity of the SPSS session as excellent. 36.2% found it clear. 12.8% gave a neutral rating. 1.1% rated it as unclear. No participants rated it as completely unclear. Overall, 86.2% of respondents found the SPSS session clear and well-presented, indicating that the FDP effectively conveyed the fundamentals and application of SPSS to most participants.



9. Suggestions/Comments

Fo the open-ended question - comments of FDP or suggestions for improvement attracted the following

- **Highly Engaging & Informative** – Sessions were well-structured, insightful, and beneficial.
- **Exceptional Resource Persons** – Prof. Melkote's sessions were particularly appreciated, with strong demand for his involvement in future FDPs.

- **SPSS & Research Methodology** – The introduction and application of SPSS were well received, with requests for deeper exploration.
- **Well-Organized & Impactful** – Participants found the FDP valuable, praising its execution and content delivery.
- **Interest in Future Sessions** – Many expressed eagerness to attend similar programs in the future.

Areas for Improvement:

- The participants suggested to do a FDP exclusively for qualitative research with case studies and software.
- Suggestions to make it offline to increase interactivity and hands-on training.
- To extend duration of FDP to deal with subject in depth.

Details of the streaming

FDP DAY 1

Stream Key: 3814-8cym-qbuc-e97k-ctbj

Stream URL : rtmp://a.rtmp.youtube.com/live2

Backup server URL: rtmp://b.rtmp.youtube.com/live2?backup=1

Live Stream page URL: https://youtube.com/live/Lmy-0p2AnIs?feature=share

FDP DAY 2

Stream Key: 3814-8cym-qbuc-e97k-ctbj

Stream URL: rtmp://a.rtmp.youtube.com/live2

Backup Server URL: rtmp://b.rtmp.youtube.com/live2?backup=1

Live stream page URL: https://youtube.com/live/PCW5RgR10TE?feature=share

FDP DAY 3

Stream Key: 3814-8cym-qbuc-e97k-ctbj

Stream URL: rtmp://a.rtmp.youtube.com/live2

Backup Server URL: rtmp://b.rtmp.youtube.com/live2?backup=1

Live stream page URL: https://youtube.com/live/-z749y7Avzw?feature=share

FDP DAY 4

Stream Key: 3814-8cym-qbuc-e97k-ctbj

Stream URL: rtmp://a.rtmp.youtube.com/live2

Backup Server URL: rtmp://b.rtmp.youtube.com/live2?backup=1

Live stream page URL: https://youtube.com/live/c6luN8rt510?feature=share

FDP DAY 5

Stream Key: 3814-8cym-qbuc-e97k-ctbj

Stream URL: rtmp://a.rtmp.youtube.com/live2

Backup Server URL: rtmp://b.rtmp.youtube.com/live2?backup=1

Live stream page URL: https://youtube.com/live/AWzJkuZxfE4?feature=share

FDP DAY 6

Stream Key: 3814-8cym-qbuc-e97k-ctbj

Stream URL: rtmp://a.rtmp.youtube.com/live2

Backup Server URL: rtmp://b.rtmp.youtube.com/live2?backup=1

Live stream page URL: https://youtube.com/live/xtKkBN-M7b0?feature=share

St. Philomena's College (Autonomous), Mysuru

The Post-Graduate Department of Studies and Research in Journalism and Mass Communication

A Six Day National Level Faculty Development Programme

On

Social Science Research Methods: Exploring Theories, Practices, and Applications in Contemporary Studies

FDP Dates: February 13 – February 19, 2025

Time: 9.30am to 12.30pm

RESOURCE PERSON

PROF.SRINIVAS MELKOTE

PROFESSOR EMERITUS, BOWLING GREEN STATE UNIVERSITY, USA

Prof. Melkote is a globally renowned scholar in the field of communication and social development. With decades of teaching and research experience, his work has made a significant impact on communication theories, development communication, and social change. Prof. Melkote's insightful sessions will provide participants with a rich blend of theoretical depth and practical application in social science research. Currently Professor Srinivas Melkote is a visiting professor at St. Philomena's college Mysuru (Autonomous)

Hybrid Mode

OUTSIDE PARTICIPANTS CAN JOIN EITHER ONLINE OR IN-PERSON

WHO SHOULD ATTEND?

- **Faculty Members from Social Science disciplines**
- **Research Scholars and Academicians**
- **Industry Professionals interested in research**

REGISTRATION DETAILS

- **Registration Fee: ₹ 500 (Without Accommodation)**
- **For accommodation, outside participants are requested to contact the organizers**
- **Last Date to Register: 5th Feb 2025**

Scan for Registration

Contact

FDP Coordinator: Dr. Venugopal Gowda M K, HOD
Convener: Dr. Vagdevi H S, Asst. Prof
Assistant Coordinator: Mr. Ravitej S P,Asst. Prof,
Mr Sanju T S, Asst. Prof

Contact

Email: pgjournalism@stphilos.ac.in
Phone: 9164130378, 9945505759
9008287788, 7026817510

Join us for an enriching learning experience

ABOUT THE FDP

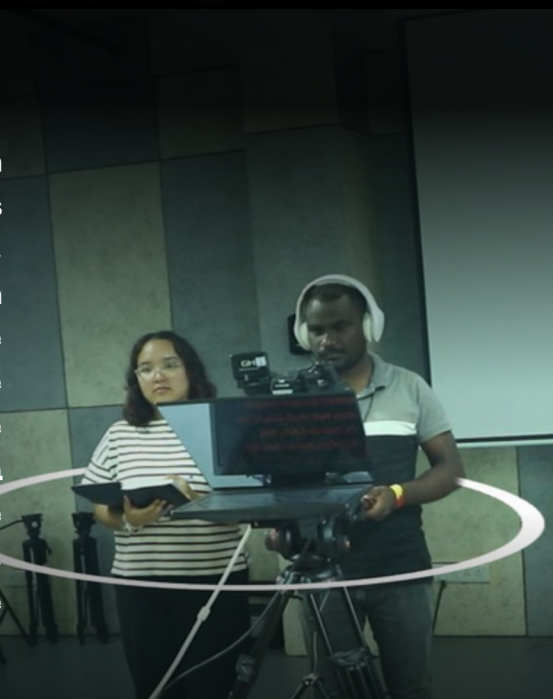
The Post-Graduate Department of Studies and Research in Journalism and Mass Communication, St. Philomena's College is delighted to announce a six-day National Level Faculty Development Programme (FDP) on "Social Science Research Methods: Exploring Theories, Practices, and Applications in Contemporary Studies."
This FDP is designed to provide an interdisciplinary platform for faculty members, research scholars, and professionals to enhance their knowledge of contemporary research methodologies in social sciences. The sessions will emphasize integrating theory with practical applications, empowering participants to conduct impactful research in their respective domains.

ABOUT THE COLLEGE

St. Philomena's College, established on October 9, 1946, is a testament to the vision and collaboration of His Excellency Rt. Rev. Dr. Rene Feuga, the first Bishop of Mysore, and the generosity of the Wodeyars, the royal family of Mysore. As the first private First Grade College in the region, affiliated with the University of Mysore, and the first private Degree Science College in the erstwhile Mysore area, it set a pioneering precedent in higher education. Guided by the motto "Caritas in Scientia," the college has grown from its humble beginnings to become a diverse and inclusive institution offering a wide array of undergraduate and postgraduate programs. Recognized as a College of Excellence by the UGC in 2015 and accredited with an A+ by NAAC, St. Philomena's has maintained a rich legacy of academic excellence, state-of-the-art infrastructure, and a global student body. Now autonomous and embracing modern challenges, the college continues to blend tradition and innovation, with aspirations of evolving into a University.

ABOUT THE DEPARTMENT

The Department of Journalism and Mass Communication at St. Philomena's College (Autonomous), Mysore, offers both undergraduate and postgraduate programs, fostering academic and professional excellence in media. Established in 1996, the UG department laid the foundation for comprehensive media education, while the PG department, inaugurated in 2013, expanded the college's contribution to the industry. Recognized as a research center by the University of Mysore in 2019, the department emphasizes research-driven learning, shaping skilled professionals and scholars for the evolving media landscape.



St. Philomena's College (Autonomous), Mysuru

The Post-Graduate Department of Studies and Research in Journalism and Mass Communication

A SIX DAY NATIONAL LEVEL FACULTY DEVELOPMENT PROGRAMME

On

Social Science Research Methods: Exploring Theories, Practices and Applications in Contemporary Studies

INAUGURATION

Prof. Srinivas Melkote
Professor Emeritus,
Bowling Green State University, USA

Presided By

Rev. Dr. Lourdu Prasad Joseph
Rector

Presence

Rev. Fr. Gnana Pragasam
Administrator

Rev. Fr. David Sagayaraj S
Assistant to Rector

Dr. Ravi J.D. Saldanha
Principal

Dr. Noor Mubasheer
PG Coordinator

Date
February 13

Time
9.30 AM

Venue
MBA Conference Hall

FDP Schedule

February 13 – February 19, 2025
⏰ Time: 9:30 AM – 12:30 PM (with a 10-minute break in between)

Day 1: February 13, 2025 (Thursday)

9:30 AM – 10:00 AM | Inauguration of FDP
10:00 AM – 12:30 PM | Session 1: Theoretical Frameworks in Social Science Research
Topic Description:

- Explore the epistemological foundations of positivistic research in natural, physical and social sciences.
- Examine how this worldview has influenced social science disciplines such as sociology, psychology and communication studies.
- Understand the historical separation of social science disciplines from philosophy departments and the evolution of their research methods.

Day 2: February 14, 2025 (Friday)

9:30 AM – 12:30 PM | Session 2: Research Techniques in Quantitative Research Methods
Topic Description:

- Introduction to quantitative research techniques.
- Understanding the positivistic assumptions underlying these methods.
- Exploring the relationship between reliability and validity in quantitative research.

Day 3: February 15, 2025 (Saturday)

9:30 AM – 12:30 PM | Session 3: Research Techniques in Quantitative Research Methods (Continued)
Topic Description:

- Application of reliability and validity measures.
- Comparison of quantitative research methods with natural and physical sciences.

Day 4: February 17, 2025 (Monday)

9:30 AM – 12:30 PM | Session 4: Ethics in Research
Topic Description:

- Ethical considerations in contemporary research.
- Addressing ethical issues in data collection, analysis and reporting.
- Case studies for ethical decision-making in research.

Day 5: February 18, 2025 (Tuesday)

9:30 AM – 12:30 PM | Session 5: Data Analysis in Quantitative Research
Topic Description:

- Construction of structured questionnaires.
- Introduction to SPSS for data entry and analysis.
- Creating a codebook and preparing a data file.

Day 6: February 19, 2025 (Wednesday)

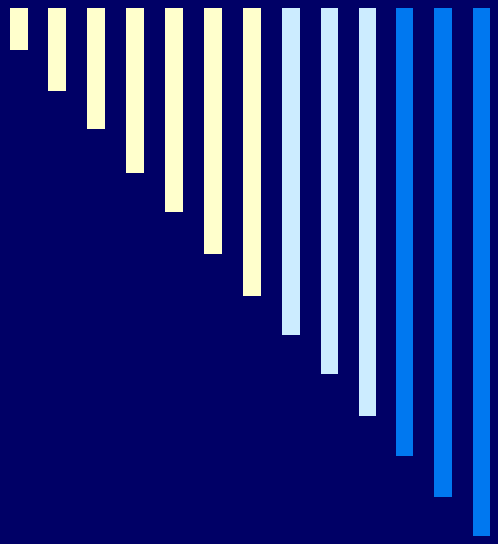
9:30 AM – 12:30 PM | Session 6: Data Analysis in Quantitative Research (Continued)
Topic Description:

- Data entry and cleaning using SPSS.
- Preparing data for analysis and basic statistical operations.

12:30 PM – 1:00 PM | Valedictory Ceremony
1:10 PM Onwards | Lunch & Networking

Timestamp	Email Address	Name	Designation / Role	College / Institution / University	State	City	Scan and Pay the Registration Fee and kindly Upload Registration Fee Receipt	Mode of attend	Contact number
1/21/2025 13:30:41	vidisha.dsouza@sju.edu	Dr Vidisha DSouza	Faculty	St Joseph's University, Bengaluru	Karnataka	Bangalore	https://drive.google.com/open?id=1OHjeDb93u6CfYc7Hax8t1J2XAV2Tj6Xs		9945216875
1/21/2025 13:49:16	gowdak94@gmail.com	Dr. Kempe Gowda G N	Faculty	Government First Grade College for W	Karnataka	Mysore	https://drive.google.com/open?id=1MYor0eXHyZz3Z-LJKoFyahhRc3-WHSbQ		9164970309
1/21/2025 17:21:31	director@nimcj.org	Prof (Dr)Shirish kashikar	Faculty	National institute of mass communic	Gujarat	Ahmedabad	https://drive.google.com/open?id=1N7zm15bxDUP3WJ9AOJB_i5BsIY4cBcnR		09974453407
1/22/2025 11:08:31	ravikumar.preetha@gma	Dr. R.Preetha	Faculty	L. V Prasad College of Media Studies	Tamil Nadu	Chennai	https://drive.google.com/open?id=1LUlMl-Hpq3q0DQE8MyU2m2gthA1gIP7f	Online	9176680612
1/22/2025 11:34:52	jkp.jmc@buodisha.edu.i	Dr.Jayanta Kumar Panda	Faculty	Berhampur University, Berhampur	Odisha	Berhampur	https://drive.google.com/open?id=1M7zKIfrLPlyX3k7QF2mswO1wzIHAqZkC	Online	9897873575
1/22/2025 12:12:28	anjali180598@gmail.cor	Anjali Joshi	Research Scholar	Central University of South Bihar	Bihar	Gaya	https://drive.google.com/open?id=12486psVFgMzo60WDyb_jwUs0ZlSDfdcm	Online	7987331046
1/22/2025 13:12:58	jena.mousami@pondiun	MOUSAMI JENA	Research Scholar	PONDICHERRY UNIVERSITY	PONDICHERRY	PONDICHERRY	https://drive.google.com/open?id=1LH1kKTBjIzVL2asiGJC5LenbgbYUpj3S	Online	9583706481
1/22/2025 15:46:59	drvasanthgopal@gmail.c	Dr G Vasanth	Faculty	Dwaraka Doss Goverdhan Doss Vaish	Tamilnadu	Chennai	https://drive.google.com/open?id=12Q5_A7j1t9g_US8nKF3-pzmM75mkUJO0	Online	9952942001
1/22/2025 19:33:22	nandhini.phd2022@gma	Nandhini C	Faculty	Dwaraka Doss Goverdhan Doss Vaish	Tamil Nadu	Chennai	https://drive.google.com/open?id=10UZCcg13rZPcWQOe-tnQohTJF2o0hpSw	Online	9003703618
1/22/2025 21:22:03	dsinghjmc@gmail.com	Dr. Dhyan Singh	Faculty	Govt. College Dharamshala	Himachal Pradesh	Government College Dha	https://drive.google.com/open?id=1UlhJGGEZ-efVXqzNQOyHoKVzKilOvTV4	In Person	9459278947
1/22/2025 23:42:20	jagroop2007@gmail.cor	JAGROOP SINGH BALHI	Research Scholar	MAHARSHI DAYANAND UNIVERSITY	HARYANA	ROHTAK	https://drive.google.com/open?id=1D6QuHSlaITnCWQRwY9XJ95KJ5ujGnTTm	Online	9354926124
1/23/2025 3:47:43	ppsingh81@gmail.com	Prabal Pratap Singh	Research Scholar	Department of Journalism and Mass	Uttar Pradesh	Kanpur	https://drive.google.com/open?id=1_ssqMyDeJKGh3T-yGF_l4RA8qxNIT_j6	Online	9451020135(Whatsappl
1/23/2025 10:02:07	vasantharaj.scholar@po	R.VASANTHARAJ	Research Scholar	PONDICHERRY UNIVERSITY	Puducherry	Puducherry	https://drive.google.com/open?id=13HBmCk8Uv7INCO-OFkMXNYUCWczC1q6X	Online	9994492135
1/23/2025 17:34:17	swarnalidutta.sdutta@g	Swarnali Dutta	Industry Person	Fortis Hospital Kolkata	West Bengal	Kolkata	https://drive.google.com/open?id=1vu44Ea9Hg5-ly9dPnUPCOdyd3rC0231r	Online	9433058310/98755657
1/24/2025 15:11:40	alishasci16@gmail.com	Alisha Pathak	Research Scholar	Central University of South Bihar	Bihar	Gaya	https://drive.google.com/open?id=1Qa83p2LqqqPQ8C8zC9HblcjoszkNli97	In Person	9523102320
1/25/2025 16:11:01	anindya@cub.ac.in	Dr. Anindya Deb	Faculty	Central University of South Bihar	Bihar	Gaya	https://drive.google.com/open?id=1y_VKLYpjP7LLk0Do9CmpNYsATy25eHO7	In Person	+91 85210 54292
1/26/2025 21:57:09	vdias.thokchom@gmail.	Dr Thokchom Vidyarani	Faculty	Naorem Birahari College	Manipur	Imphal	https://drive.google.com/open?id=1MLYgcWcVSIRWaRdWgAI-c9mGbAuSpaxp	Online	7005744987
1/28/2025 13:12:59	adritaroydasgupta@gma	Adrita Roy	Research Scholar	University of Hyderabad	West Bengal	Kolkata	https://drive.google.com/open?id=1JZCg-vOTeP8d50Juy1GdgGc1fPsjJdPc	Online	6289303226
1/28/2025 23:06:49	mayureepal18@gmail.cc	Mayuree Pal	Research Scholar	Presidency University	Karnataka	Bangalore	https://drive.google.com/open?id=1xWqfOUwmbGCeRbjtEfOlaA_rt5Pd7ji-	Online	9432311449
1/29/2025 20:59:03	mayureepal18@gmail.cc	Mayuree Pal	Research Scholar	Presidency University	Karnataka	Bangalore	https://drive.google.com/open?id=1wGEwdvlHYO7Ax3g5y1zyWmSm2YEf4cxm	Online	9432311449
1/30/2025 12:57:18	jeffrinaldo60@gmail.cor	Jeffrin Aldo J	Research Scholar	PSG College of Arts and Science	Tamilnadu	Coimbatore	https://drive.google.com/open?id=1d8_uTtxcJnSqzeeZ-OJM3N8YhdUAMUkt	Online	9626021209
1/30/2025 13:13:37	reshithalakshmi@gmail.	Reshitha Lakshmi R	Research Scholar	PSG College of Arts and Science	Tamilnadu	Coimbatore	https://drive.google.com/open?id=1VArduJGfPhLIec5ML7V3zkR0NBazXSpj	Online	7810836777
1/30/2025 14:20:42	info.studioguild@gmail.c	Shalini T	Student	Bharath College of Science and Mana	Tamilnadu	Thanjavur	https://drive.google.com/open?id=1WdDbYAVclbQnhWXTBT2iXHaGsdpyDt_L	Online	6369558980
2/1/2025 13:21:34	swapnilsvkamble@gmai	Swapnil Kamble	Faculty	Maratheada Mitra Mandals College o	Maharashtra	Pune	https://drive.google.com/open?id=1OhlbbYeyZSph_ib8xp4oety6eRDsS-Oj	Online	09657114599
2/1/2025 13:31:03	mayureepal18@gmail.cc	Mayuree Pal	Research Scholar	Presidency University	Karnataka	Bangalore	https://drive.google.com/open?id=1fWOYq5fZZWS-3m1WSdQ1BXbVm8T6p1d9	Online	9432311449
2/1/2025 15:02:08	omsdas2006@gmail.cor	Dr. OM PRAKASH DAS	RESEARCH FELLOW	Manohar Parrikar Institute for Defenc	DELHI	NEW DELHI	https://drive.google.com/open?id=1QnUvcaJwXyQGYc879tvAMICQdal14H_L	Online	9717925557
2/1/2025 18:15:16	muhammedswalihk@jm	Muhammed Swalih K	Research Scholar	Department of JMC, University of My	Karnataka	Mysore	https://drive.google.com/open?id=1Jl9kucTUy_376O7ejO1qxVXGboOvohJP	Online	7994891646
2/1/2025 18:23:57	mahi.m6051@gmail.cor	MAHENDRA KUMAR	Research Scholar	DOS JOURNALISM AND MASS COMM	KARNATAKA	Mysuru	https://drive.google.com/open?id=1Q51UV3ZmipGKAkhLD0ZuCDO5ZUNs-enb	In Person	8904538227
2/1/2025 19:05:52	anupama@sju.edu.in	Dr. Anupama Sharma	Faculty	St Joseph's University	Karnataka	Bangalore	https://drive.google.com/open?id=1TukARAA5w0_8kPz1XrlhGW_IREchqOV9	Online	9876363603
2/1/2025 23:21:55	ronalkendy@gmail.com	Ronald Kenedy Longjam	Faculty	Naorem Birahari College, Khundrakpa	Manipur	Imphal	https://drive.google.com/open?id=1h2QhuSnn2B30fCt0gIMSLSAWWtvAaZLW	Online	8383871345
2/1/2025 23:27:23	divya.k@ctuap.ac.in	Dr Divya K.	Faculty	Central Tribal University of Andhra Pra	Kerala	Vizianagaram	https://drive.google.com/open?id=1run6ert0N6UAQZNWXcuyB-VRdbB4GtEb	Online	09535299960
2/2/2025 11:09:20	pratap1012.ram@gmail.	Dr. Ram Pratap Singh	Faculty	Manipal University Jaipur	Rajasthan	Jaipur	https://drive.google.com/open?id=1Mgx4l-tejEmc0Fig2EYm8SGL1ZzMvooB	Online	9990762529
2/2/2025 15:28:35	sajan@sju.edu.in	Sajan PK	Research Scholar	St. Joseph's University, Bengaluru	Karnataka	Bengaluru	https://drive.google.com/open?id=1LmBrERewX0dqnPOEQtYsDJYpRNyh7gUH	In Person	9841639881
2/3/2025 7:53:22	ssnehgupta@gmail.com	Sneh Gupta	Faculty	Bennett University	UP	Greater Noida	https://drive.google.com/open?id=19Wbz8Hx7sBnS5Eu-he0rAe67tDBGksVT	In Person	9873777231
2/3/2025 10:39:12	pushpa34567@gmail.co	PUSHPALATHA M	Faculty	Bangalore institute of legal studies	Karnataka	Bangaloren	https://drive.google.com/open?id=1zcc2Aedq8cq_Pv-T9UypyA5mfAeri8vX	Online	7382452945
2/3/2025 14:03:11	swayamprakash1510@g	Swayam Prakash Bedan	Research Scholar	Berhampur University	Odisha	Berhampur	https://drive.google.com/open?id=1pqU8iSRV-TnfVi06RSZDA8kLQB2_eMQL	Online	7894286649
2/3/2025 15:59:40	mp.shwethavijay@gmail	Swetha M.P	Research Scholar	Mysore university	Karnataka	Mysore	https://drive.google.com/open?id=1mF9Vhb6yglfOCGzsqlQFAt0BMtkL-_0p	Online	9986827705
2/3/2025 21:52:16	brindhad@psgcas.ac.in	Brindha D	Faculty	PSG College of Arts and Science	Tamil Nadu	Coimbatore	https://drive.google.com/open?id=16vViS3Bif49jvZsK3ySHQRWiNEd7ocyA	Online	7708923415
2/4/2025 14:45:29	jyothireddy06@gmail.co	Dr Jyothi C	Faculty	Sri Siddhartha centre for media studie	Karnataka	Tumkur	https://drive.google.com/open?id=1wobSUKvb9crB4lv3ACftu46zzCKhQxDg	Online	9916181497
2/4/2025 22:15:46	nandana2222@gmail.co	Nandana U S	Research Scholar	Department of Communication and J	Kerala	Thiruvananthapuram	https://drive.google.com/open?id=1uxBPfrlQKfXpcfUADBOYZi2rCjQbB_mu	Online	9074042637
2/5/2025 9:57:09	sdevgouri@gmail.com	GOURI S DEV	Research Scholar	PSG College of Arts and Science	Tamil Nadu	Coimbatore	https://drive.google.com/open?id=1M9fyCCgs-HkZvU60HbUh72vOY_aHOqy5	Online	08921367380
2/5/2025 9:57:09	22pmcf01@psgcas.ac.in	Nithiyanandhan S	Research Scholar	PSG College of Arts and Science	Tamil Nadu	Coimbatore	https://drive.google.com/open?id=1bd2BNIaANAvLaMDt-RhXhJiDzy8r47SL	Online	+91 9524298530
2/5/2025 11:08:44	gyanaranjan.mishra@bg	Dr.Gyanaranjan Mishra	Faculty	Birla Global University	Odisha	Bhubaneswar	https://drive.google.com/open?id=1gfI98tfg0JQ9tkl3d30MPQwocUd1eBJH	Online	09337270764
2/5/2025 12:43:33	pbhalla@jmi.ac.in	Pragati Paul	Faculty	AJK MCRC , Jamia Millia Islamia ,Nev	Haryana	Gurgaon	https://drive.google.com/open?id=1YP6y28NIzwI4F4yT2Mc_DgKkCRH5K8Pq	Online	9899854583
2/5/2025 15:23:43	neelarin25@gmail.com	Arin	Research Scholar	Deptt. Of Mass Communication And	Uttar Pradesh	Lucknow	https://drive.google.com/open?id=1dqRGb0S9BKZ3h7sm-oly3m0ZwyXAR_LJ	Online	09812209080
2/5/2025 15:43:55	kashishsingh.w@gmail.c	Kashish Singh	Research Scholar	AJK MCRC, Jamia Millia Islamia	Delhi	Delhi	https://drive.google.com/open?id=1ty9JMHYTEZLGURvkSlRQ_SJU3inlbzP-	Online	7982361825

Timestamp	Email Address	Name	Designation / Role	College / Institution / University	State	City	Scan and Pay the Registration Fee and kindly Upload Registration Fee Receipt	Mode of attend	Contact number
2/5/2025 22:22:50	sripriya_m@psgcas.ac.i	Dr.M.Sripriya	Faculty	PSG College of Arts and Science, Coi	Tamil	Coimbatore	https://drive.google.com/open?id=1SpdempCNnTCsDYoSvcetHFQuPlMv4Qc4	Online	9944588033
2/5/2025 22:24:46	rjvenkat25@gmail.com	M.Venkatesh	Research Scholar	PSG College of Arts and Science, Coi	Tamil Nadu	Coimbatore	https://drive.google.com/open?id=1JlHlEJPu3lcBZV5gJM1-Kx8Jyf1awXgc	Online	8056316973
2/6/2025 12:36:03	chandinidass1004@gm	Chandini S	Research Scholar	Journalism and Mass Communicatio	Karnataka	Mysuru	https://drive.google.com/open?id=1HlmGxsxyKDi8PsdWR_ldYdKHdDF5grPH	Online	7090501064
2/6/2025 12:37:15	sriz1107@gmail.com	Ningappa S	Faculty	Chamarajendra Govt Visual Art Colle	Karnataka	Mysore	https://drive.google.com/open?id=1JA0TB059zlaKBaTcfVshpXpY_pKsT-Ue	Online	7411604142
2/6/2025 12:44:00	chandinidass1004@gm	Chandini S	Research Scholar	Journalism and Mass Communicatio	Karnataka	Mysore	https://drive.google.com/open?id=1E6g32LGRwztPbvDs9wXEmMeLYw3_wart	Online	70905 01064
2/6/2025 13:20:43	rajamanimysore6@gma	Rajamani R	Research Scholar	Dos journalism and Mass communica	Karnataka	Mysuru	https://drive.google.com/open?id=1cn798C0Rzb_IVSfqkmoIg8pEG4Ffnm09	Online	9380484286
2/6/2025 17:04:22	nehaagrwl.05@gmail.co	Neha Agarwal	Research Scholar	Manipal University Jaipur	Rajasthan	Jaipur	https://drive.google.com/open?id=15P4DwNy7GtzBbCVa6x_BXnXKUipts5CU	Online	9462456784
2/6/2025 17:40:15	malavikasunilk@gmail.c	Dr. Malavika Sunil Karip	Faculty	Kumaraguru College of Liberal Arts a	Tamil Nadu	Coimbatore	https://drive.google.com/open?id=1oITfbICFJCvGqJDq4UL4FjEybZ5BYJCV	Online	9995988927
2/6/2025 18:06:33	prof.devika@gmail.com	Devika P	Faculty	Kumaraguru College of Liberal Arts a	Tamil Nadu	COIMBATORE	https://drive.google.com/open?id=146BLiieynT34y5zZyjAxrqe_7E5zxLbx	Online	95005 0467
2/6/2025 18:24:36	20snpc05@uohyd.ac.in	Vamsi Krishna Pothuru	Research Scholar	University of Hyderabad	Telangana	Hyderabad	https://drive.google.com/open?id=1TF8gqxKJrqBSI_xdTauo3mhnIlkyBheo	Online	8374743523
2/6/2025 23:37:47	suryachaithanya21@gm	DARSHAN M	Research Scholar	UNIVERSITY OF MYSORE	KARNATAKA	MYSORE	https://drive.google.com/open?id=1Ig61oS2N4CyMtE1P2LfeqhiA6buojZp6	Online	6361224131
2/7/2025 7:26:20	perukaravi10@gmail.cor	Dr. D. Madhavi	Faculty	Telangana social welfare Residential	Telangana	Warangal	https://drive.google.com/open?id=1jIcIG2aN3vzF1OzAsMgcyF0rSuWxrxN5	Online	9121877567
2/7/2025 9:55:38	radhikahariharanviscom	Radhika H	Research Scholar	Presidency University	Karnataka	Bengaluru	https://drive.google.com/open?id=1y209uBANmGwq87cO430MSU6HqKmNsPc-	Online	8825944146
2/7/2025 10:07:20	acharyabhishek24@gm	ABHISHEK ACHARYA	Research Scholar	BERHAMPUR UNIVERSITY	ODISHA	Berhampur	https://drive.google.com/open?id=1VMttIKwcW3Gj-R9F3p1Hilzd43Jxvq_G	Online	8016268471
2/7/2025 10:07:20	jupiteroneman@gmail.c	Jupiter Satapathy	Research Scholar	Berhampur University	Odisha	Berhampur	https://drive.google.com/open?id=12VljNPay5HBJdW2PW8zxuvVChvn2nMC0	Online	7750006606
2/7/2025 11:59:21	prathvi@kristujayanti.co	Prathvi	Faculty	Kristu Jayanti College	Karnataka	Bengalore	https://drive.google.com/open?id=1hSZ69K-hTD8O81vRj9YkpLVow6m_iXh-	Online	7353293976
2/7/2025 17:43:58	drsaleemamku@gmail.c	Dr S Saleema Rabiyath	Faculty	Madurai Kamaraj University	Tamil Nadu	Madurai	https://drive.google.com/open?id=1eEmj-lrKw8qviAZwZdHeK53AYNkp1X7E	Online	9976796865
2/8/2025 11:57:08	ishanvirsharma@gmail.c	Ishanvi Sharma	Faculty	NMKRVCW	Karnataka	Bengaluru	https://drive.google.com/open?id=1OFbPBnZiCBL2dfpF58LksahSpxjanxOZ	Online	6361351165
2/9/2025 11:44:37	ramumrsr@gmail.com	Dr. RAMU M S	Faculty	Sri Siddeshwara Government First Gra	Karnataka	Nargund, Gadag	https://drive.google.com/open?id=1OUeMyufe1lgLI3zdydYuEbpB_UwTKUlr	Online	9036209080
2/9/2025 14:07:37	alan.mjose@kristujayan	Alan Maria Jose	Faculty	Kristu Jayanti College Autonomous	Karnataka	Bengaluru	https://drive.google.com/open?id=1mpA1ngor-0jBpuOy66kgP-FxyrlMv34b	Online	7810032017
2/10/2025 10:23:46	shwethabharath24@nitt	Shwetha	Research Scholar	NMAMIT, Nitte	Karnataka	Mangalore	https://drive.google.com/open?id=1CgqkN8J3SLrz3WTQj3vELMbdBPKYy_yZ	Online	9611269637
2/10/2025 11:37:50	srai@nitte.edu.in	SUMA N S	Faculty	Nitte (deemed to be University,)	Karnataka	Mangalore	https://drive.google.com/open?id=1Fqcj5j5RIwxBNnkbpWM7eqkpg9Qb7iT-	Online	8971583780
2/10/2025 13:11:50	anishakumaran@nitte.e	Dr Anisha	Faculty	Nitte Institute of Communication	Karnataka	Mangalore	https://drive.google.com/open?id=1RKWSnavfNpl7NARq6ZD5D7xpb4-j4lFK	Online	7676565368
2/10/2025 13:12:13	pkduragesh@gmail.com	Dr. Duragesh Pujari	Faculty	Shree Siddeshwara Government First	Karnataka	Gadag	https://drive.google.com/open?id=1ubwdVkNDi-nbaXf4a4jJ0Kt2Xh9TmN6L	Online	9113594576
2/10/2025 13:12:15	madhu.rajgowda01@gm	Dr.Madhu G R	Faculty	Sri Sideshwara Governament First Gra	Karnataka	NARGUND	https://drive.google.com/open?id=1DFy-DKoOUADqoErlxlOcZkSp7j1Whkme	Online	9844340315
2/10/2025 13:18:28	daruriradha@gmail.com	Radha M	Faculty	Sri Siddeshwara First Grade College a	Karnataka	NARGUND	https://drive.google.com/open?id=1iDnS_IMXlxfAEb-qvqwjCnP0NPeyAX_H	Online	9916255250
2/10/2025 14:02:23	shabbirhadimani1992@	shabbir m hadimani	Faculty	ssgfgc nargund	Karnataka	hubli	https://drive.google.com/open?id=1Jw7-MKOLp0M-ANRnnMPcjL5pV1sPgxNX	Online	9590232519
2/10/2025 22:15:50	surmalah@gmail.com	Sagolsem Surmala Devi	Faculty	Naorem Birahari College, Khundrakpa	Manipur	Imphal	https://drive.google.com/open?id=1Io6MJh82WVW-BR9vf67YKkghlqErXqIx	Online	9774160624
2/12/2025 10:59:39	atulavneesh@gmail.com	Dr. Avneesh Kumar	Faculty	Manipal University Jaipur	Rajasthan	Jaipur	https://drive.google.com/open?id=1wr85zoirXgoQfOoMRlbZsQdB0HlnQepz	Online	9582035652
2/12/2025 11:11:58	berlinsachu555@gmail.c	Berlin sachu D	Research Scholar	PSG COLLEGE OF ARTS AND SCIENC	Tamil Nadu	Coimbatore	https://drive.google.com/open?id=1MS6r7wgN8ubhkZY-0Yg3gyauCFOAisvc	Online	9940790522
2/12/2025 12:18:03	sarvajithjn@gmail.com	SARVAJITH KUMAR J N	Faculty	Cresta First Grade College	Karnataka	Mysore	https://drive.google.com/open?id=1ZD-BDiGf_tE_WpsT189qh3V0AuIlPIru	Online	9164086701
2/12/2025 12:28:38	pkarnam93@gmail.com	Pallavi cn	Faculty	Slate by cresta	Karnataka	Mysore	https://drive.google.com/open?id=18lhFhrprcdNABQz_gS3aP1AraBFF68XV	Online	9108222266
2/12/2025 13:03:03	chandanm4295@gmail.c	Chandan M	Research Scholar	Manasa gangothri University of Myso	Karnataka	Mysore	https://drive.google.com/open?id=1LcApMYBilODmkLvJMsGx9K03H_BkreeG	Online	7090899373
2/12/2025 13:54:32	sanrita.24phum102@stu	Sanrita Jasmine Madtha	Research Scholar	Nitte Institute of Communication	Karnataka	Mangalore	https://drive.google.com/open?id=1lBl9L1xlX7xfAcLQyoSoK6KLzAK7gCRU	Online	9482568944
2/12/2025 15:25:11	rochelle.24phum101@st	Rochelle Catherine Fern	Research Scholar	Nitte Institute of Communication	Karnataka	Mangaluru	https://drive.google.com/open?id=1LmFoVKnbjuK1K2XZm0MAJXsEw9N5PDtW	Online	7899074775
2/12/2025 15:26:30	anjali.22phdh201@stud	Anjali Rai	Research Scholar	Nitte Institute of Communication	Karnataka	Mangaluru	https://drive.google.com/open?id=15fxmlYJcN0JdE_vN2oKo4xfSFXVcano1	Online	9535442285
2/12/2025 16:27:40	priyadayalan3105@gma	Priyanka D	Research Scholar	PSG COLLEGE OF ARTS AND SCIENC	Tamil Nadu	Coimbatore	https://drive.google.com/open?id=1rzQpnKWM8GeS6Hlwx1_Qd-Wj8C1I-rcB	Online	9150163211



Epistemological Foundations of Research

Brief History

- Goes back at least 500-600 years
- Ptolemy, Galileo's Research in Physics and Astronomy
- Period of Renaissance
- Idea of a Research University
- Mostly Quantitative Research in
- Physical and Natural Sciences

Ontology of Positivist Research

- Origin of positivism
- Augustus Comte rejected religion and
- metaphysics as sources of knowledge
- Established empiricism as a form of
- inquiry in philosophy
- Holds that experimental investigation
- and observation are the only sources
- of knowledge for positive facts

Features of Positivism

- Reality exists outside the observer
- It is essentially the same for all, i.e.
- Single reality
- Researchers can be trained to see the
- single reality through a rigorous and
- systematic research process

History of Social Sciences

- Late 1800's implosion of philosophy
- departments
- Research tradition in the social sciences
- followed the positivistic model
- Fascination for statistics in research

Nature of Science

- Science and scientific theories are storehouses of current knowledge
- Disciplines vary from natural/physical sciences to social sciences in their subject matter
- What unites them is a common epistemology or foundation
  - Logic and methodology are similar
    - Objectives, assumptions, methodology, logic

Scientific knowledge

- What characterizes scientific knowledge?
  - Based on questions requiring empirical inquiry
    - Empirical Vs. non-empirical inquiry
  - Ex. Is there God? Vs. What are the different perceptions of God among people?
  - So, scientific questions are those that can be asked for which data are available

Scientific knowledge

Description:

- In attempting to answer questions, scientific knowledge must meet certain requirements
  - Knowledge produced aims to DESCRIBE comprehensively the objects of study such that they can be verified
    - Concepts/ideas are carefully constructed and described
      - Conceptual and operational definitions (ex. Weight)
      - Operational definitions help in linking theoretical concepts with their correct measurement(helps with verification and reliability)

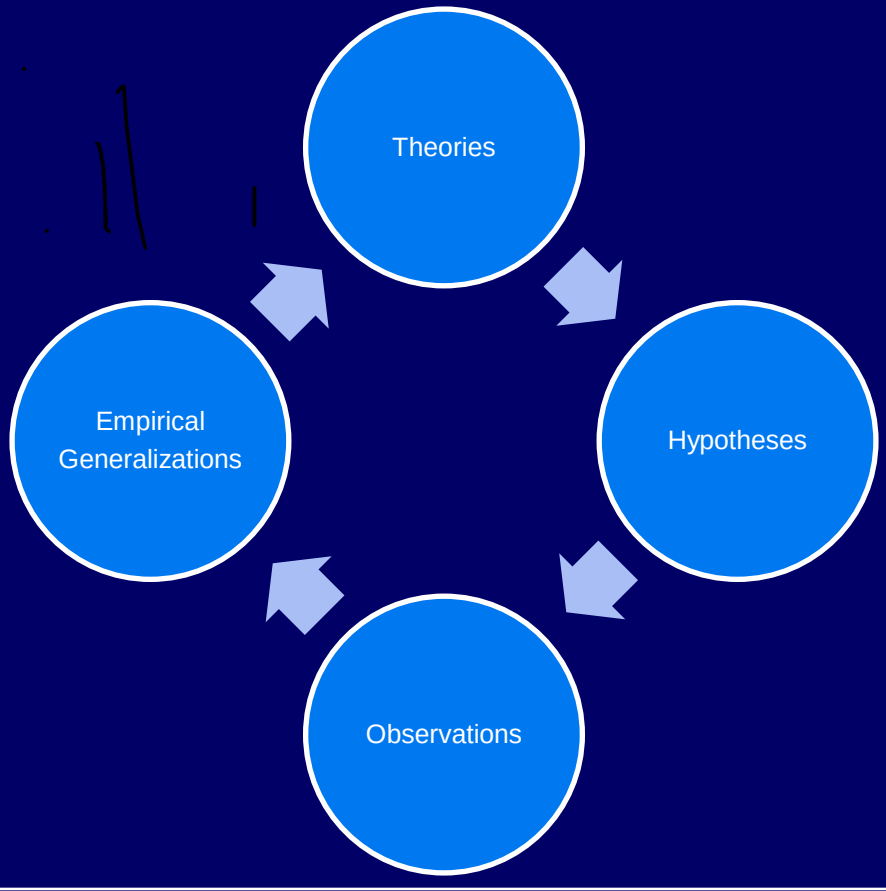
Science as a Product

- Explanation and Understanding:
- What characterizes scientific knowledge? (continued)
  - Knowledge produced aims to aid understanding of the relationships between defined concepts
    - Understanding comes from building empirically verified relationships between concepts
    - Causal relationships signify greater understanding though it may not be possible in all research contexts

Scientific knowledge

- What characterizes scientific knowledge? (continued)
  - Process is open-ended
    - Scientific knowledge esp. in the social sciences does not purport to be the “truth” for all times
    - Scientific knowledge is always open to change through reinterpretation or by new evidence

Science as Process



Science as a Process

- Process is cyclical
  - Theory to Hypotheses to Observations to Conclusions to Theory
  - Theory to Hypotheses is a deductive process that falls within the realm of “theory”
  - Hypotheses to observations is a deductive process that falls within the realm of “research”

Science as a Process

- Observations to conclusions is an inductive process that falls within the realm of “research”
- Conclusions to theory is an inductive process that falls within the realm of “theory”

Science as a Process

- As a process, scientific research is based on empiricism (i.e. empirically observable)
- Scientific research is objective (free from bias)
- Scientific research attempts to minimize bias & thus rule out alternate explanations
  - Control groups
  - Randomization or random sampling
  - Double blind technique

Positivism in Social Sciences

- Reality exists outside the observer
- It is essentially the same for all, i.e.
- Single reality
- Researchers can be trained to see the
- single reality through a rigorous and
- systematic research process

Criticism of positivistic research

- Critics of ‘quantitative’ research say
  - Positivist or natural sciences model should not be used in social research
  - Understanding of relationships is more important than ascribing “causes” for relationships

Nature of different sciences

- Physical/natural sciences vs. Social Sciences
- They deal with inherently different
- objects of study
- Inanimate or nonhuman objects vs.
- human subjects
- In social sciences subjects interpret their own worlds (i.e. there is no single reality)

Alternative interpretations in research

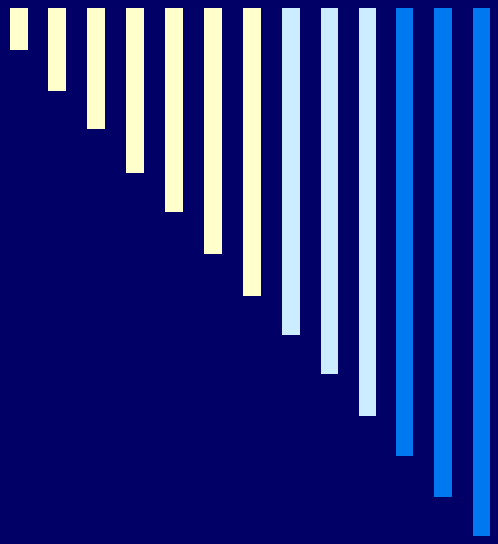
- Researcher or observer exists within the reality
- There are multiple realities
- Researchers and research subjects interpret and act within their frames of reference

Contemporary Approaches in Research

- Research scenario post-1980s
- Understanding of relationships more
- important than ascribing causes
- Statistics is a tool in research and not
- research by itself

Epistemology of Devcom Research

- Research and theory went from a
- positivistic and quantitative approach
- to critical and interpretative
- approaches
- Had a profound effect on research and
- theoretical outcomes
- Went from a teleological and deterministic process to a
- more open ended and critical process



Elements of Research Design

Research topic

- Topics can come from theory or from everyday events/experiences
  - Must be empirical and social
- Few ways in which topics may be generated (may be overlapping categories)
  - From theoretical literature
    - Psychology: aggression, altruism, conformity, etc.

Research Topic

- From theoretical literature (continued)
  - Economics: inflation and cost of living
  - Social work: the problem with homeless people
  - Journalism/communication: effects of social media; specific subgroups within your field, i.e. S-M-C-R-E
- Look for gaps in theoretical literature

Research topic

- From theoretical literature (Continued)
  - In Journalism/communication studies
    - Gatekeeper issues
    - Agenda Setting
    - Social construction of reality
- From Personal interests/values
  - Ex. Development communication

Research Topic

- Socially premium areas/High visibility
  - Propaganda related research in journalism
  - New media and their roles and effects
  - Epidemics– AIDS, COVID
  - Health Comm: Obesity, eating disorders
- Some caveats
  - Time, cost, personnel, training challenges
- Fine tuning the topic: too broad, unresearchable, harm to subjects

Objects of study

- Units of study can vary from individuals to groups to organizations to media to other artifacts
- Individual data may be aggregated to compare groups

Research Qs/ Hypotheses

- From topic to research questions/ hypotheses
  - State objectives in a formal manner
  - Select objects of study, variables carefully and precisely
  - State the relationships between variables clearly (empirically verifiable)
  - Review of literature: Helps to refine, focus,
  - recast topic

Research Qs/Hypotheses

- Research Questions
  - Are older people more afraid of crime than younger people?
  - Does economic development lower the birth rate?
- Hypotheses
  - Higher the educational level of people, the lower will be their belief in propaganda
  - Longer the engagement period, longer will be the marriage
  - Bigger the city, greater is the crime levels
- What is being studied/compared above?
  - Unit of analysis
- What relationship is being studied?

Research Qs/Hypotheses

- Ecological Fallacy
  - Confusion in identifying units/objects of analysis
- What are the variables being studied in the Qs/ hypotheses above?

Variables

- Concept to variable
  - Variables can be empirically verified
  - Variables take on different values across research objects or time

Variables

- Explanatory variables
  - Independent variable (or predictor variable)
  - Dependent variable

Variables

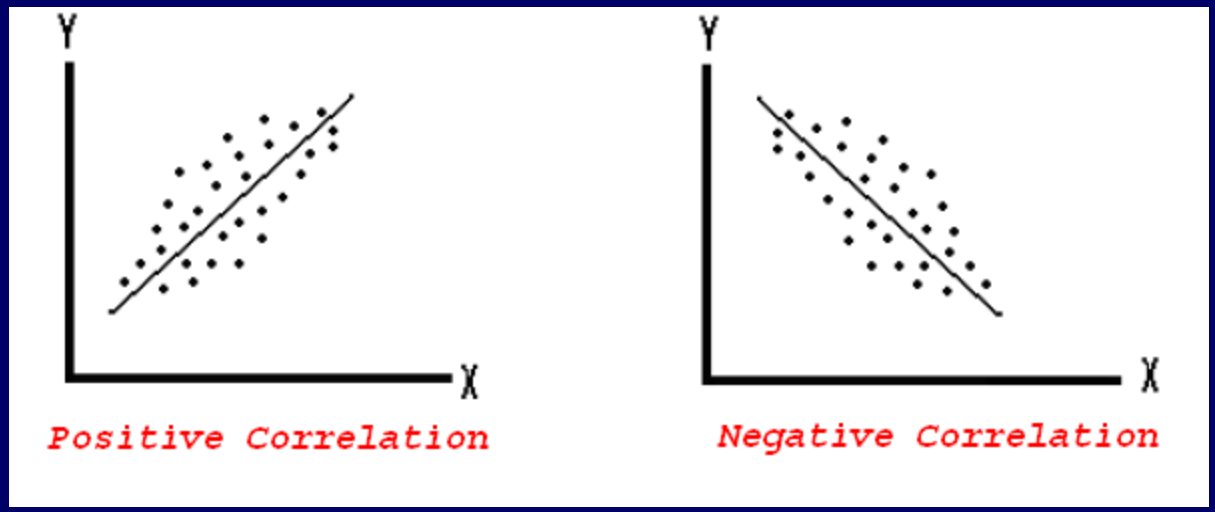
- Control variables?
  - Example: Excessive playing of violent video games is related to greater aggressive behavior
  - Control variables need to be controlled to avoid spurious (false) effects
    - Ex. Age, gender, family context, etc
  - Control may be manual and/or statistical

Empirical Relationships

- Relationships should be empirically verifiable between defined variables
  - Flows directly from carefully defined questions or hypotheses (which flow from theory)

Empirical Relationships

- Relationships between quantitative variables
- Direction
  - Positive relationship (Direct relationship)
  - Negative or inverse relationship
- Strength
  - Statistical indices used to measure strength (Ex. Pearson “r”)


Y
X
Positive Correlation
Y
X
Negative Correlation

Empirical Relationships

- Relationships between quantitative variables
  - Curvilinear relationships
- Relationships between qualitative and quantitative variables
  - Usually the IV is qualitative
    - May use ‘t’ tests or ANOVA

Empirical Relationships

- T test
  - Relation between gender and avg. number of hours of playing violent video games

MALES	FEMALES
40 hours	15 hours

- ANOVA TEST

WHITES	BLACKS	ASIANS
$ 100,000	$ 60,000	$ 120,000

Typical stages in a generic research project

- Selection of research design (survey, experiment, content analysis, other)
  - Selection of subjects/ sampling
- Collection of data
  - Set up, data collection instruments
- Data compilation and processing
  - Set up, cleaning data, running reliability and validity of scales created,

Typical stages in a generic research project (cont'd)

- Data analyses
  - Run tests, test relationships
- Writing the report
  - Reporting results
  - Discussion and conclusion
    - Interpretationof results
    - Contributions of this study
    - Lessons learnt
    - Recommendations for further research

Causality in relationships

- Three rules for assuming causation
  - There must be a statistically significant relationship between the two variables
  - The causal variable must occur before the "caused" or effect variable
  - All extraneous variables must be controlled
    - Extraneous variable/variables may be related to the IV and/or DV, thus acting as a causal variable (spurious effect)

Causality in relationships

- Non-spurious relationship
  - Control all extraneous variables so that an association/correlation cannot be explained by them

Content Analysis

- “It is a multipurpose research method developed specifically for investigating any problem in which the content of communication serves as the basis for inference.” (Holsti, 1969, p.2)
- “Is any technique for making inferences by objectively and systematically identifying specified characteristics of messages.” (Holsti, 1969, p. 14)

CONTENT ANALYSIS

- ***Definition***
  - Systematic, objective, and quantitative analysis of media content, which is based on a theoretical framework
    - **Objective**: two rational people conducting research independently should come up with the same results
    - **Systematic**: rules and guidelines on how to conduct a study in terms of inclusion & exclusion of content
    - **Quantitative**: uses numbers, very precise, possible to standardize, can use statistics to analyze and interpret data

Latent vs. Manifest Content

- Content analysis is restricted to coding manifest (surface meaning) content
- Inferences of the latent (hidden meaning) meanings of messages are permitted but MUST be corroborated with independent evidence

Research Problems in Content Analysis

- Message Analysis
  - To describe trends in communication content across time, situations, audiences, etc.
  - To relate known characteristics of sources to the messages to the messages they produce
  - To audit communication content against standards
  - To analyze techniques of style and persuasion cues
  - To relate known characteristics of audience to messages produced for them

Research Problems in Content Analysis

- Analysis of source and encoding process (i.e. analysis of the relationship between sources and their messages)
  - Who is the source of a disputed document?
  - What are the meanings , values, motives, intentions, psychological traits, etc. of the communicator?

Research Problems in Content Analysis

- Analysis of the decoding process
  - By examining source messages and recipient messages to study the flow of information
  - By examining source messages and recipient behavior, to assess responses to communication (this will require use of other methods of research such as surveys and interviews)

Advantages of Content Analysis

- Non-reactive measurements
- Analysis of social structures
- Studying the past

Examples of uses of content analysis

- 1. Description
- 2. Testing Hypotheses/ Research Questions
- 3. Comparing Media Content with “Reality”
- 4. Assessing the Image of Minority Groups in Society
- 5. Media effects

STEPS IN CONTENT ANALYSIS

1. Formulate research question / hypothesis
2. Define the population in question
3. Select an appropriate sample from the population
4. Construct the content categories
5. Select and define the recording unit
6. Establish a quantification system
7. Conduct a pilot study and establish intercoder reliability
8. Code the content according to established definitions
9. Analyze the collected data
10. Draw inferences & conclusions

Step 1

- Formulate research questions and/or hypotheses
  - Must be linked to a strong theoretical framework
    - » Must conduct a thorough review of scholarly literature

Sampling

- Most often, a given population is fairly large
  - So, a sampling method is used to reduce the number and make it more manageable
  - Two major categories of samples are representative and non-representative samples
  - If the objective is to generalize the findings to the population, a representative sample must be used

Step 2

- Define the population carefully
- Usually, two parameters are topic area and the time periods
  - Ex. We plan to examine a newspaper's political reporting during previous year
  - Define what a newspaper is and political reporting

Step 3

- Select an appropriate sample
- Disclaimer: sampling is not an uniform procedure and can vary from problem to problem
- Most content analyses involve the use of multistage sampling with or without stratification

Step 3

- I Stage
  - In the previous example, all objects that satisfy the definition of “newspaper” are admissible as part of the population
  - Involves sampling of newspapers based on some objective criteria with or without stratification

Step 3

- II Stage
  - Select dates
  - In our example, we will have 366 issues for the whole year in 2008
  - Device a method to select some dates/issues such that it is a representative sample
  - Avoid systematic bias in selection

Step 3

- III stage
  - Select specific content from the selected issues
    - Front page only
    - Front page and editorial page

Step 4

- Construct Content Categories
  - Emergent coding
    - Done after preliminary examination of data
  - A Priori coding
    - Done before preliminary examination of data
      - Based on some theoretical or conceptual rationale

Step 4

- General requirements for construction of categories
  - Must reflect the investigator's research question
  - Categories must be exhaustive
    - All coding units should fit into one of the categories
  - Categories must be mutually exclusive
    - A coding unit can be placed in only one content category

Step 5

- Selection of the recording unit
  - This is the specific content unit that is to be placed into a given content category
    - Operational definition of the unit must be clear
    - Criteria for selection must be apparent and easily observed

Step 5

- In printed media, it could be
  - A word, or a symbol (smallest unit used in content analysis)
  - A theme (a single assertion about some subject)
  - A sentence or a paragraph or an entire story

Step 5

- Context Unit
  - It may not be possible to classify a recording unit without some reference to the context in which it appears
    - Word (context unit: sentence)
    - Symbol (context unit: sentence)
    - Sentence (context unit: sentence)
    - Paragraph (context unit: paragraph)
    - Article (context unit: article)

Step 6

- Establish an enumeration system
  - Nominal data are counted up as frequency of occurrence (chi square tests may be used to show relationships between variables)
  - Interval/Ratio level data permit use of powerful statistical tests (correlations, regression, etc.)

Some Caveats

- Content analysis cannot serve as the sole basis for claims about media effects
- Causal implications must be drawn very carefully.
  - Correlations do not imply causality
- Inferences would be limited to the operational definitions of the content categories

Inter-coder Reliability

- Holsti's Formula = 2M/N1 + N2
  - Can be used for 2 coders
  - Does not take into account some coder agreement due to chance
- Scott's *pi* Formula

  $$= \frac{\%\ \text{obs. Agreement} - \%\ \text{expected agreement}}{1 - \%\ \text{expected agreement}}$$

  > accounts for chance agreement

Inter-coder Reliability

- Cohen's *kappa* is another formula
  - SPSS will compute this for 2 coders for nominal data
- For interval and ratio level data
  - Compute alpha for overall reliability
- An ICR of at least .80 is recommended for *kappa*

Statistical Methods for Quantitative Data Analysis

Mahesha M
Senior Professor
DoS in Economics and Co-operation
University of Mysore
Mysuru

Data Analysis

- Data analysis is the process of developing answers to questions through the examination and interpretation of data.
- Turning raw data into useful information.

- Purpose is to provide answers to research questions.

- Even the greatest amount and best quality data mean nothing if not properly analyzed—or if not analyzed at all.

Data Analysis

- The basic steps in the analytic process consist of

  - ❖ Identifying issues
  - ❖ Determining the availability of suitable data
  - ❖ Deciding on which methods are appropriate for answering the questions of interest
  - ❖ Applying the methods and
  - ❖ Evaluating, summarizing and communicating the results.

Also the purpose of analysing data is to obtain usable and useful information.

The analysis, irrespective of whether the data is qualitative or quantitative, may:

- Describe and summarise the data
- Identify relationships between variables
- Compare variables
- Identify the difference between variables
- Measure cause and effect
- Analyses interdependence
- Forecast outcomes

7 STEPS OF RESEARCH PROCESS

- Step One: Define research problem
- Step Two: Review of literature
- Step Three: Formulate hypotheses
- Step Four: Preparing the research design
- Step Five: Data collection
- Step Six: Data analysis
- Step Seven: Interpretation and report writing

Criteria for Selection of Statistical Tools for Data Analysis

1. Number of Variable/s
   - Univariate – Bivariate – Multivariate

2. Measurement Scale of Variable
   – Nominal, Ordinal, Interval and Ratio

3. Purpose of the Analysis
   – Descriptive - Inferential

4. Based on Assumption
   - Parametric – Non-parametric

Three types of analysis

- Univariate analysis
  - The examination of the distribution of cases on only one variable at a time (e.g., weight of college students)

- Bivariate analysis
  - The examination of two variables simultaneously (e.g., the relation between gender and weight of college students)

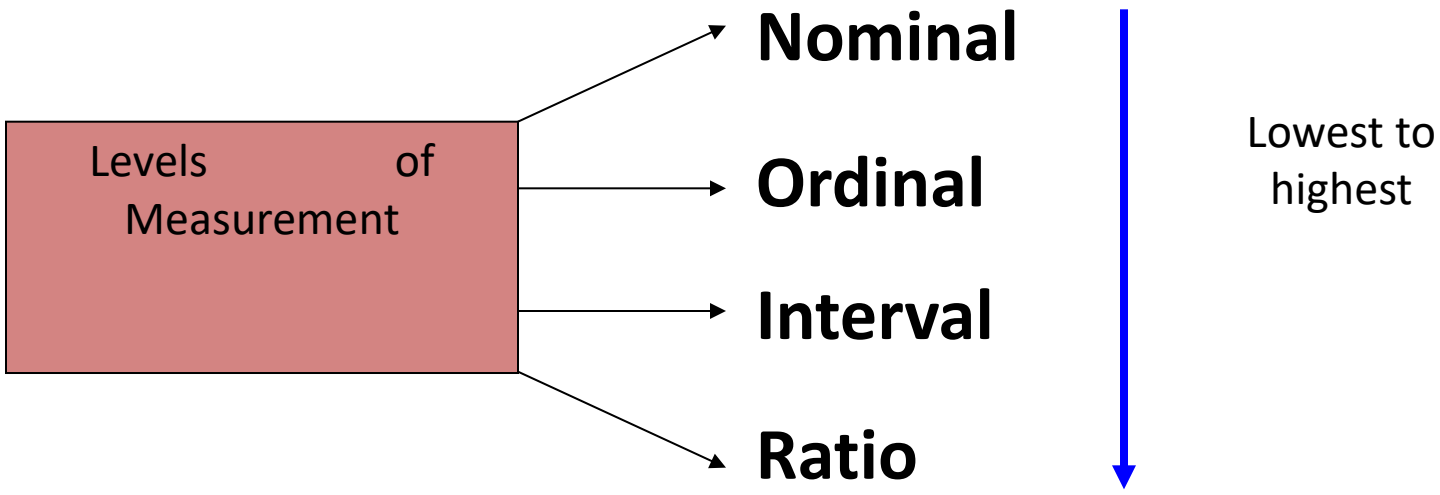
- Multivariate analysis
  - The examination of more than two variables simultaneously (e.g., the relationship between gender, race and weight of college students)

Purpose of diff. types of analysis

- Univariate analysis
  - Purpose: mainly description
- Bivariate analysis
  - Purpose: determining the empirical relationship between the two variables
- Multivariate analysis
  - Purpose: determining the empirical relationship among multiple variables

2. Measurement Scale of Variable

Data can be classified according to levels of measurement. The level of measurement of the data dictates the calculations that can be done to summarize and present the data. It will also determine the statistical tests that should be performed.



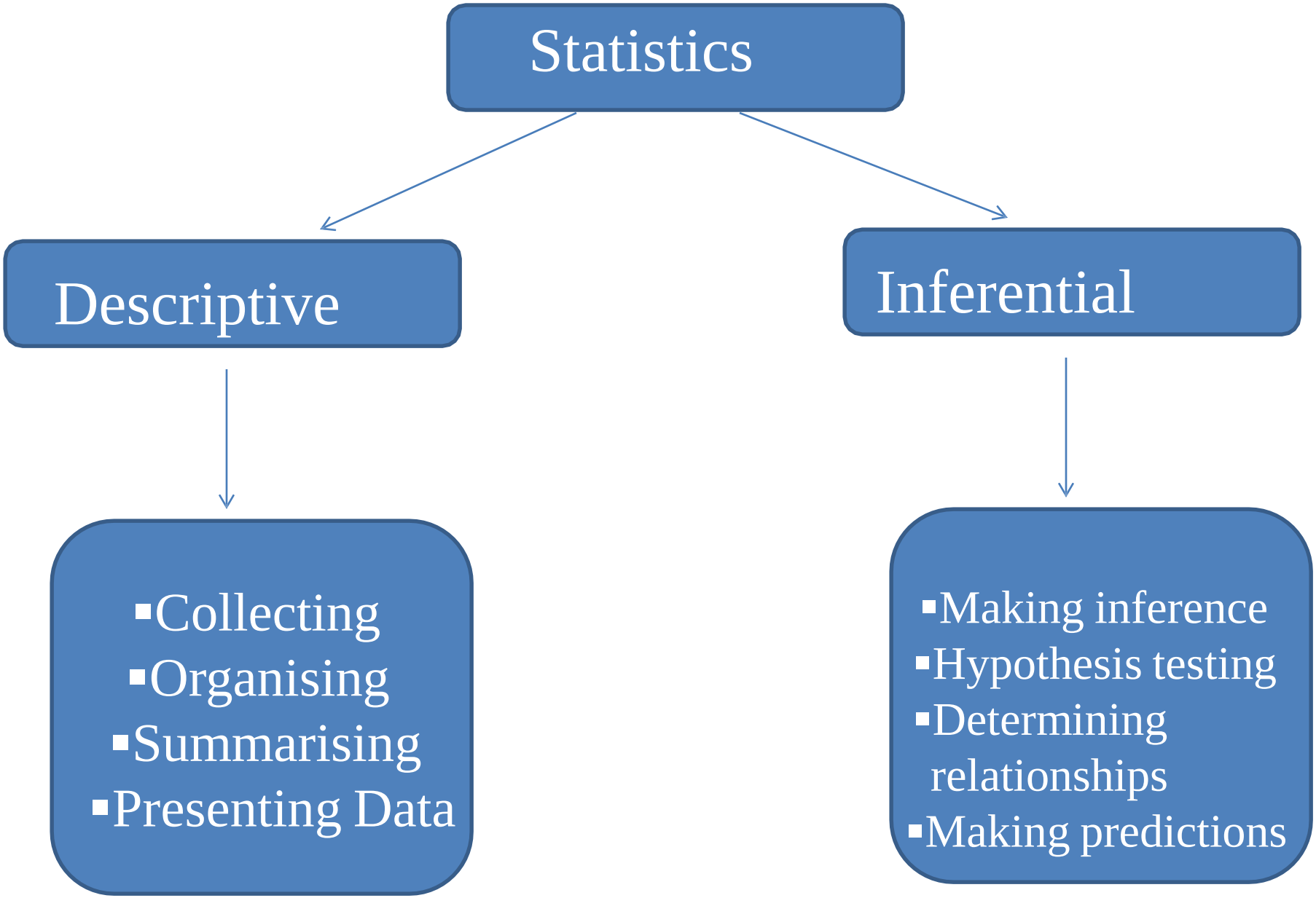
Four Levels of Measurement

Nominal - Observations of a qualitative variable can only be classified and counted.
Male / female -Black / white -Young / old -Single / married / widowed -Nationality
-
Ordinal - Data are represented by sets of labels or names; they have relative values and hence they can be ranked or ordered.
Status (low, middle, high) -Size (smallest, small, big, biggest) -Quality (poor, good, very good, excellent)

Interval -It includes all the characteristics of the ordinal level, and additionally the difference between values is a constant size.
Degrees of temperature -Calendar time -Attitude scales -IQ scores

Ratio - It has all the characteristics of the interval level, and additionally the 0 point is meaningful and the ratio between two numbers is meaningful.
-Number of family members -Weight -Length -Distance

3. Purpose of the Analysis



Descriptive and Inferential Statistics

- Descriptive Statistics refers to a discipline that quantitatively describes the important characteristics of the dataset.
- For the purpose of describing properties, it uses measures of central tendency, i.e. mean, median, mode and the measures of dispersion i.e. range, standard deviation, quartile deviation and variance, etc.
- Organize, analyze and present data in a meaningful way.
- Charts, Graphs, Tables and Numerical methods

Inferential Statistics is all about generalising from the sample to the population, i.e. the results of analysis of the sample can be deduced to the larger population, from which the sample is taken.

It is a convenient way to draw conclusions about the population when it is not possible to query each and every member of the universe.

The sample chosen is a representative of the entire population; therefore, it should contain important features of the population.

Compares, test and predicts data.

4. Based on Assumption

Parametric or Non-parametric?

- Parametric tests are restricted to data that:
  1) show a normal distribution
  2) are independent of one another
  3) are on the same *continuous* scale of measurement

- Non-parametric tests are used on data that:
  1) show an other-than normal distribution
  2) are dependent or conditional on one another
  3) in general, do not have a continuous scale of measurement

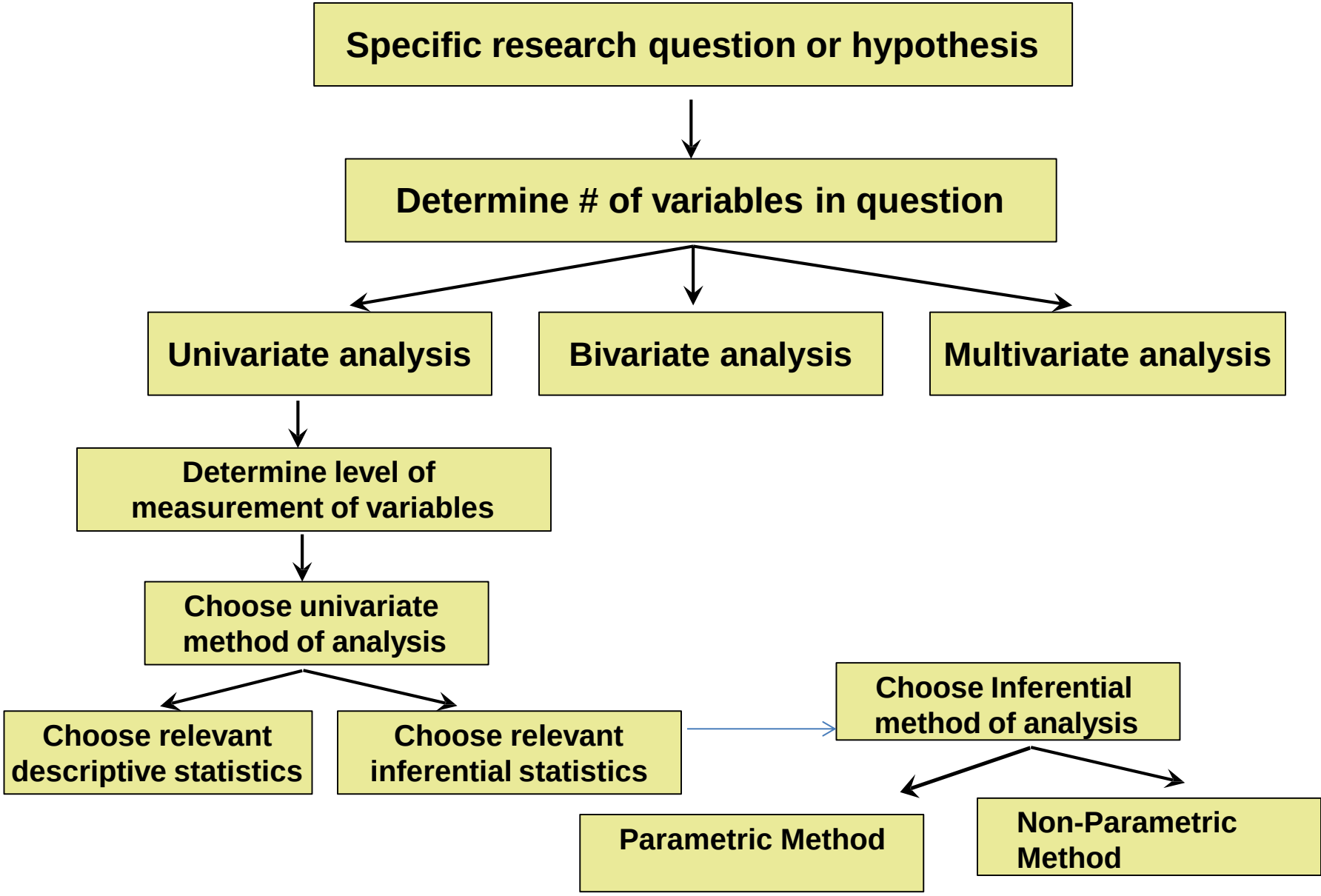
Parametric and Non parametric

Parametric	Non Parametric
Information about population is completely known	No information about the population is available
Specific assumptions are made regarding the population	No assumptions are made regarding the population
Null hypothesis is made on parameters of the population distribution	The null hypothesis is free from parameters

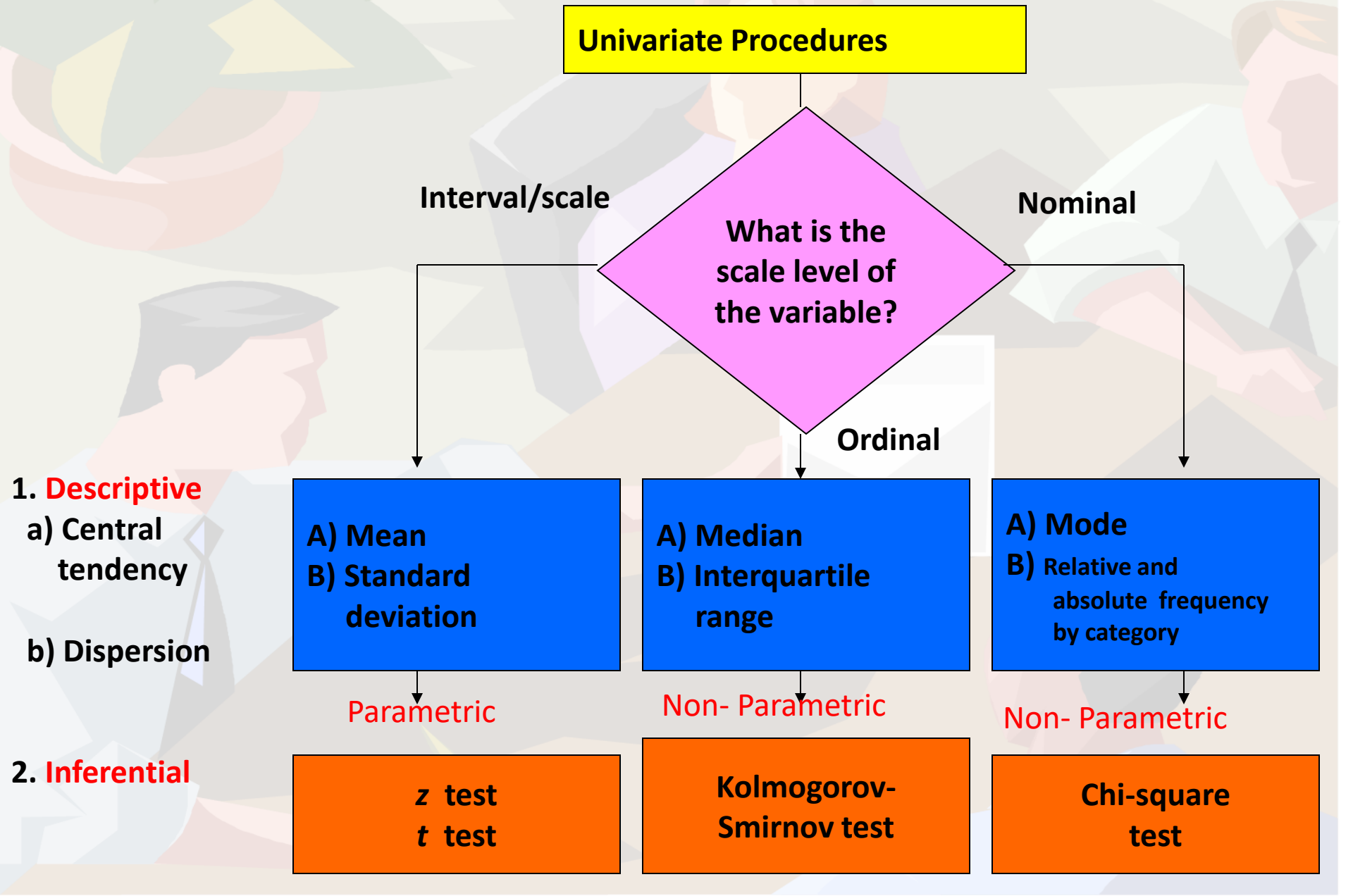
Difference between parametric and Non parametric

Parametric	Non Parametric
Test statistic is based on the distribution	Test statistic is arbritary
Parametric tests are applicable only for variable	It is applied both variable and artributes
No parametric test exist for Nominal scale data	Non parametric test do exist for norminal and ordinal scale data
Parametric test is powerful, if it exist	It is not so powerful like parametric test

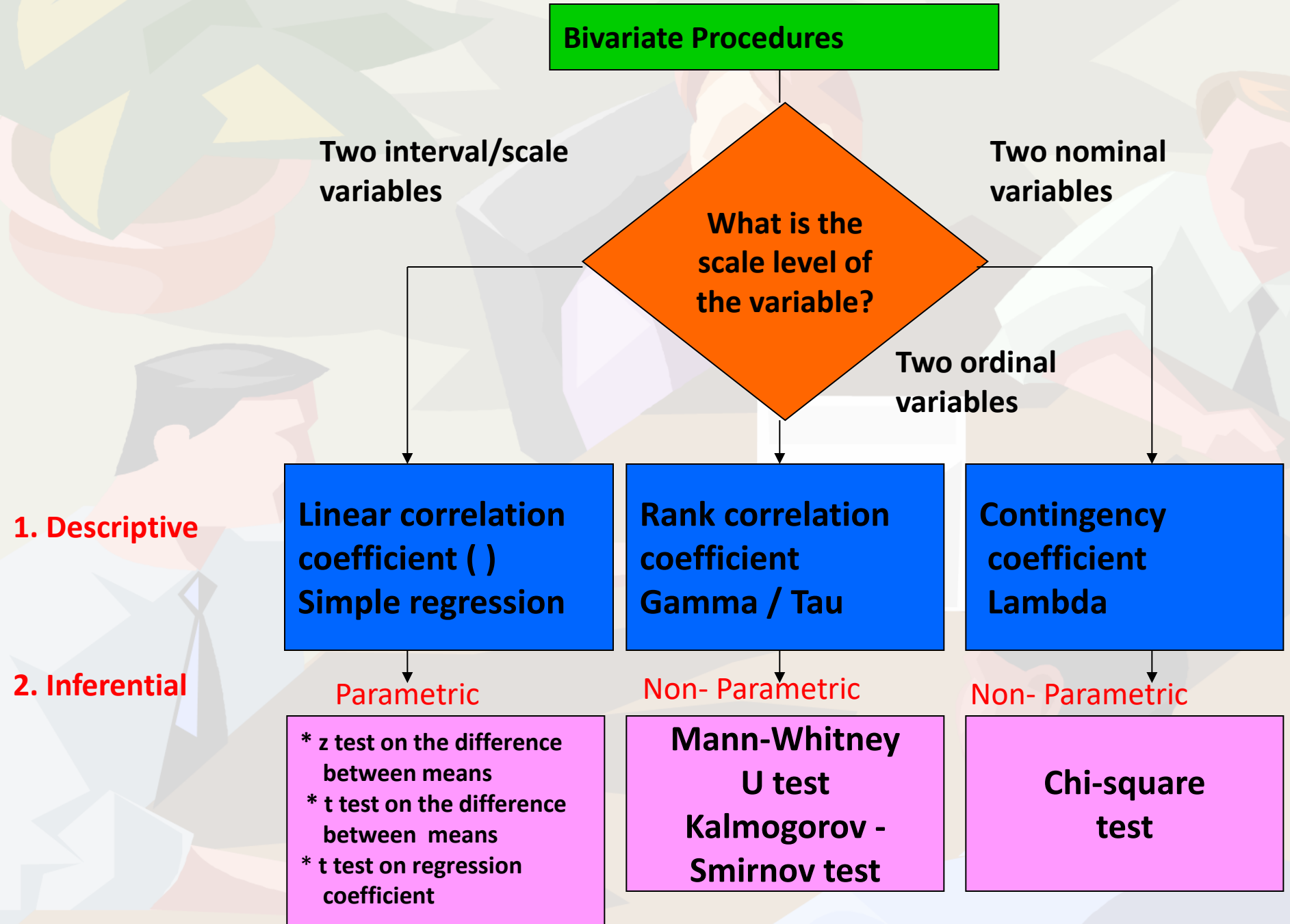
Choosing the Statistical Technique



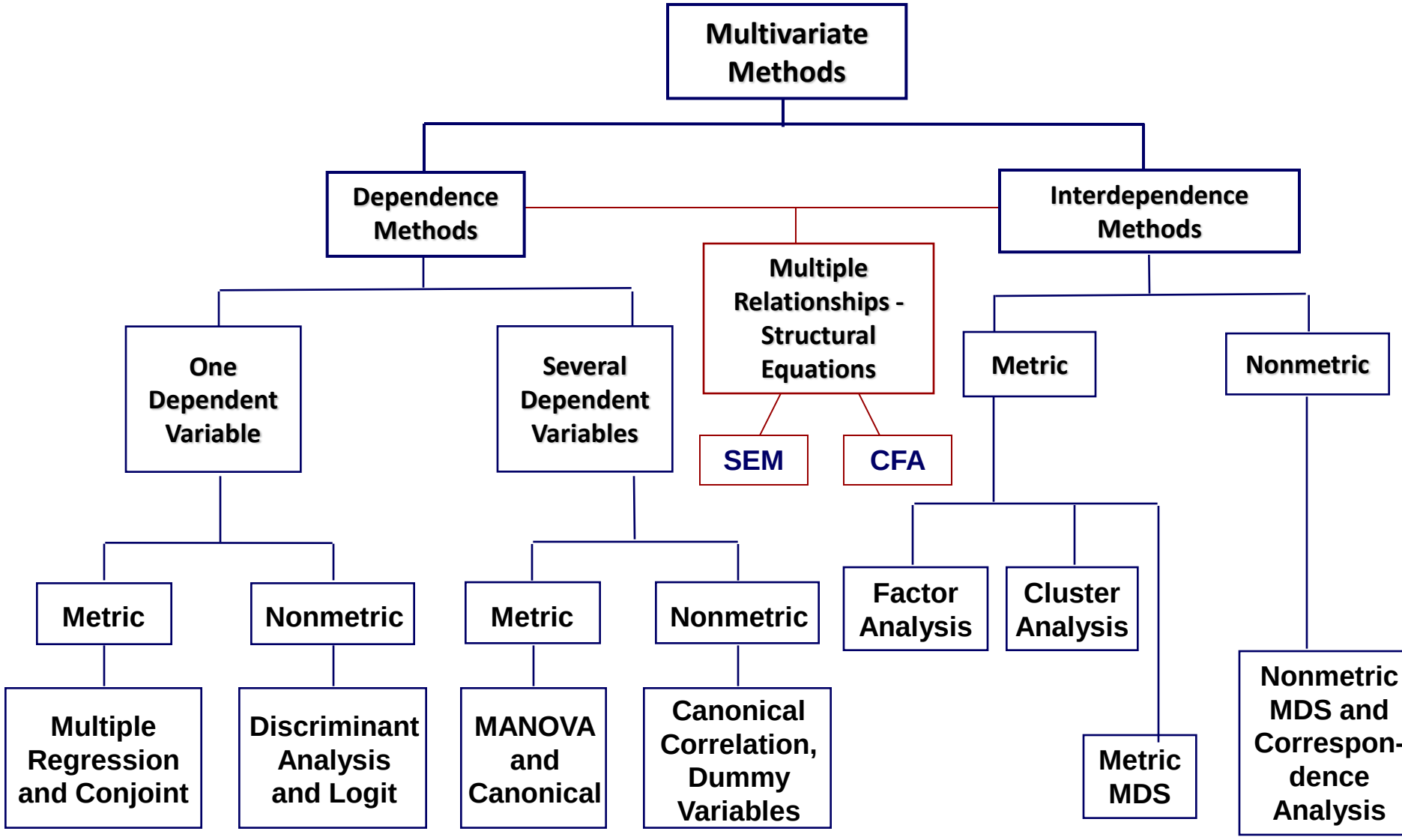
OVERVIEW OF UNIVARIATE DATA ANALYSIS PROCEDURES

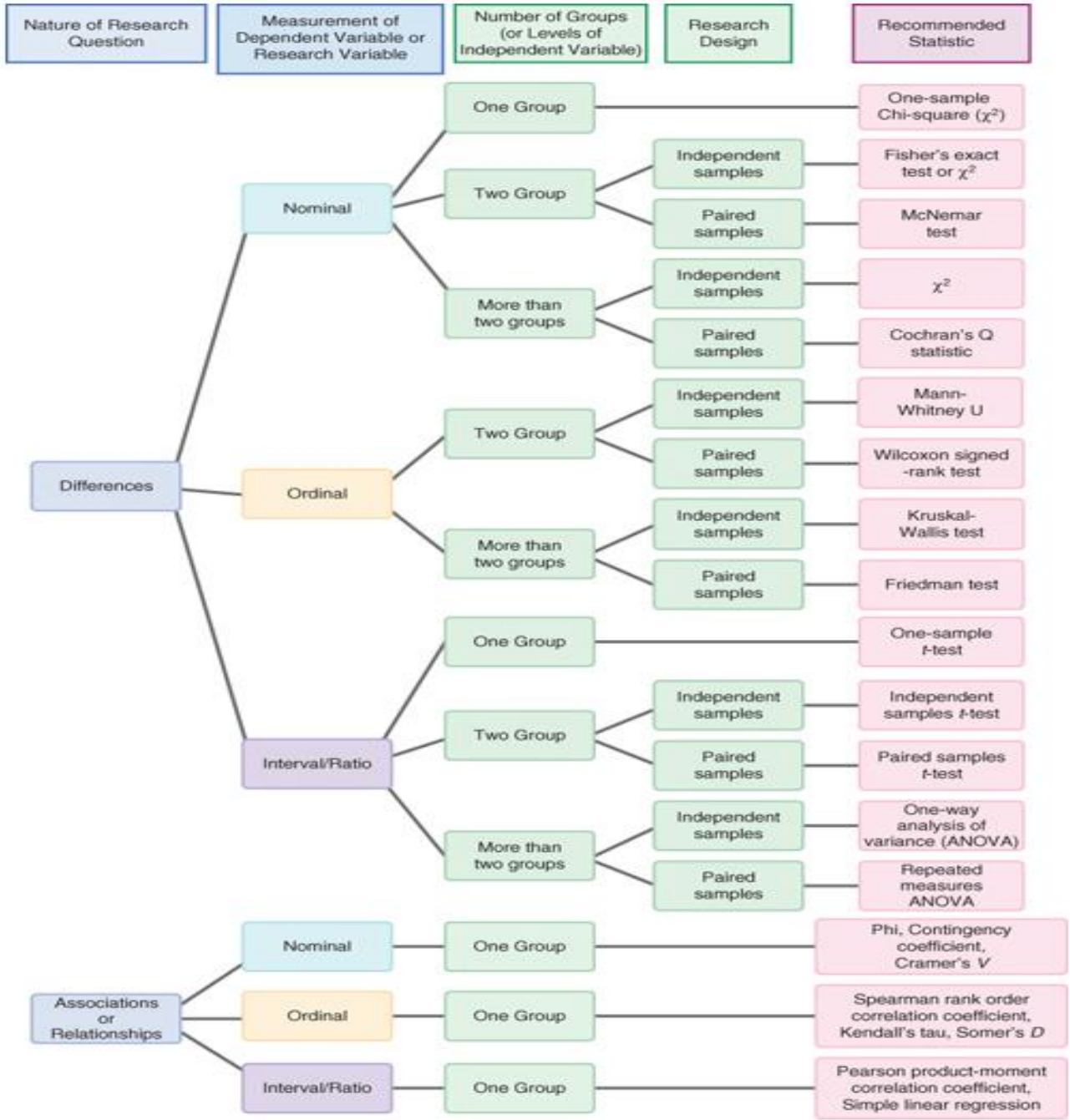


BIVARIATE DATA ANALYSIS PROCEDURES



Selecting the Correct Multivariate Method

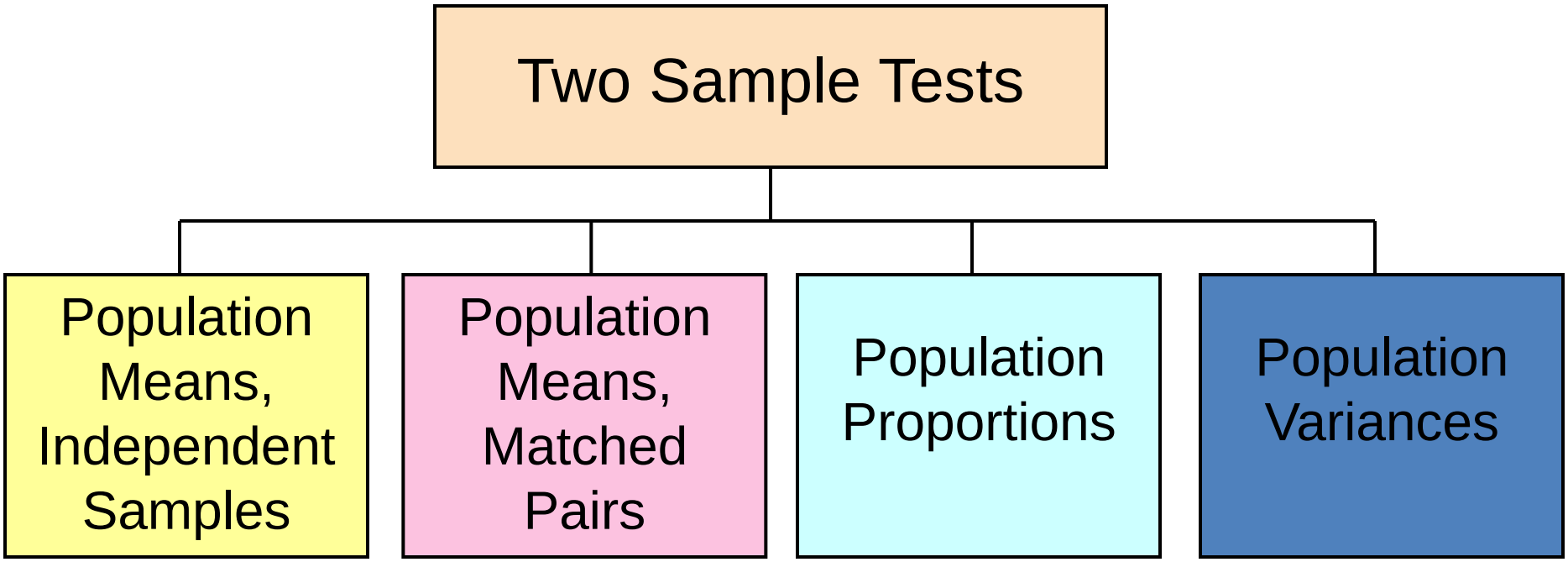




dified from Grove, S. K., Burns, N., & Gray, J. R. [2013]. *The practice of nursing research: Appraisal, synthesis, and generation of evidence*

Hypothesis Testing - Two Population Means

Two Sample Tests

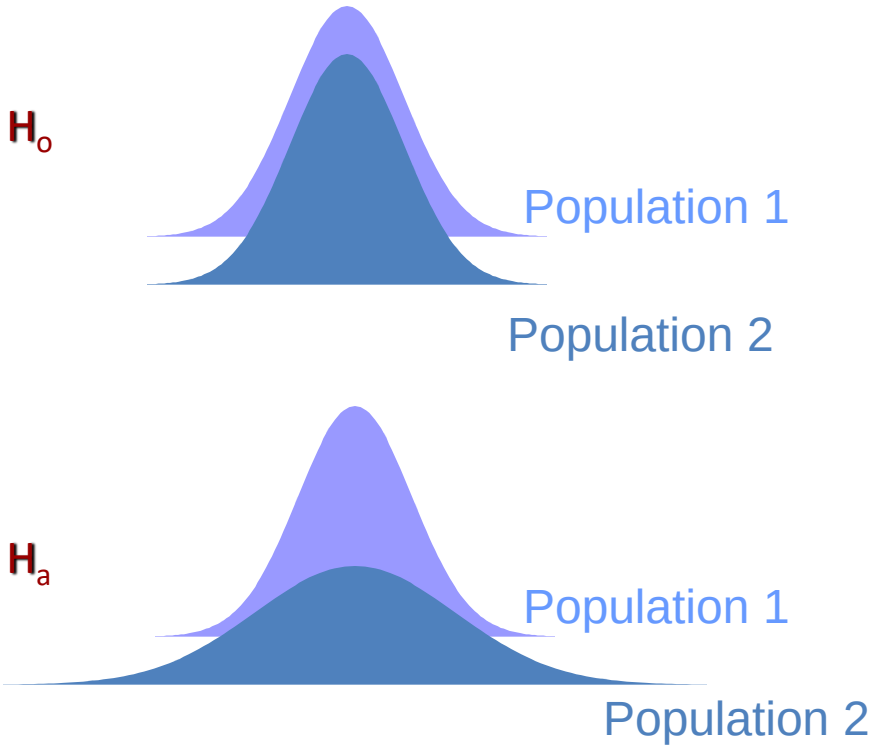


Examples:

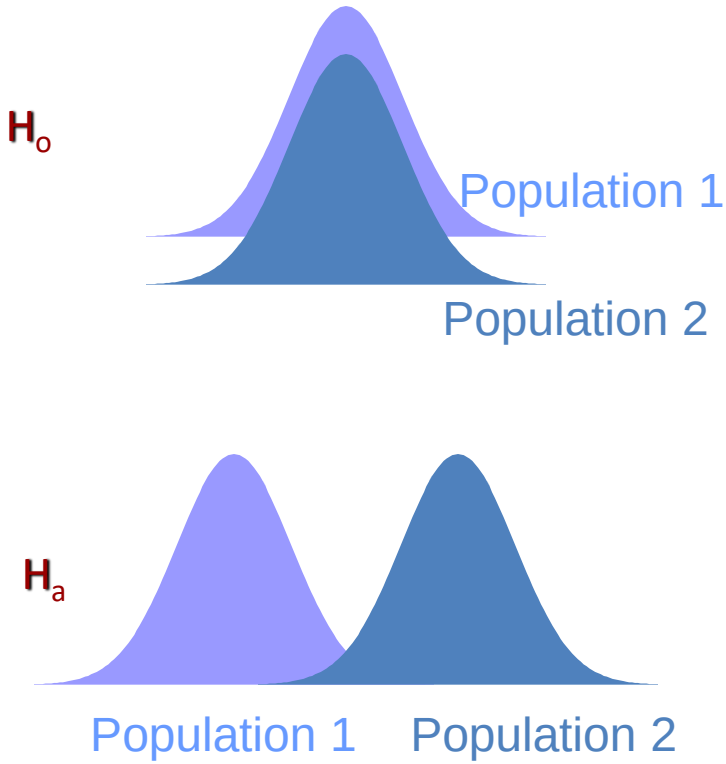
Group 1 vs group 2 (Independent)	Same group before vs after treatment	Proportion 1 vs. Proportion 2	Variance 1 vs. Variance 2

Two Sample Tests

TEST FOR EQUAL VARIANCES



TEST FOR EQUAL MEANS



Difference Between Two Means

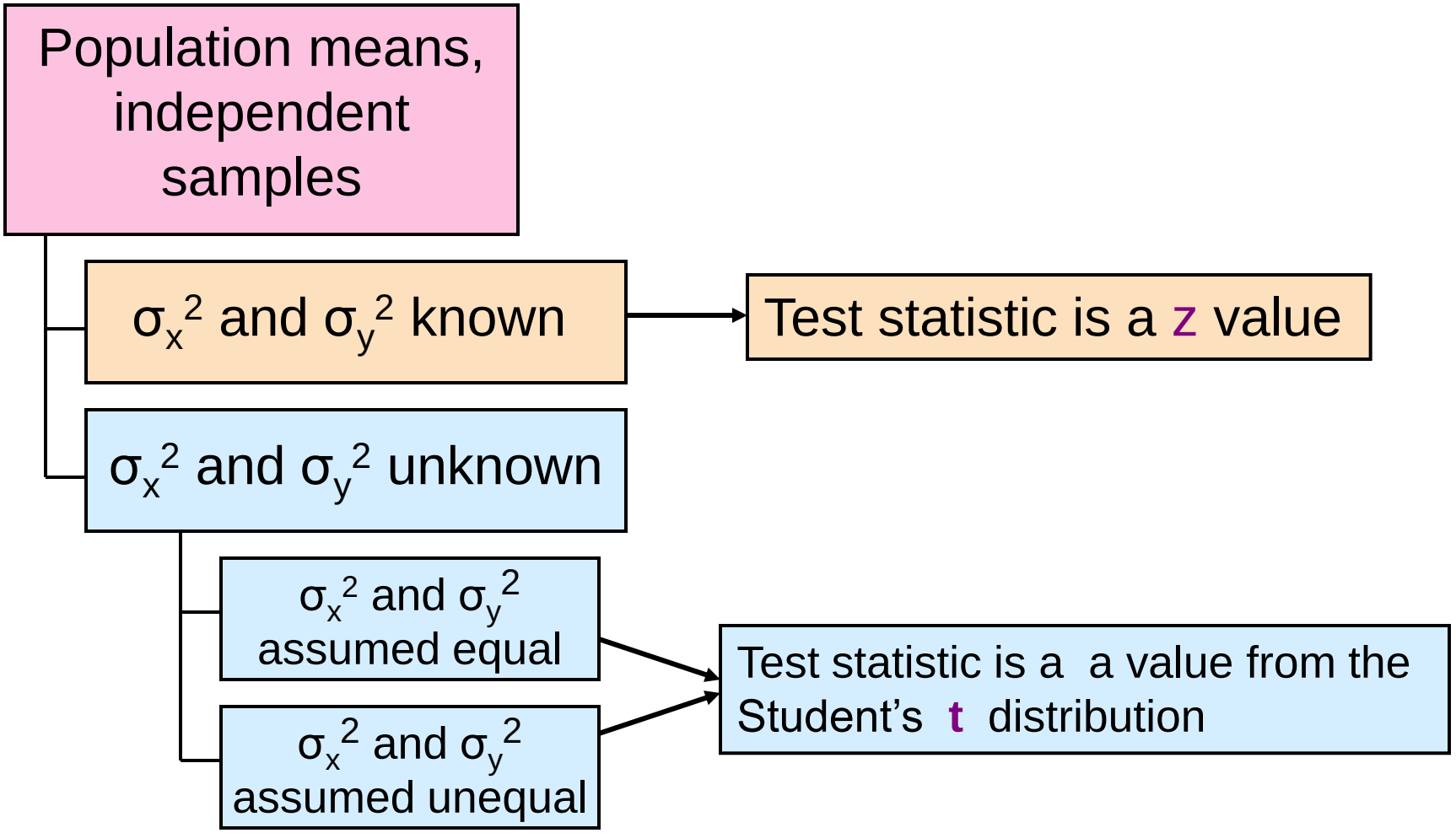
Population means, independent samples

Goal: Form a confidence interval for the difference between two population means, $\mu_x - \mu_y$

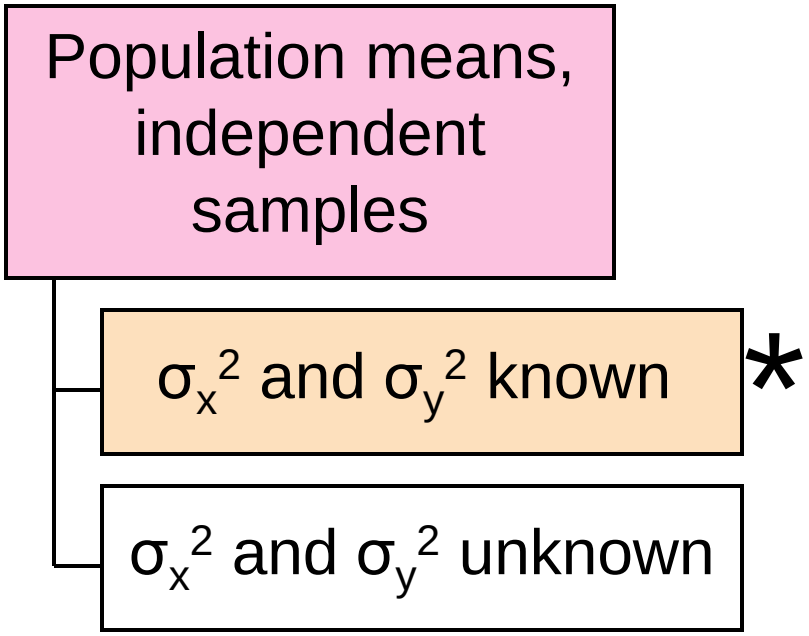
- Different data sources
  - Unrelated
  - Independent
    - Sample selected from one population has no effect on the sample selected from the other population

Difference Between Two Means

(continued)



σ_x^2 and σ_y^2 Known



Assumptions:

- Samples are randomly and independently drawn
- both population distributions are normal
- Population variances are known

σ_x^2 and σ_y^2 Known

(continued)

- Population means, independent samples
  - σ_x^2 and σ_y^2 known *
  - σ_x^2 and σ_y^2 unknown

When σ_x^2 and σ_y^2 are known and both populations are normal, the variance of $\overline{X} - \overline{Y}$ is

$$\sigma^2_{\overline{X}-\overline{Y}} = \frac{\sigma_x^2}{n_x} + \frac{\sigma_y^2}{n_y}$$

…and the random variable

$$Z = \frac{(\overline{x} - \overline{y}) - (\mu_X - \mu_Y)}{\sqrt{\frac{\sigma_x^2}{n_X} + \frac{\sigma_y^2}{n_Y}}}$$

has a standard normal distribution

Test Statistic, σ_x^2 and σ_y^2 Known

Population means, independent samples

- σ_x^2 and σ_y^2 known *
- σ_x^2 and σ_y^2 unknown

The test statistic for $\mu_x - \mu_y$ is:

$$z = \frac{(\bar{x} - \bar{y}) - D_0}{\sqrt{\frac{\sigma_x^2}{n_x} + \frac{\sigma_y^2}{n_y}}}$$

Hypothesis Tests for Two Population Means

Two Population Means, Independent Samples

Lower-tail test:

$H_0: \mu_x \geq \mu_y$
$H_1: \mu_x < \mu_y$

i.e.,

$H_0: \mu_x - \mu_y \geq 0$
$H_1: \mu_x - \mu_y < 0$

Upper-tail test:

$H_0: \mu_x \leq \mu_y$
$H_1: \mu_x > \mu_y$

i.e.,

$H_0: \mu_x - \mu_y \leq 0$
$H_1: \mu_x - \mu_y > 0$

Two-tail test:

$H_0: \mu_x = \mu_y$
$H_1: \mu_x \neq \mu_y$

i.e.,

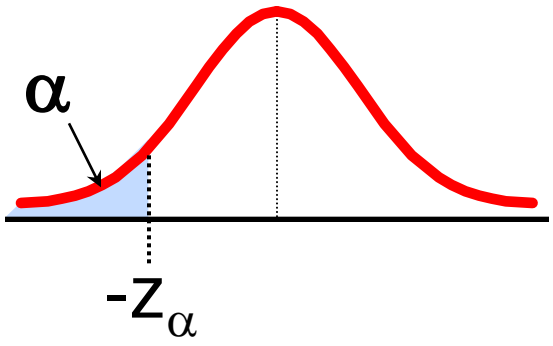
$H_0: \mu_x - \mu_y = 0$
$H_1: \mu_x - \mu_y \neq 0$

Decision Rules

Two Population Means, Independent Samples, Variances Known

Lower-tail test:

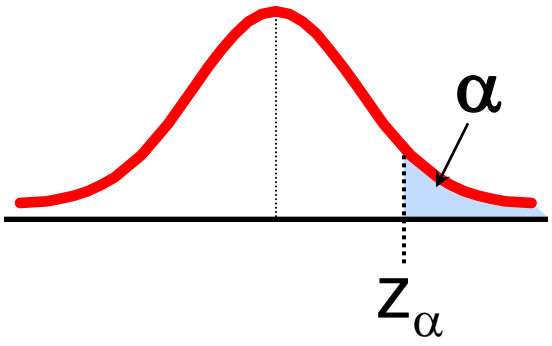
$H_0: \mu_x - \mu_y \geq 0$
$H_1: \mu_x - \mu_y < 0$



Reject H_0 if $z < -z_\alpha$

Upper-tail test:

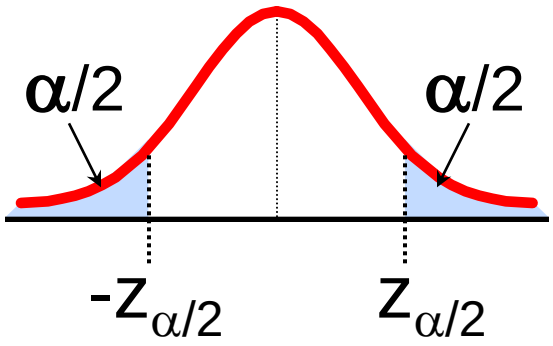
$H_0: \mu_x - \mu_y \leq 0$
$H_1: \mu_x - \mu_y > 0$



Reject H_0 if $z > z_\alpha$

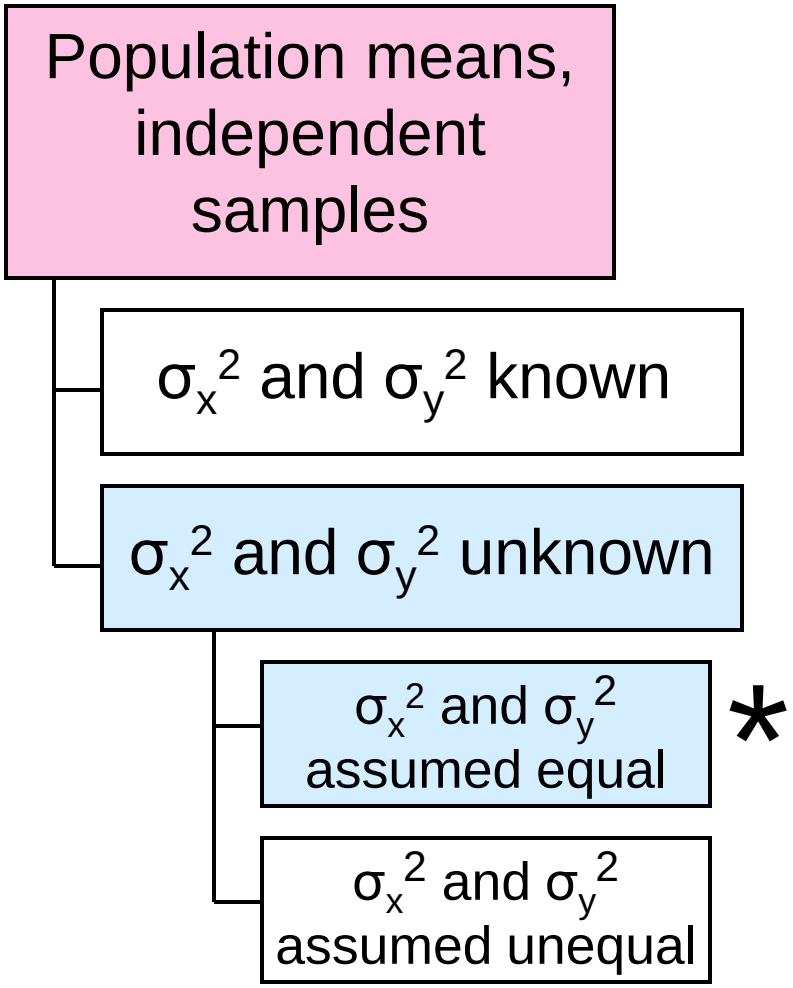
Two-tail test:

$H_0: \mu_x - \mu_y = 0$
$H_1: \mu_x - \mu_y \neq 0$



Reject H_0 if $z < -z_{\alpha/2}$ or $z > z_{\alpha/2}$

σ_x^2 and σ_y^2 Unknown, Assumed Equal

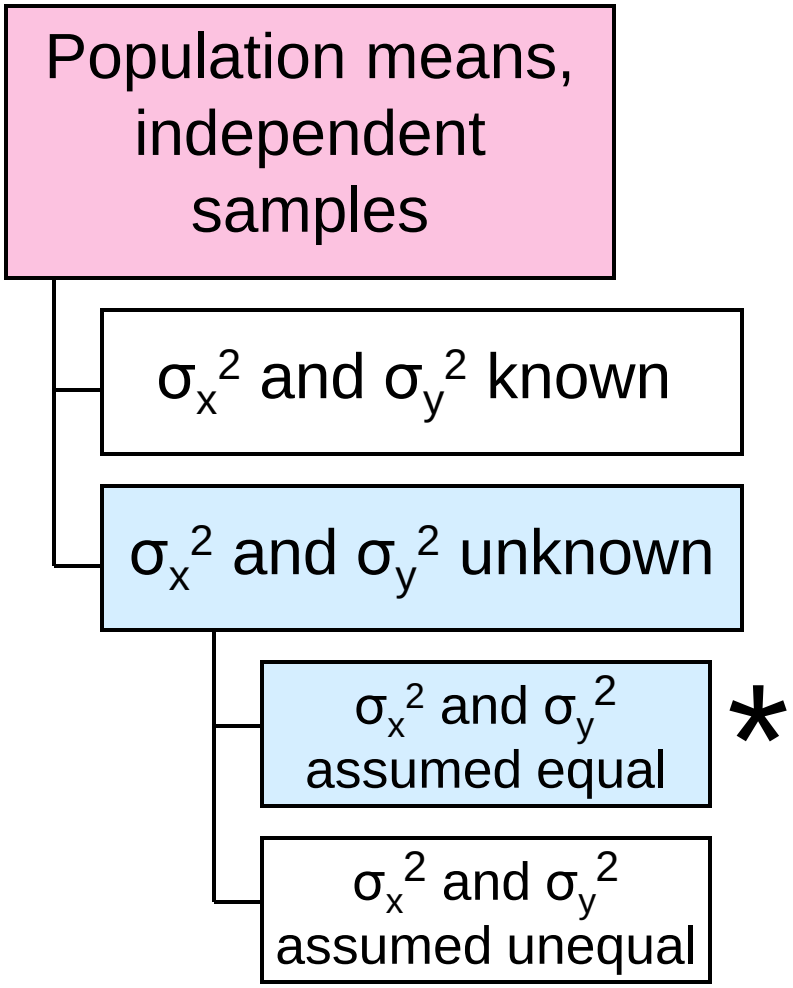


Assumptions:

- Samples are randomly and independently drawn
- Populations are normally distributed
- Population variances are unknown but assumed equal

$\sigma_x 2$ and σ_y^2 Unknown, Assumed Equal

(continued)



Forming interval estimates:

- The population variances are assumed equal, so use the two sample standard deviations and pool them to estimate σ
- use a t value with $(n_x + n_y - 2)$ degrees of freedom

Test Statistic, σ_x^2 and σ_y^2 Unknown, Equal

- σ_x^2 and σ_y^2 unknown
  - σ_x^2 and σ_y^2 assumed equal *
  - σ_x^2 and σ_y^2 assumed unequal

The test statistic for $\mu_x - \mu_y$ is:

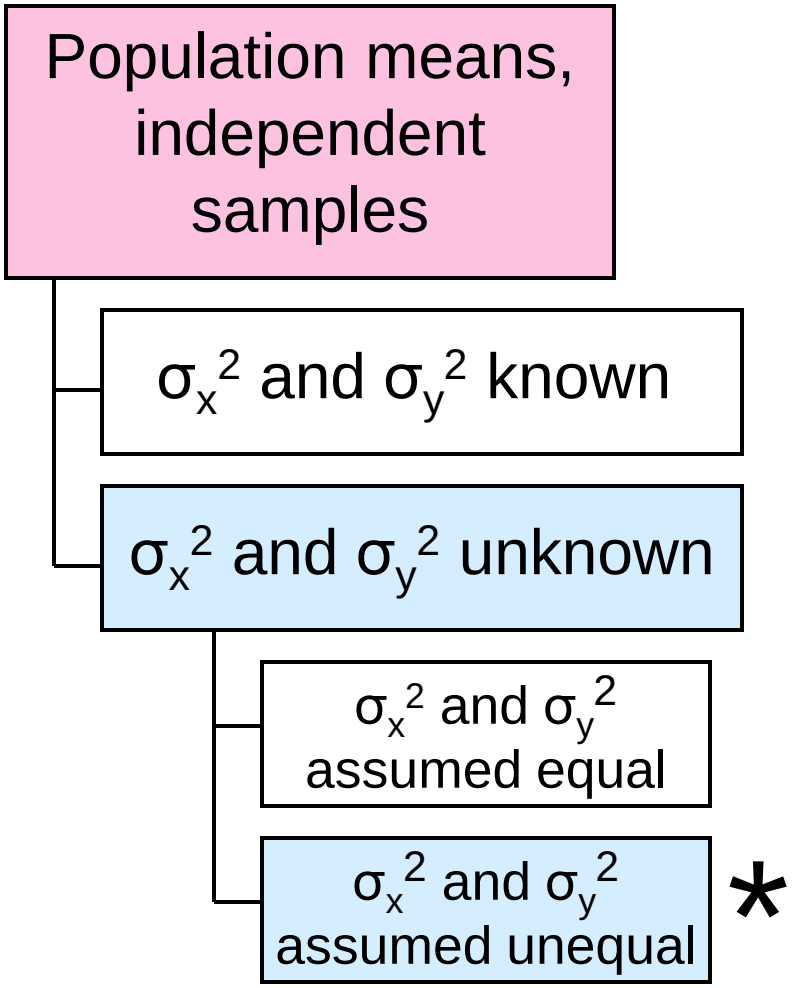
$$t = \frac{(\bar{x} - \bar{y}) - (\mu_x - \mu_y)}{\sqrt{s_p^2\left(\frac{1}{n_x} + \frac{1}{n_y}\right)}}$$

Where t has $(n_1 + n_2 - 2)$ d.f.,

and

$$s_p^2 = \frac{(n_x - 1)s_x^2 + (n_y - 1)s_y^2}{n_x + n_y - 2}$$

σ_x^2 and σ_y^2 Unknown, Assumed Unequal



Assumptions:

- Samples are randomly and independently drawn
- Populations are normally distributed
- Population variances are unknown and assumed unequal

σ_x^2 and σ_y^2 Unknown, Assumed Unequal

(continued)

- Population means, independent samples
  - σ_x^2 and σ_y^2 known
  - σ_x^2 and σ_y^2 unknown
    - σ_x^2 and σ_y^2 assumed equal
    - σ_x^2 and σ_y^2 assumed unequal *

Forming interval estimates:

- The population variances are assumed unequal, so a pooled variance is not appropriate
- use a t value with ν degrees of freedom, where

$$\nu = \frac{\left[\left(\frac{s_x^2}{n_x}\right)+\left(\frac{s_y^2}{n_y}\right)\right]^2}{\left(\frac{s_x^2}{n_x}\right)^2/(n_x-1)+\left(\frac{s_y^2}{n_y}\right)^2/(n_y-1)}$$

Test Statistic, σ_x^2 and σ_y^2 Unknown, Unequal

- σ_x^2 and σ_y^2 unknown
  - σ_x^2 and σ_y^2 assumed equal
  - σ_x^2 and σ_y^2 assumed unequal *

The test statistic for $\mu_x - \mu_y$ is:

$$t = \frac{(\bar{x} - \bar{y}) - D_0}{\sqrt{\frac{\sigma_x^2}{n_X} + \frac{\sigma_y^2}{n_Y}}}$$

Where t has ν degrees of freedom:

$$\nu = \frac{\left[\left(\frac{s_x^2}{n_x}\right) + \left(\frac{s_y^2}{n_y}\right)\right]^2}{\left(\frac{s_x^2}{n_x}\right)^2 / (n_x - 1) + \left(\frac{s_y^2}{n_y}\right)^2 / (n_y - 1)}$$

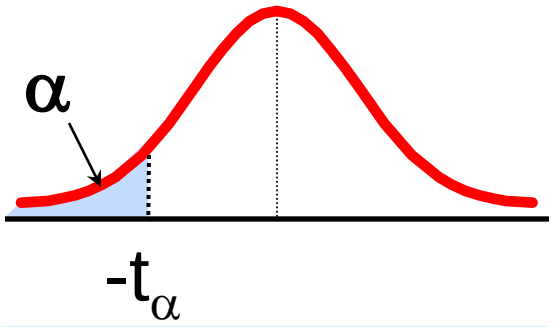
Decision Rules

Two Population Means, Independent Samples, Variances Unknown

Lower-tail test:

$H_0: \mu_x - \mu_y \geq 0$

$H_1: \mu_x - \mu_y < 0$

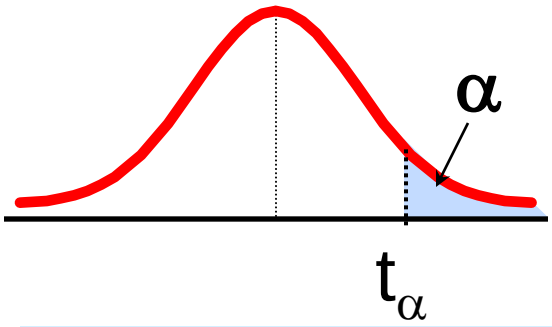


Reject H_0 if $t < -t_{n-1,\,\alpha}$

Upper-tail test:

$H_0: \mu_x - \mu_y \leq 0$

$H_1: \mu_x - \mu_y > 0$

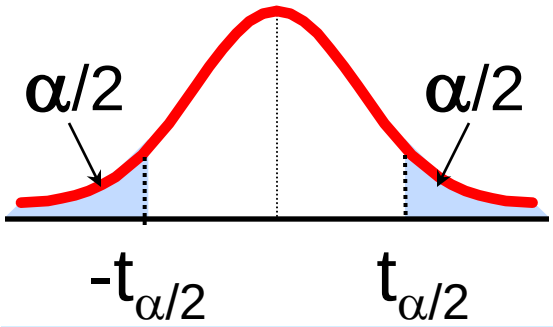


Reject H_0 if $t > t_{n-1,\,\alpha}$

Two-tail test:

$H_0: \mu_x - \mu_y = 0$

$H_1: \mu_x - \mu_y \neq 0$



Reject H_0 if $t < -t_{n-1\,,\,\alpha/2}$ or $t > t_{n-1\,,\,\alpha/2}$

Independent Sample Test -Example

```
. ttest Savings, by ( Group) unpaired

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. err.	Std. dev.	[95% conf.	interval]
1	90	2026.667	41.80091	396.5582	1943.609	2109.724
2	90	1182.222	15.64891	148.4586	1151.128	1213.316
Combined	180	1604.444	38.61605	518.0887	1528.243	1680.646
diff		844.4444	44.63411		756.3643	932.5246

```
    diff = mean(1) - mean(2)                                      t =  18.9193
H0: diff = 0                                     Degrees of freedom =      178

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

Independent Sample Test –Example

```
. ttest savingsSC== SavingsST, unpaired welch

Two-sample t test with unequal variances
```

Variable	Obs	Mean	Std. err.	Std. dev.	[95% conf.	interval]
saving~C	90	2026.667	41.80091	396.5582	1943.609	2109.724
Saving~T	90	1182.222	15.64891	148.4586	1151.128	1213.316
Combined	180	1604.444	38.61605	518.0887	1528.243	1680.646
diff		844.4444	44.63411		756.0247	932.8641

```
    diff = mean(savingsSC) - mean(SavingsST)                      t =  18.9193
H0: diff = 0                     Welch's degrees of freedom =  114.016

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

Matched Pairs

Matched Pairs

Tests Means of 2 Related Populations

- Paired or matched samples
- Repeated measures (before/after)
- Use difference between paired values:

$$d_i = x_i - y_i$$

- Assumptions:
  - Both Populations Are Normally Distributed

Test Statistic: Matched Pairs

Matched Pairs

The test statistic for the mean difference is a t value, with n – 1 degrees of freedom:

$$t = \frac{\bar{d} - D_0}{\frac{s_d}{\sqrt{n}}}$$

Where

D_0 = hypothesized mean difference

s_d = sample standard dev. of differences

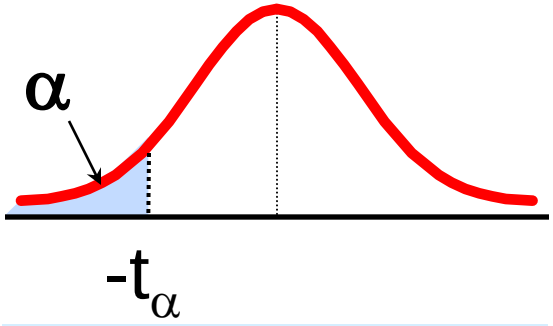
n = the sample size (number of pairs)

Decision Rules: Matched Pairs

Paired Samples

Lower-tail test:

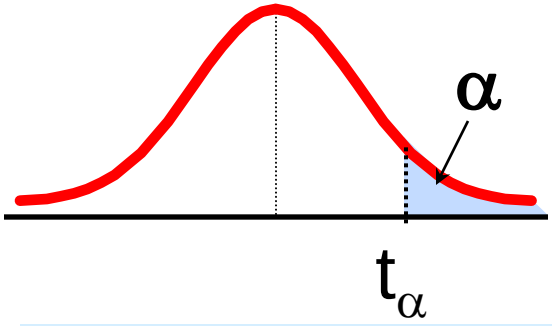
$H_0: \mu_x - \mu_y \geq 0$
$H_1: \mu_x - \mu_y < 0$



Reject H_0 if $t < -t_{n-1,\,\alpha}$

Upper-tail test:

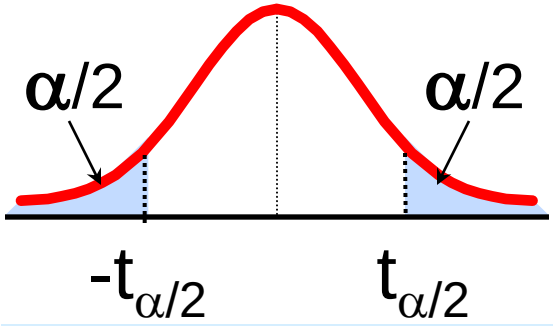
$H_0: \mu_x - \mu_y \leq 0$
$H_1: \mu_x - \mu_y > 0$



Reject H_0 if $t > t_{n-1,\,\alpha}$

Two-tail test:

$H_0: \mu_x - \mu_y = 0$
$H_1: \mu_x - \mu_y \neq 0$



Reject H_0 if $t < -t_{n-1\,,\,\alpha/2}$ or $t > t_{n-1\,,\,\alpha/2}$

Where $t = \dfrac{\bar{d} - D_0}{\frac{s_d}{\sqrt{n}}}$ has $n - 1$ d.f.

Matched Paired Test - Example

```
. ttest prescore== postscore

Paired t test
```

Variable	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]	
prescore	50	4.1	.2945075	2.082483	3.508165	4.691835
postsc~e	50	6.9	.2461955	1.740865	6.405252	7.394748
diff	50	-2.8	.3416646	2.415934	-3.486601	-2.113399

```
     mean(diff) = mean(prescore - postscore)                      t =  -8.1952
 H0: mean(diff) = 0                                     Degrees of freedom =       49

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

Analysis of Variance

- The purpose of ANOVA is much the same as the t tests. The goal is to determine whether the mean differences that are obtained for sample data are sufficiently large to justify a conclusion that there are mean differences between the populations from which the samples were obtained.

- The difference between ANOVA and the t tests is that ANOVA can be used in situations where there are *two or more* means being compared, whereas the t tests are limited to situations where only two means are involved.
- Analysis of variance is necessary to protect researchers from excessive risk of a Type I error in situations where a study is comparing more than two population means.

- These situations would require a series of several t tests to evaluate all of the mean differences. (Remember, a t test can compare only 2 means at a time.)
- Although each t test can be done with a specific α-level (risk of Type I error), the α-levels accumulate over a series of tests so that the final **experiment-wise α-level** can be quite large.

Tests on multiple hypotheses

- Consider the situation where the means for more than two groups are compared, e.g. mean expenditure for: (a) students; (b) unemployed; (c) employees

- One could run a set of two mean comparison tests (students vs. unemployed, students vs. employed, employed vs. unemployed)

- However, as seen in Two Means test, each of these tests is subject to Type one error (the level of significance, α), i.e. the probability of rejecting the null hypothesis when it is actually true

- Thus, the overall Type one error for the joint three tests is larger than α because the probability of Type one error increases with the number of tests

- This is the so-called *problem of inflated family-wise (or experiment-wise) Type one error*

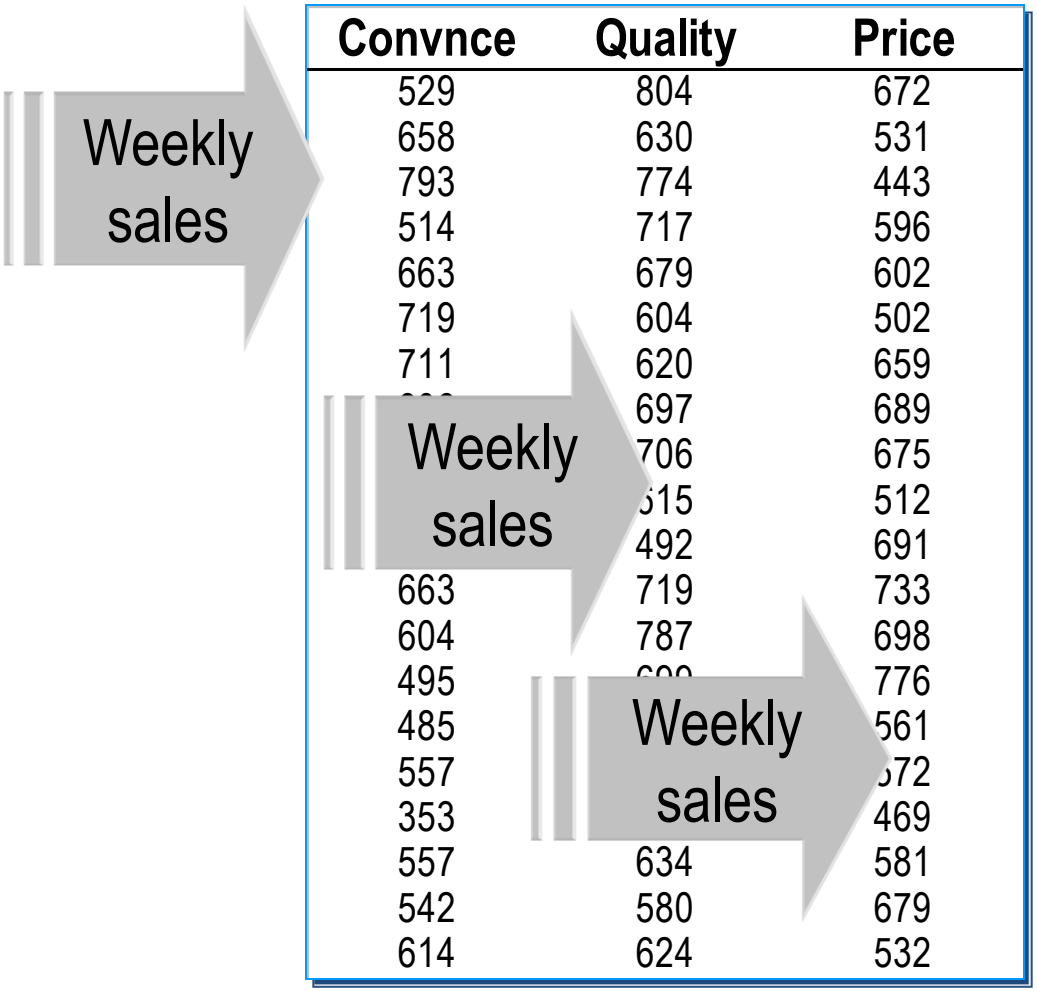
One Way Analysis of Variance

- Example
  - An apple juice manufacturer is planning to develop a new product -a liquid concentrate.
  - The marketing manager has to decide how to market the new product.
  - Three strategies are considered
    - Emphasize convenience of using the product.
    - Emphasize the quality of the product.
    - Emphasize the product's low price.

One Way Analysis of Variance

- Example - continued
  - An experiment was conducted as follows:
    - In three cities an advertisement campaign was launched .
    - In each city only one of the three characteristics (convenience, quality, and price) was emphasized.
    - The weekly sales were recorded for twenty weeks following the beginning of the campaigns.

One Way Analysis of Variance



Convnce	Quality	Price
529	804	672
658	630	531
793	774	443
514	717	596
663	679	602
719	604	502
711	620	659
	697	689
	706	675
	515	512
	492	691
663	719	733
604	787	698
495		776
485		561
557		572
353		469
557	634	581
542	580	679
614	624	532

One Way Analysis of Variance

- Solution
  - The data are interval
  - The problem objective is to compare sales in three cities.
  - We hypothesize that the three population means are equal

Defining the Hypotheses

- Solution

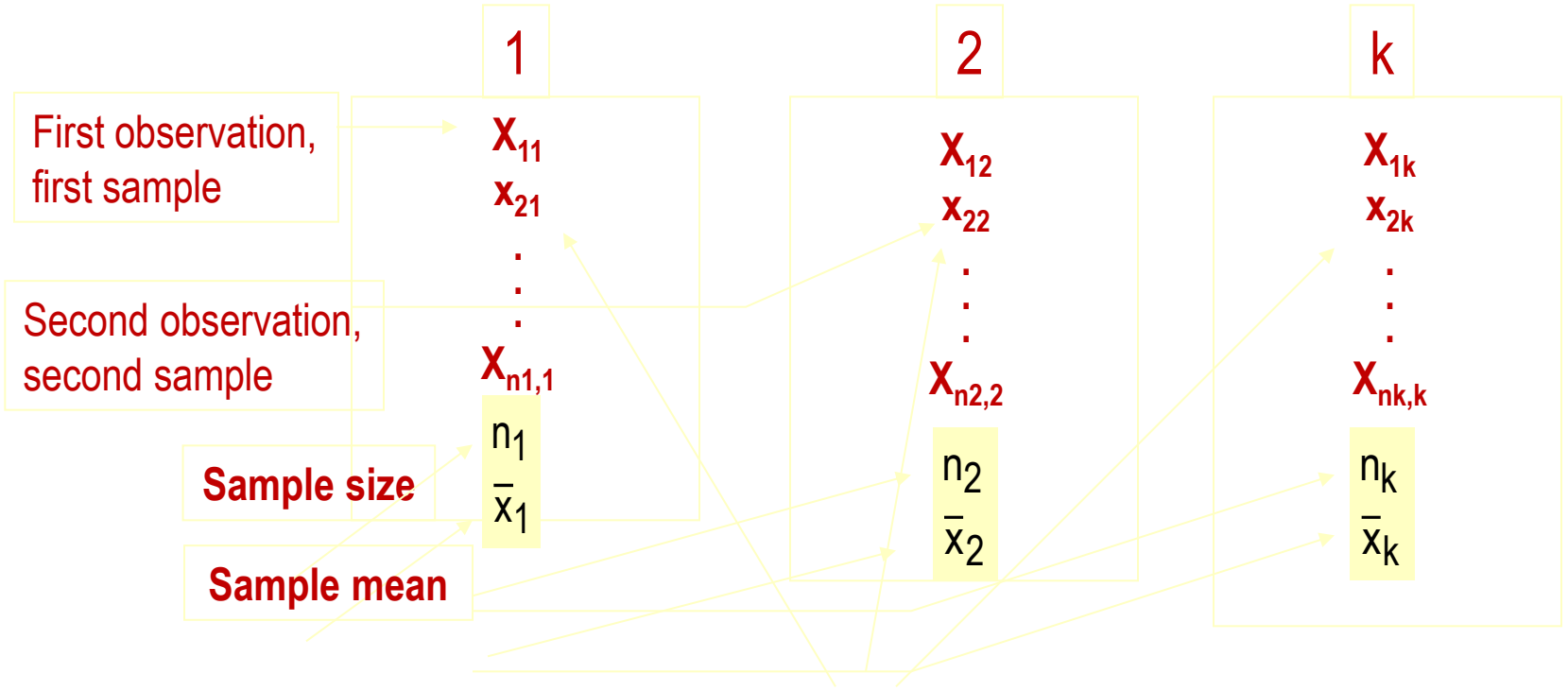
H_0: $\mu_1 = \mu_2 = \mu_3$

H_1: At least two means differ

To build the statistic needed to test the hypotheses use the following notation:

Notation

Independent samples are drawn from k populations (treatments).



X is the "response variable".
The variables' value are called "responses".

Terminology

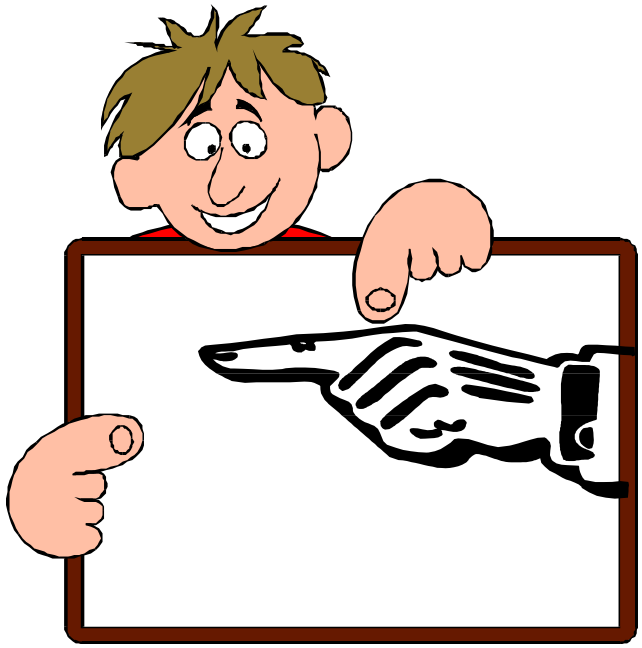
- In the context of this problem…

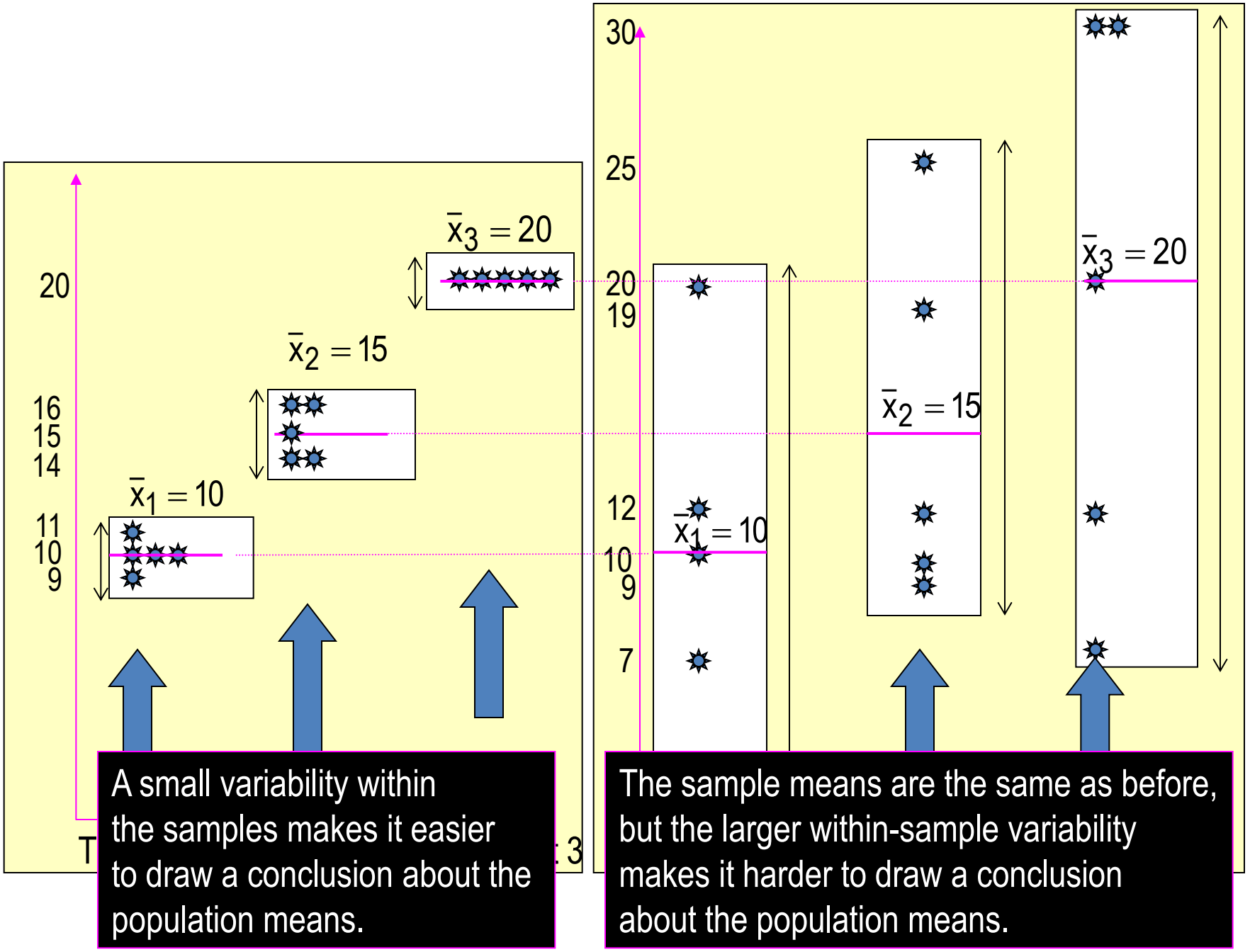
  Response variable – weekly sales
  Responses – actual sale values
  Experimental unit – weeks in the three cities when we record sales figures.
  Factor – the criterion by which we classify the populations (the treatments). In this problems the factor is the marketing strategy.

  Factor levels – the population (treatment) names. In this problem factor levels are the marketing strategies.

The rationale of the test statistic

Two types of variability are employed when testing for the equality of the population means





A small variability within the samples makes it easier to draw a conclusion about the population means.

The sample means are the same as before, but the larger within-sample variability makes it harder to draw a conclusion about the population means.

The rationale behind the test statistic – I

- If the null hypothesis is true, we would expect all the sample means to be close to one another (and as a result, close to the grand mean).
- If the alternative hypothesis is true, at least some of the sample means would differ.
- Thus, we measure variability between sample means.

Variability between sample means

- The variability between the sample means is measured as the sum of squared distances between each mean and the grand mean.

This sum is called the
Sum of **S**quares for **T**reatments
SST

In our example treatments are represented by the different advertising strategies.

Sum of squares for treatments (SST)

$$SST = \sum_{j=1}^{k} n_j (\bar{x}_j - \bar{\bar{x}})^2$$

There are k treatments

The size of sample j

The mean of sample j

Note: When the sample means are close to one another, their distance from the grand mean is small, leading to a small SST. Thus, large SST indicates large variation between sample means, which supports H_1.

Sum of squares for treatments (SST)

Is SST large enough to reject H_0 in favor of H_1?

See next.

The rationale behind test statistic – II

- Large variability within the samples weakens the “ability” of the sample means to represent their corresponding population means.
- Therefore, even though sample means may markedly differ from one another, SST must be judged relative to the “within samples variability”.

Within samples variability

- The variability within samples is measured by adding all the squared distances between observations and their sample means.

This sum is called the
Sum of **S**quares for **E**rror
SSE

In our example this is the sum of all squared differences between sales in city j and the sample mean of city j (over all the three cities).

Sum of squares for errors (SSE)

Is SST large enough relative to SSE to reject the null hypothesis that specifies that all the means are equal?

The mean sum of squares

To perform the test we need to calculate the ***mean squares*** as follows:

Calculation of **MST** - **M**ean **S**quare for **T**reatments

$$\text{MST} = \frac{SST}{K-1}$$

Calculation of **MSE** **M**ean **S**quare for **E**rror

$$\text{MSE} = \frac{\text{SSE}}{n-K}$$

Calculation of the test statistic

$$F = \frac{MST}{MSE}$$

with the following degrees of freedom:
v_1=k -1 and v_2=n-k

Required Conditions:

1. The populations tested are normally distributed.
2. The variances of all the populations tested are equal.

The F test rejection region

And finally

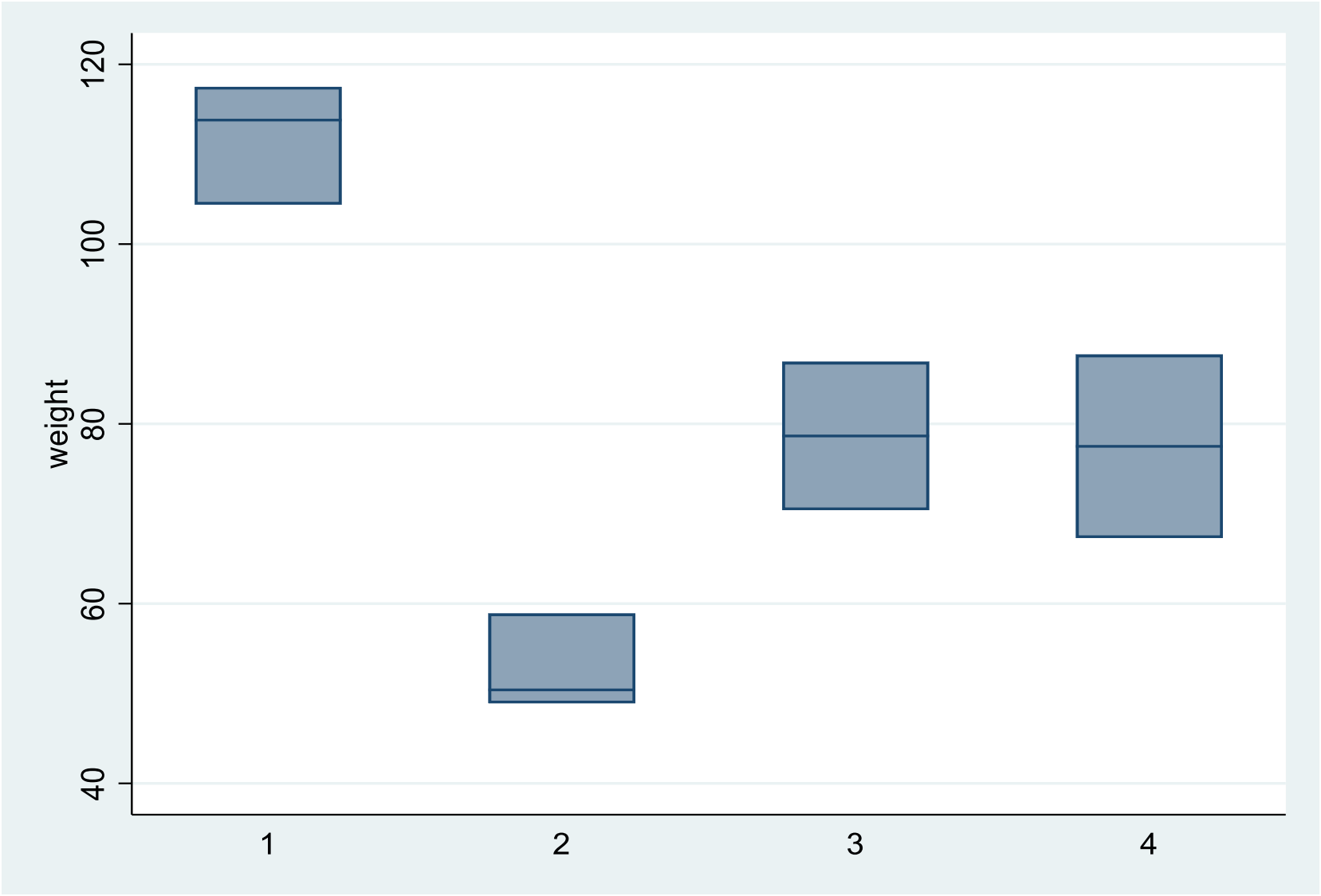
the hypothesis test:

H_0: $\mu_1 = \mu_2 = \ldots = \mu_k$

H_1: At least two means differ

Test statistic: $F = \frac{MST}{MSE}$

R.R: $F > F_{\alpha,k-1,n-k}$


weight
120
100
80
60
40
1
2
3
4

Example

```
. oneway weight treatment,t
```

treatment	Summary of weight Mean	Std. dev.	Freq.
1	111.9	6.7535176	3
2	52.733333	5.3928966	3
3	78.65	11.667262	2
4	77.5	14.424978	2
Total	80.62	25.362124	10

Analysis of variance

Source	SS	df	MS	F	Prob > F
Between groups	5295.54433	3	1765.18144	21.46	0.0013
Within groups	493.591667	6	82.2652778		
Total	5789.136	9	643.237333		

```
Bartlett's equal-variances test: chi2(3) =   1.3900    Prob>chi2 = 0.708
```

Multiple Comparison Test

Comparison of weight by treatment
(Bonferroni)

Row Mean-Col Mean	1	2	3
2	-59.1667 0.001		
3	-33.25 0.042	25.9167 0.122	
4	-34.4 0.036	24.7667 0.146	-1.15 1.000

Comparison of weight by treatment
(Scheffe)

Row Mean-Col Mean	1	2	3
2	-59.1667 0.001		
3	-33.25 0.039	25.9167 0.101	
4	-34.4 0.034	24.7667 0.118	-1.15 0.999

Comparison of weight by treatment
(Sidak)

Row Mean-Col Mean	1	2	3
2	-59.1667 0.001		
3	-33.25 0.041	25.9167 0.116	
4	-34.4 0.035	24.7667 0.137	-1.15 1.000

Correlation Analysis

Correlation

- Correlation analysis is used to measure strength of the association (linear relationship) between two variables

- Only concerned with strength of the relationship.

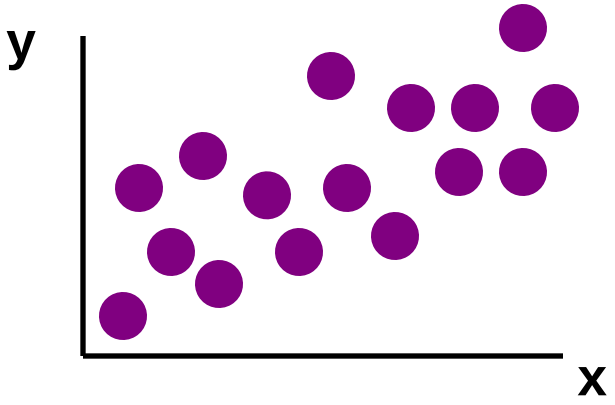
- No causal effect is implied

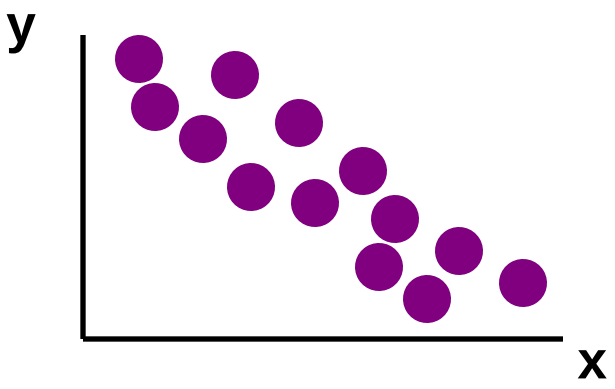
Scatter Plots and Correlation

- A scatter plot (or scatter diagram) is used to show the relationship between two variables

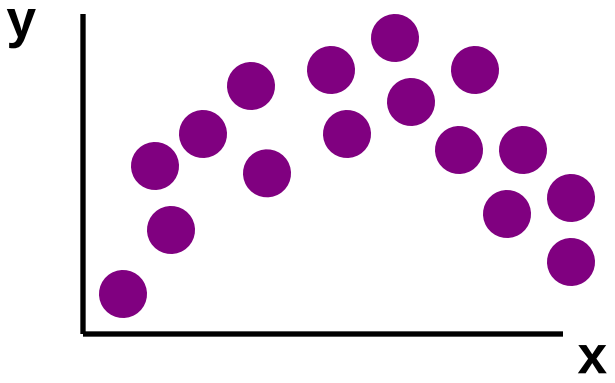
Scatter Plot Examples

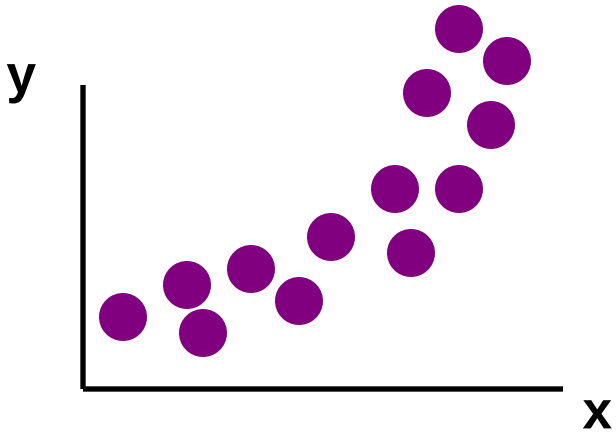
Linear relationships





Curvilinear relationships

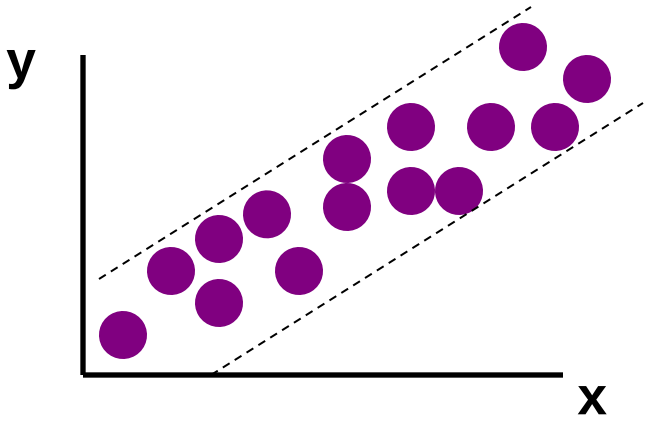


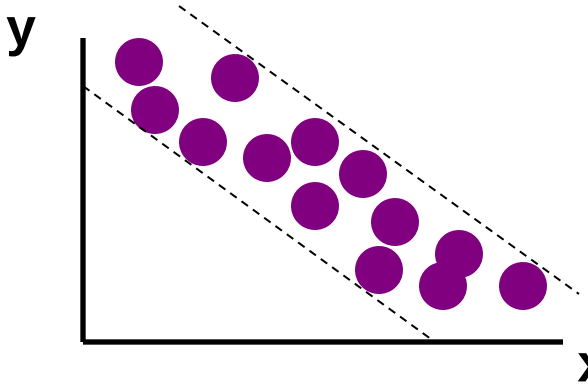


Scatter Plot Examples

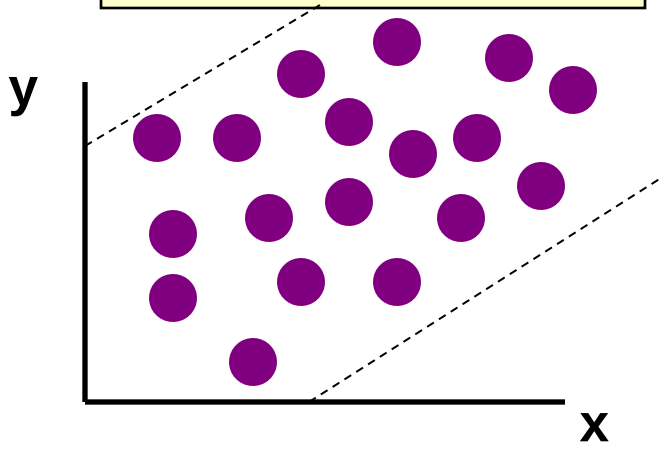
(continued)

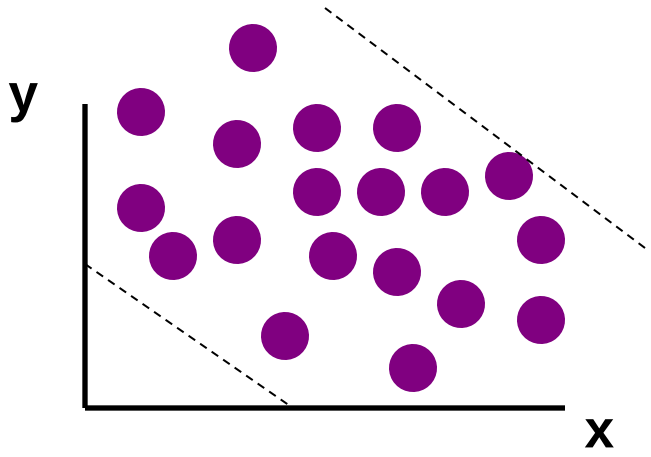
Strong relationships





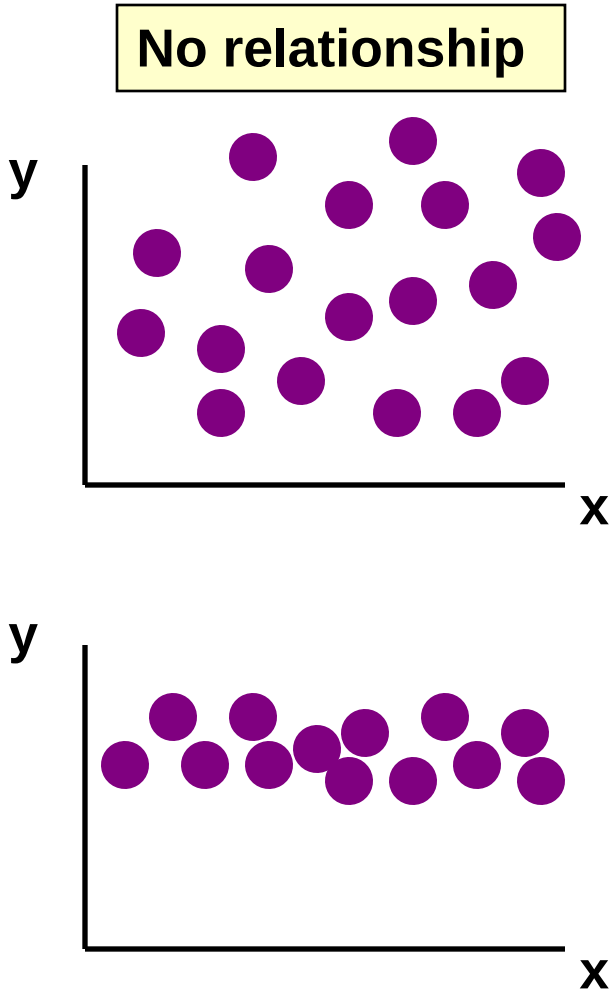
Weak relationships





Scatter Plot Examples

(continued)



Product Moment Correlation

- The **product moment correlation**, *r*, summarizes the strength of association between two metric (interval or ratio scaled) variables, say *X* and *Y*.

- It is an index used to determine whether a linear or straight-line relationship exists between *X* and *Y*.

- As it was originally proposed by Karl Pearson, it is also known as the *Pearson correlation coefficient*. It is also referred to as *simple correlation*, *bivariate correlation*, or merely the *correlation coefficient*.

Correlation Coefficient

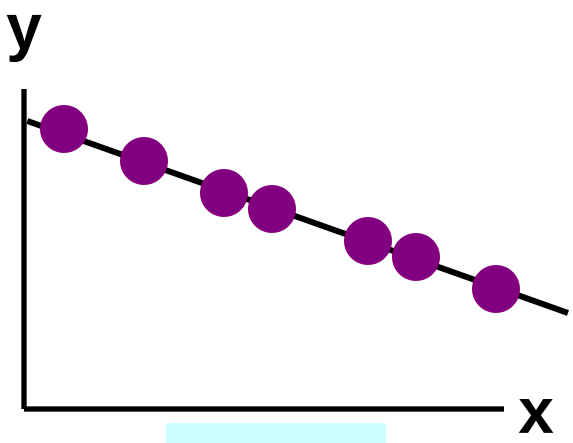
(continued)

- The population correlation coefficient ρ (rho) measures the strength of the association between the variables
- The sample correlation coefficient r is an estimate of ρ and is used to measure the strength of the linear relationship in the sample observations

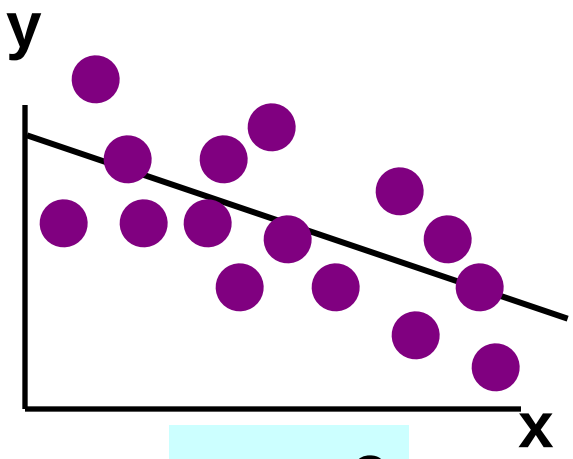
Features of ρ and r

- Unit free
- Range between -1 and 1
- The closer to -1, the stronger the negative linear relationship
- The closer to 1, the stronger the positive linear relationship
- The closer to 0, the weaker the linear relationship

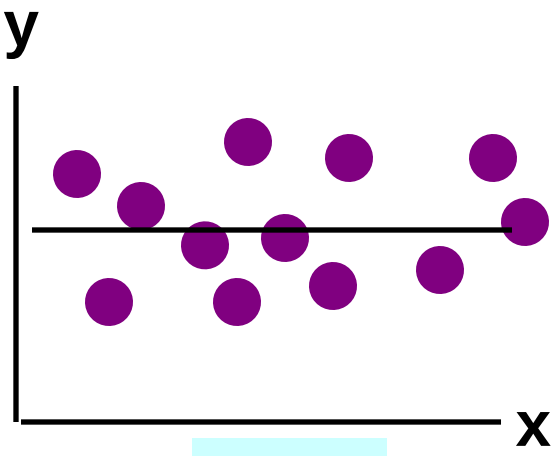
Examples of Approximate r Values



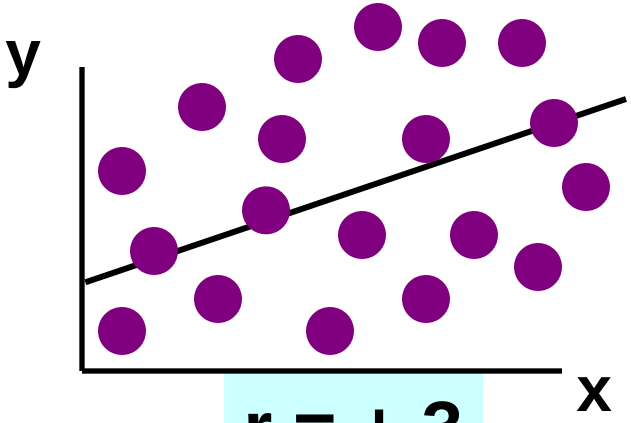
r = -1



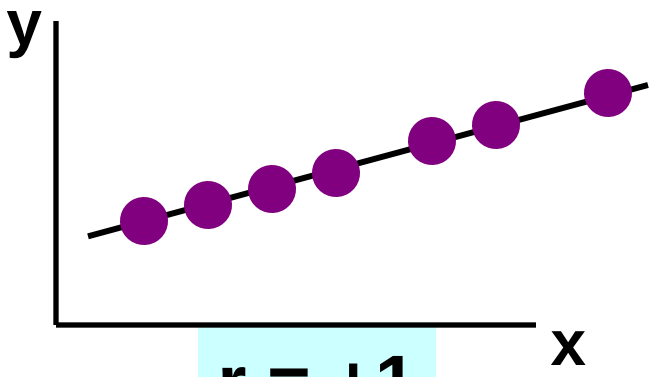
r = -.6



r = 0



r = +.3



r = +1

Calculating the Correlation Coefficient

Sample correlation coefficient:

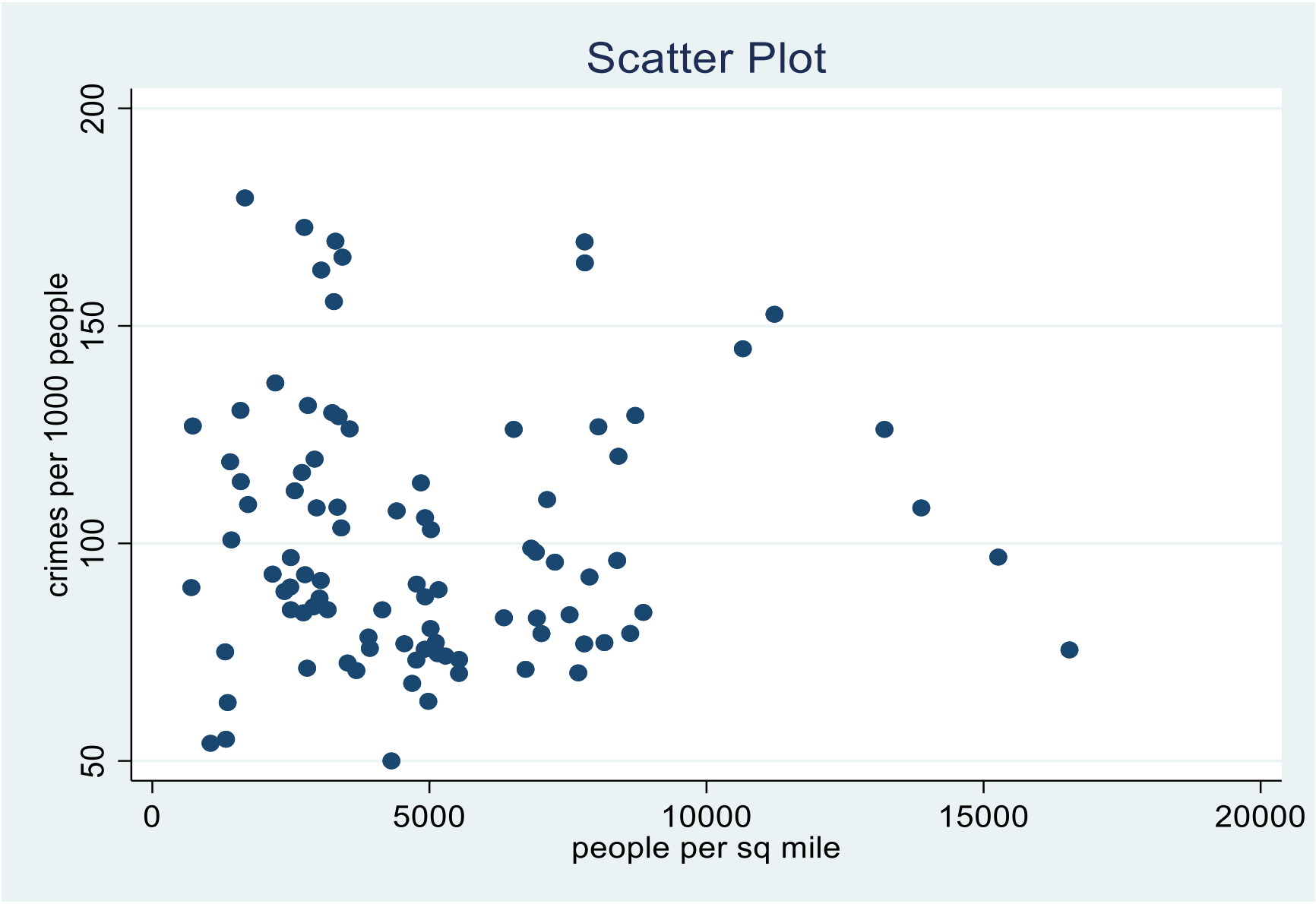
$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{[\sum (x - \bar{x})^2][\sum (y - \bar{y})^2]}}$$

or the algebraic equivalent:

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n(\sum x^2) - (\sum x)^2][n(\sum y^2) - (\sum y)^2]}}$$

where:

r = Sample correlation coefficient
n = Sample size
x = Value of the independent variable
y = Value of the dependent variable


Scatter Plot
crimes per 1000 people
200
150
100
50
0
5000
10000
15000
20000
people per sq mile

```
. pwcorr crimesper1000people  policeper1000people unem,sig star(.05)

             | crimes~e police~e     unem
-------------+---------------------------
crimesper1~e |   1.0000
             |
             |
policeper1~e |   0.3664*  1.0000
             |   0.0003
             |
       unem  |  -0.0348   0.2224*  1.0000
             |   0.7420   0.0331
             |
```

Introduction to Regression Analysis

- Regression analysis is used to:
  - Predict the value of a dependent variable based on the value of at least one independent variable
  - Explain the impact of changes in an independent variable on the dependent variable

Dependent variable: the variable we wish to explain

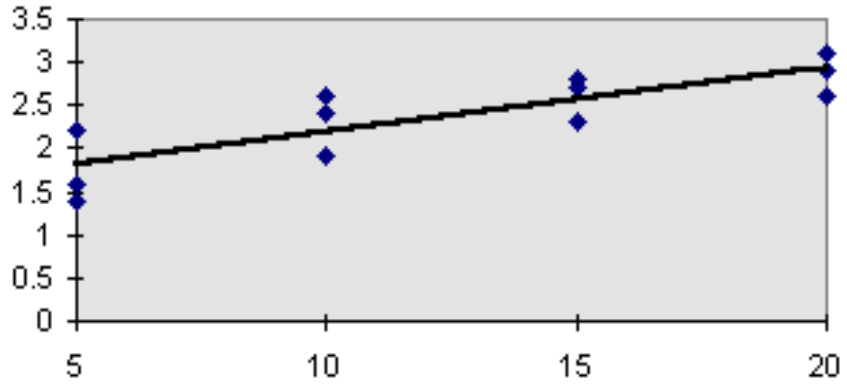
Independent variable: the variable used to explain the dependent variable

Simple Linear Regression Model

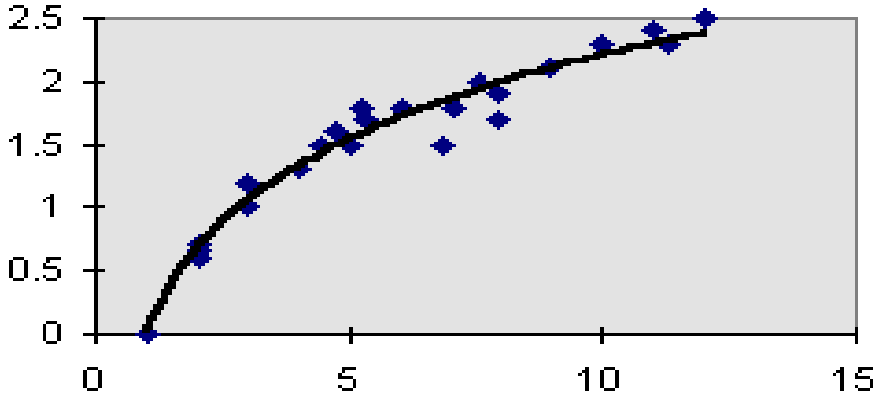
- Only **one** independent variable, x
- Relationship between x and y is described by a linear function
- Changes in y are assumed to be caused by changes in x

Types of Regression Models

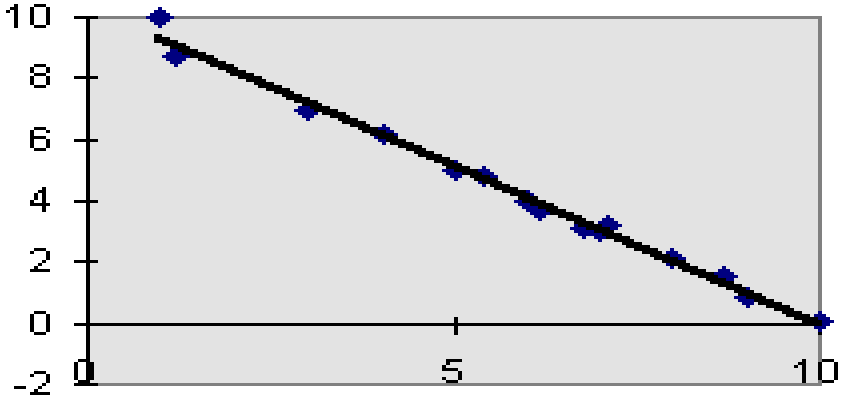
Positive Linear Relationship



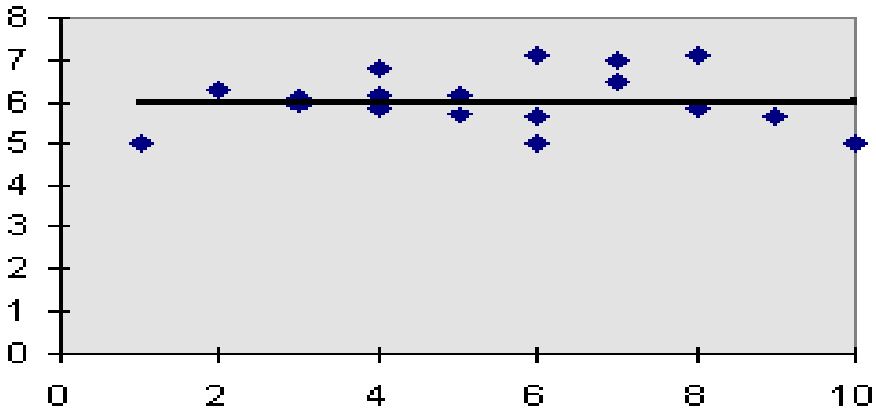
Relationship NOT Linear



Negative Linear Relationship

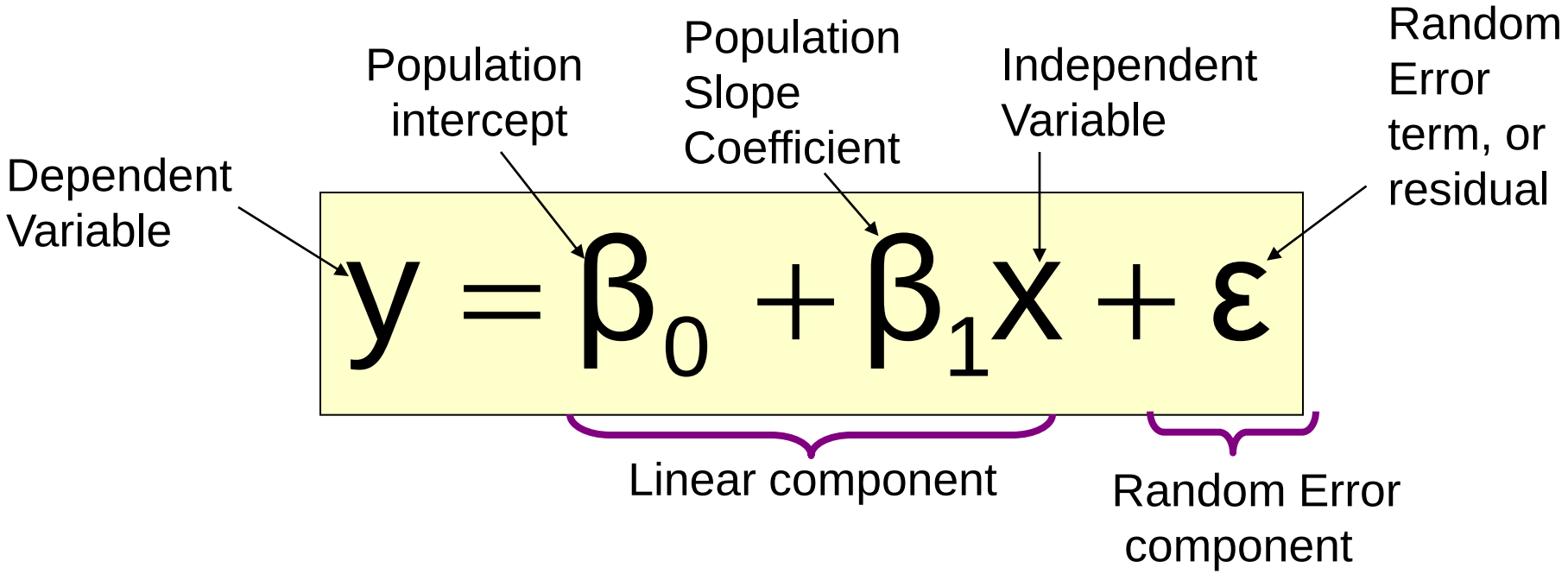


No Relationship



Population Linear Regression

The population regression model:

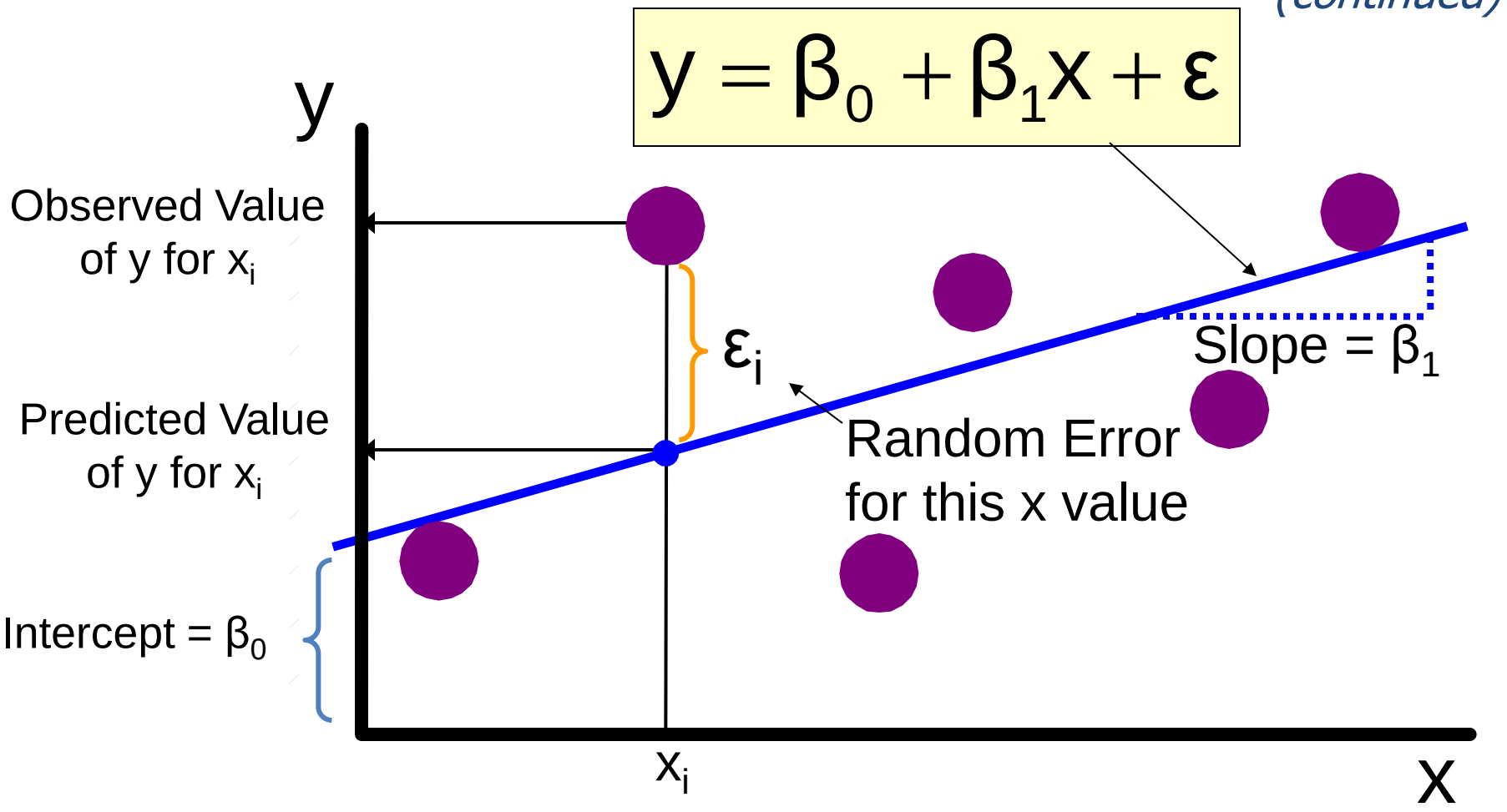


Linear Regression Assumptions

- Error values (ε) are statistically independent(No Autocorrelation)
- Error values are normally distributed for any given value of x
- The Mean value of the errors is zero
- The probability distribution of the errors has constant variance(Homoscedasticity)
- The underlying relationship between the x variable and the y variable is linear
- There is no exact linear relationship between two or more than two independent variables(No Perfect Multicollinearity)

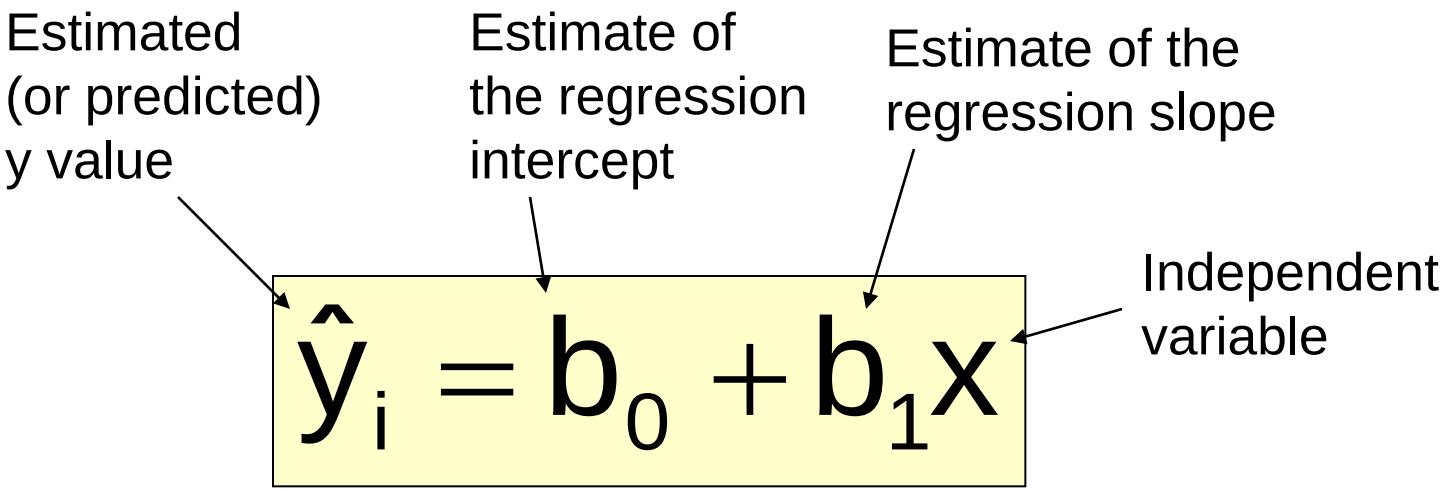
Population Linear Regression

(continued)



Estimated Regression Model

The sample regression line provides an estimate of the population regression line



The individual random error terms e_i have a mean of zero

Least Squares Criterion

- b_0 and b_1 are obtained by finding the values of b_0 and b_1 that minimize the sum of the squared residuals

$$\sum e^2 = \sum (y - \hat{y})^2$$

$$= \sum (y - (b_0 + b_1 x))^2$$

The Least Squares Equation

- The formulas for b_1 and b_0 are:

$$b_1 = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

algebraic equivalent:

$$b_1 = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$$

and

$$b_0 = \bar{y} - b_1 \bar{x}$$

Interpretation of the Slope and the Intercept

- b_0 is the estimated average value of y when the value of x is zero

- b_1 is the estimated change in the average value of y as a result of a one-unit change in x

Simple Linear Regression- Example

- A real estate agent wishes to examine the relationship between the selling price of a home and its size (measured in square feet)

- A random sample of 10 houses is selected
  - Dependent variable (y) = house price in $1000s
  - Independent variable (x) = square feet

Sample Data for House Price Model

House Price in $1000s (y)	Square Feet (x)
245	1400
312	1600
279	1700
308	1875
199	1100
219	1550
405	2350
324	2450
319	1425
255	1700

The regression equation is:

$$\text{house price} = 98.24833 + 0.10977(\text{square feet})$$

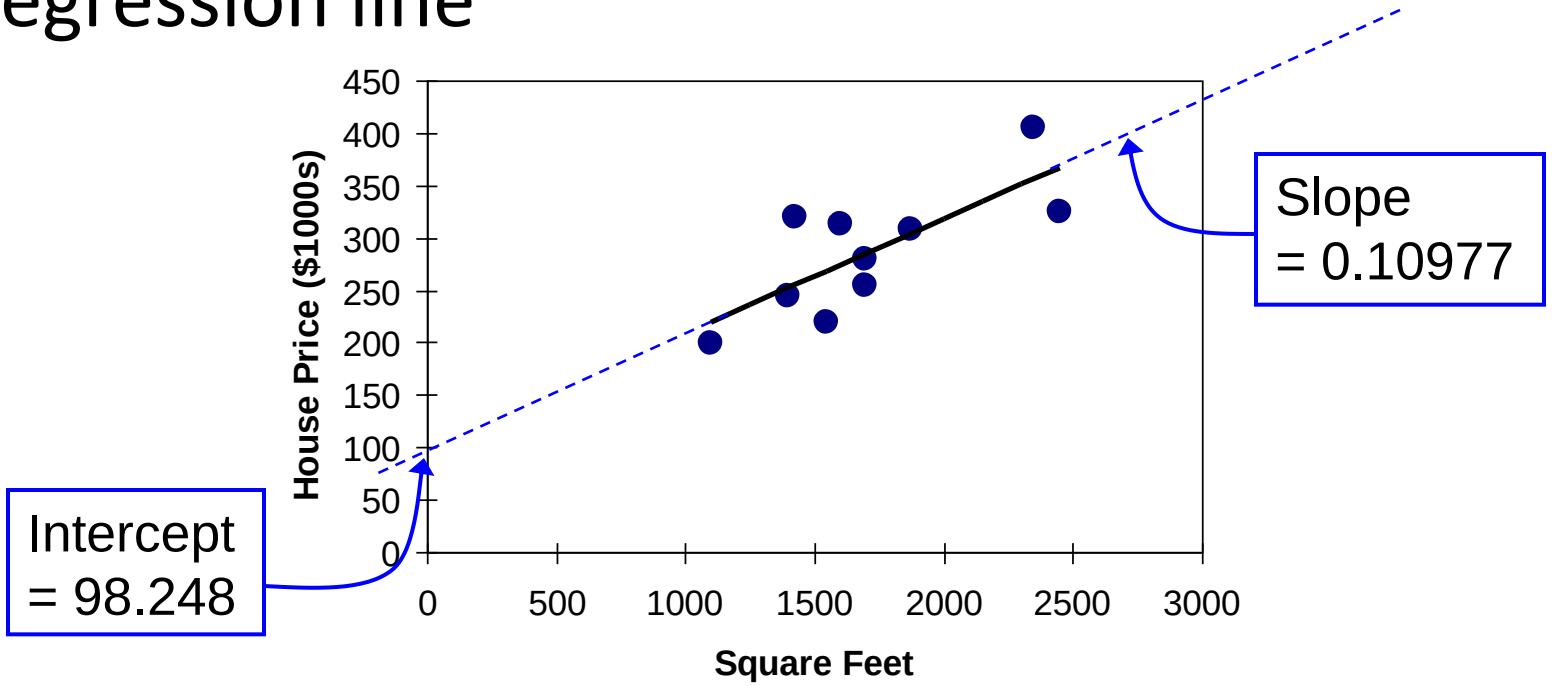
Regression Statistics	
Multiple R	**0.76211**
R Square	**0.58082**
Adjusted R Square	**0.52842**
Standard Error	**41.33032**
Observations	**10**

ANOVA	***df***	***SS***	***MS***	***F***	***Significance F***
Regression	**1**	**18934.9348**	**18934.9348**	**11.0848**	**0.01039**
Residual	**8**	**13665.5652**	**1708.1957**		
Total	**9**	**32600.5000**			

	Coefficients	***Standard Error***	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***
Intercept	**98.24833**	**58.03348**	**1.69296**	**0.12892**	**-35.57720**	**232.07386**
Square Feet	**0.10977**	**0.03297**	**3.32938**	**0.01039**	**0.03374**	**0.18580**

Graphical Presentation

- House price model: scatter plot and regression line



$$\widehat{\text{house price}} = 98.24833 + 0.10977(\text{square feet})$$

Interpretation of the Intercept, b_0

$$\widehat{\text{house price}} = 98.24833 + 0.10977(\text{square feet})$$

- b_0 is the estimated average value of Y when the value of X is zero (if x = 0 is in the range of observed x values)

Here, no houses had 0 square feet, so b_0 =98.24833 just indicates that, for houses within the range of sizes observed, $98,248.33 is the portion of the house price not explained by square feet.

Interpretation of the Slope Coefficient, b_1

$$\widehat{\text{house price}} = 98.24833 + 0.10977(\text{square feet})$$

- b_1 measures the estimated change in the average value of Y as a result of a one-unit change in X

Here, b_1 = .0.10977 tells us that the average value of a house increases by .10977($1000) = $109.77, on average, for each additional one square foot of size

Least Squares Regression Properties

- The sum of the residuals from the least squares regression line is 0 ($\sum (y - \hat{y}) = 0$)
- The sum of the squared residuals is a minimum (minimized $\sum (y - \hat{y})^2$)
- The simple regression line always passes through the mean of the y variable and the mean of the x variable
- The least squares coefficients are unbiased estimates of β_0 and β_1

Explained and Unexplained Variation

- Total variation is made up of two parts:

$$SST = SSE + SSR$$

Total sum of Squares	Sum of Squares Error	Sum of Squares Regression
$SST = \sum (y - \bar{y})^2$	$SSE = \sum (y - \hat{y})^2$	$SSR = \sum (\hat{y} - \bar{y})^2$

where:

$\bar{y}$ = Average value of the dependent variable

y = Observed values of the dependent variable

$\hat{y}$ = Estimated value of y for the given x value

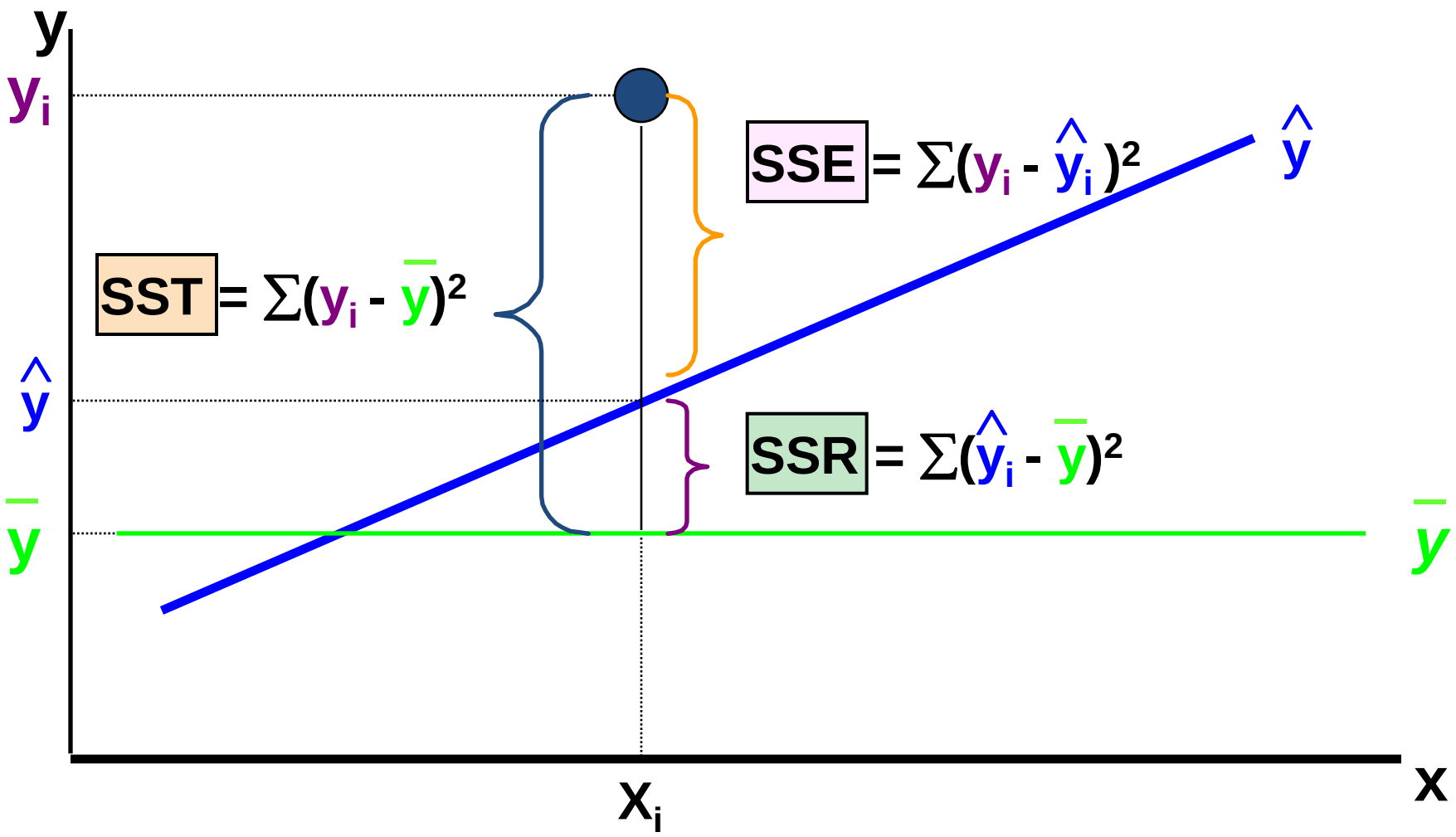
Explained and Unexplained Variation

(continued)

- SST = total sum of squares
  - Measures the variation of the y_i values around their mean y
- SSE = error sum of squares
  - Variation attributable to factors other than the relationship between x and y
- SSR = regression sum of squares
  - Explained variation attributable to the relationship between x and y

Explained and Unexplained Variation

(continued)



Coefficient of Determination, R^2

- The coefficient of determination is the portion of the total variation in the dependent variable that is explained by variation in the independent variable

- The coefficient of determination is also called R-squared and is denoted as R^2

$$R^2 = \frac{SSR}{SST}$$

where $0 \le R^2 \le 1$

Coefficient of Determination, R^2

(continued)

Coefficient of determination

$$R^2 = \frac{SSR}{SST} = \frac{\text{sum of squares explained by regression}}{\text{total sum of squares}}$$

Note: In the single independent variable case, the coefficient of determination is

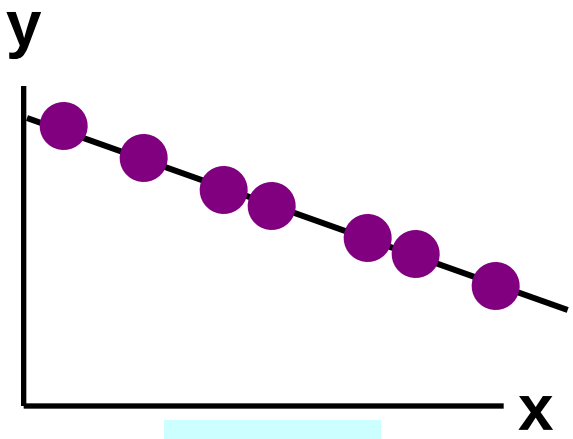
$$R^2 = r^2$$

where:

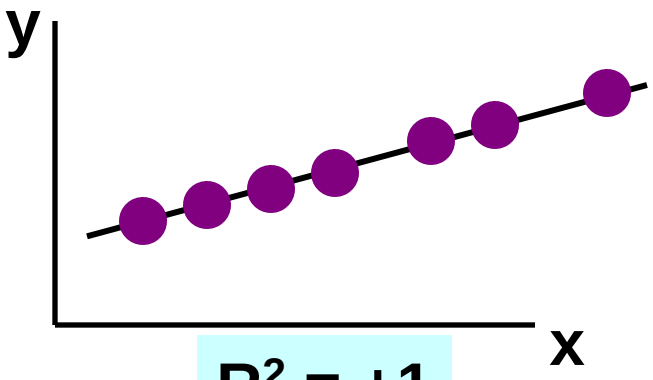
R^2 = Coefficient of determination

r = Simple correlation coefficient

Examples of Approximate R^2 Values



$R^2 = 1$



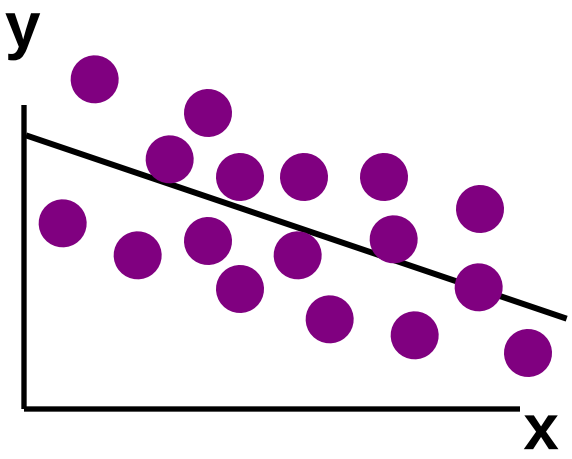
$R^2 = +1$

$R^2 = 1$

Perfect linear relationship between x and y:

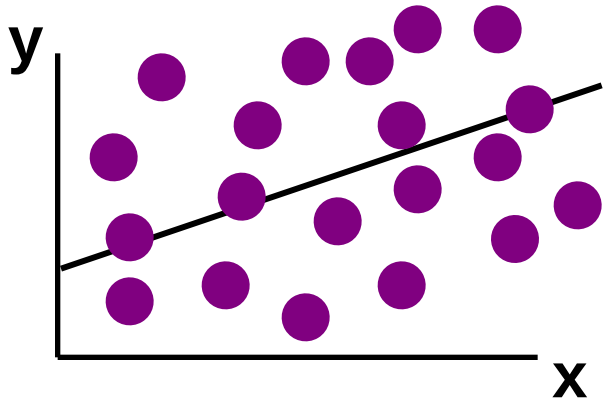
100% of the variation in y is explained by variation in x

Examples of Approximate R^2 Values



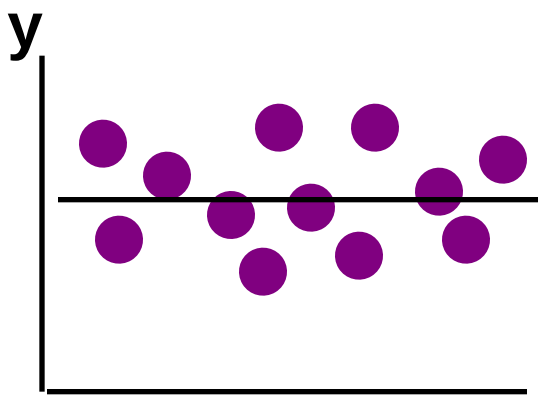
$0 < R^2 < 1$

Weaker linear relationship between x and y:



Some but not all of the variation in y is explained by variation in x

Examples of Approximate R^2 Values



$R^2 = 0$

$R^2 = 0$

No linear relationship between x and y:

The value of Y does not depend on x. (None of the variation in y is explained by variation in x)

Regression Statistics	
Multiple R	0.76211
R Square	0.58082
Adjusted R Square	0.52842
Standard Error	41.33032
Observations	10

$$R^2 = \frac{SSR}{SST} = \frac{18934.9348}{32600.5000} = 0.58082$$

58.08% of the variation in house prices is explained by variation in square feet

ANOVA	*df*	*SS*	*MS*	*F*	*Significance F*
Regression	1	18934.9348	18934.934	11.0848	0.01039
Residual	8	13665.5652	1708.1957		
Total	9	32600.5000			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	98.24833	58.03348	1.69296	0.1289	-35.57720	232.0738
Square Feet	0.10977	0.03297	3.32938	0.0103	0.03374	0.18580

Inference about the Slope: t Test

- t test for a population slope
  - Is there a linear relationship between Square Feet (x) and House Pricey?
- Null and alternative hypotheses
  - H_0: $\beta_1 = 0$ (no linear relationship)
  - H_1: $\beta_1 \neq 0$ (linear relationship does exist)
- Test statistic
  -
  -

$$t = \frac{b_1 - \beta_1}{s_{b_1}}$$

$$d.f. = n - 2$$

where:

b_1 = Sample regression slope coefficient

β_1 = Hypothesized slope

s_{b1} = Estimator of the standard error of the slope

Inference about the Slope: t Test

(continued)

House Price in $1000s (y)	Square Feet (x)
245	1400
312	1600
279	1700
308	1875
199	1100
219	1550
405	2350
324	2450
319	1425
255	1700

Estimated Regression Equation:

$$\widehat{\text{house price}} = 98.25 + 0.1098(\text{sq.ft.})$$

The slope of this model is 0.1098

Does square footage of the house affect its sales price?

Inferences about the Slope: t Test Example

Test Statistic: **t = 3.329**

$H_0: \beta_1 = 0$

$H_A: \beta_1 \neq 0$

From Excel output:

b_1 S_{b_1} t

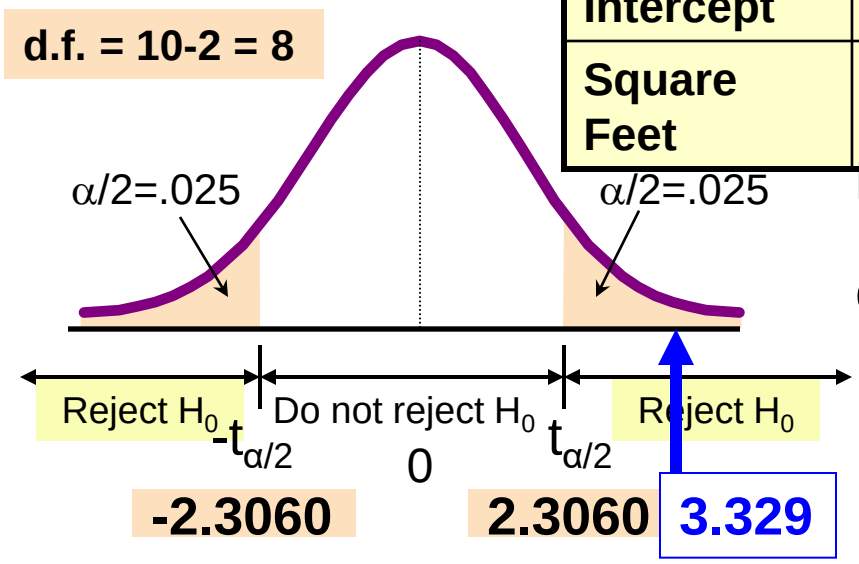
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	**98.24833**	**58.03348**	**1.69296**	**0.12892**
Square Feet	**0.10977**	**0.03297**	**3.32938**	**0.01039**

Decision:

Reject H_0

Conclusion:

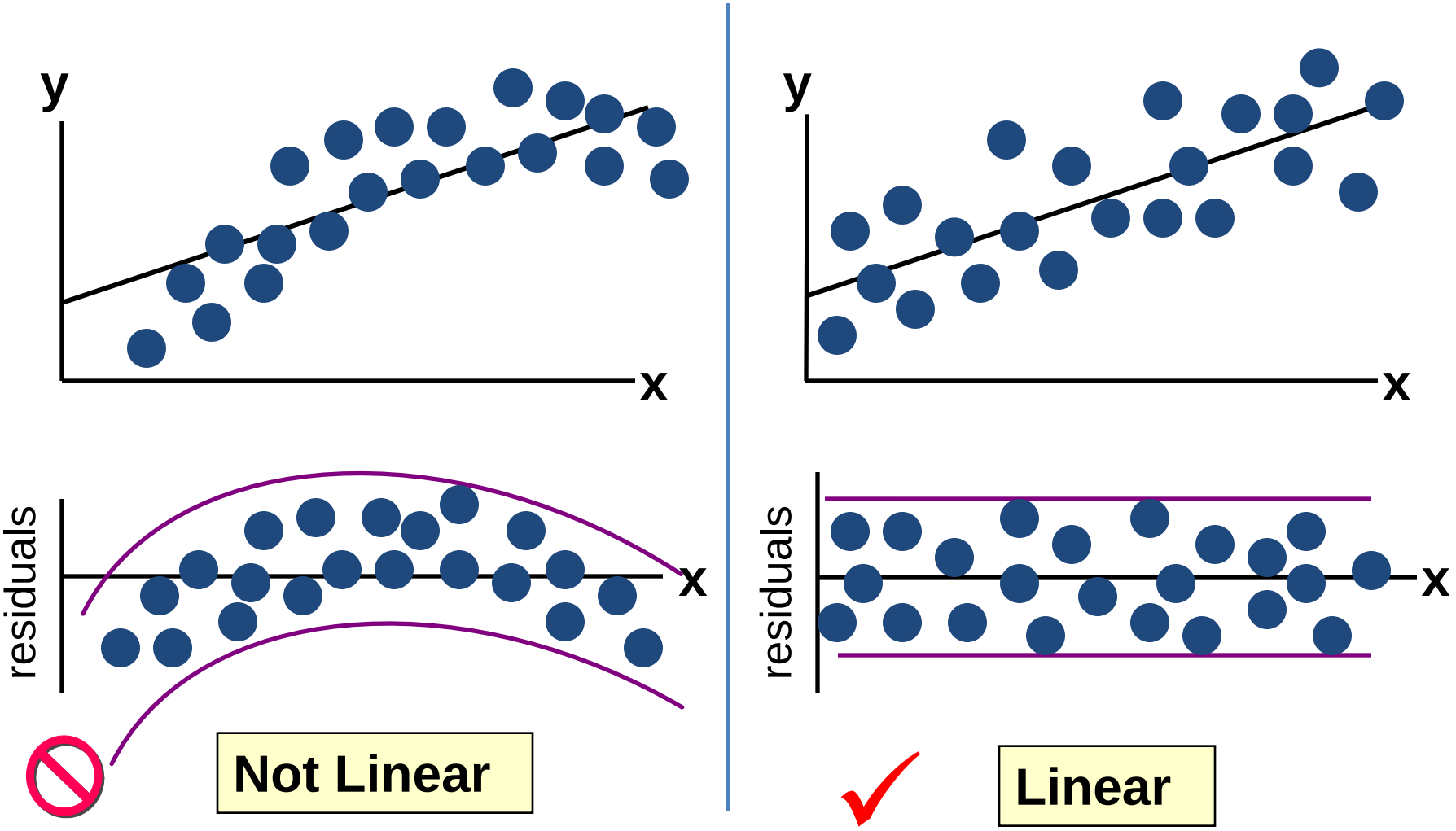
There is sufficient evidence that square footage affects house price



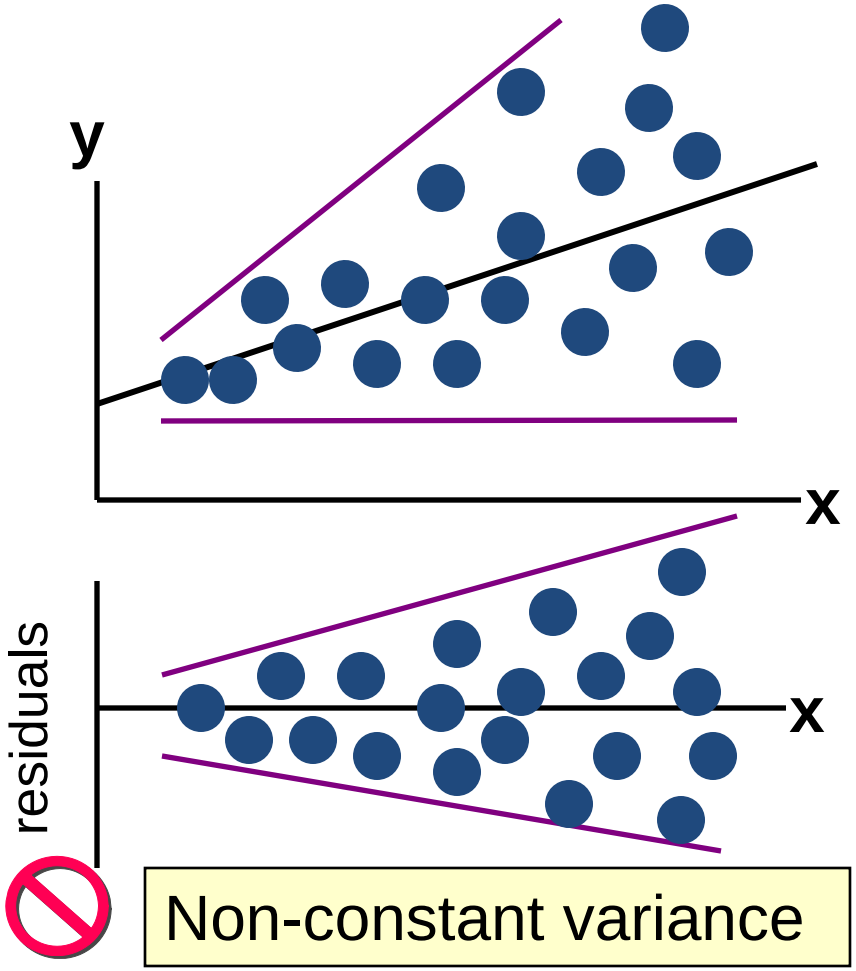
Residual Analysis

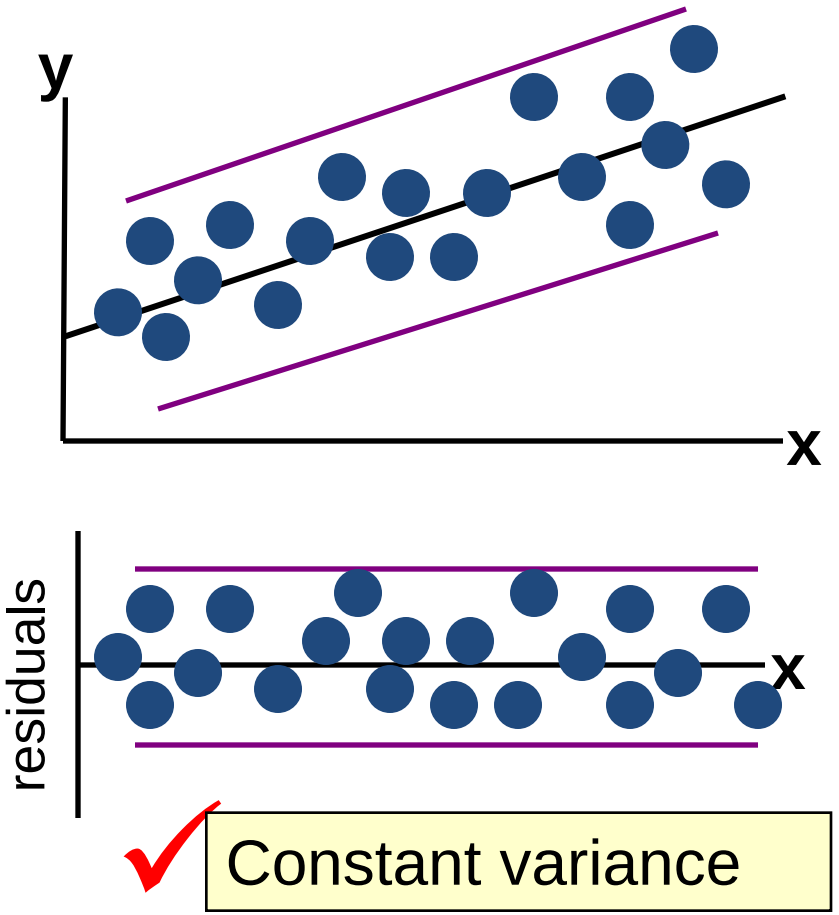
- Purposes
  - Examine for linearity assumption
  - Examine for constant variance for all levels of x
  - Evaluate normal distribution assumption
- Graphical Analysis of Residuals
  - Can plot residuals vs. x
  - Can create histogram of residuals to check for normality

Residual Analysis for Linearity



Residual Analysis for Constant Variance

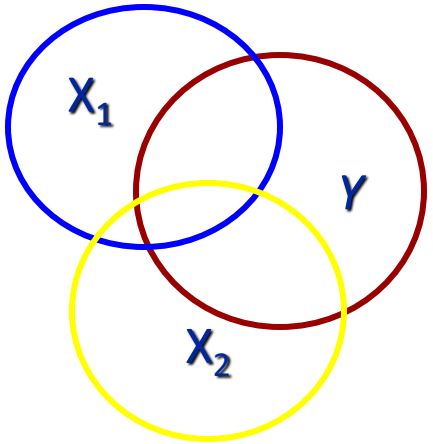




Multivariate Analysis

Multiple Regression

. . . a single metric dependent variable is predicted by several metric independent variables.



Discriminant analysis

- It is a technique for analyzing data when the criterion or dependent variable is categorical (hence non metric) and the predictor or independent variables are metric in nature

- The primary objective is to understand group differences and to predict the likelihood that an entity (individual or object) will belong to a particular group based on several metric independent variables

Discriminant Analysis

- Discriminate between Bones or skeletons of males or females
- Dividing people into potential buyers or non buyers
- Classifying individuals as good or bad credit risk
- Classifying companies as good or bad investment risks
- Classifying consumers as brand loyal or brand switchers

Conjoint Analysis

- It is an emerging dependence technique for assessing consumer utility levels for specific product attributes and their levels
- Consumers are required to evaluate only a few product profiles which are combinations of product levels
- It can answer questions such as what utility consumers see in price levels, in after sales service levels, product features etc
- It can be used in evaluation of new as well as existing products or services

Conjoint Analysis

- Assume a product has three attributes Price(H,M,L) , quality(Super Deluxe,Deluxe,Normal) & colour (red, yellow, blue) each at three possible levels .
- Instead of having to evaluate 27 possible combinations a subset of 9 or more can be evaluated for their attractiveness to the consumers
- Researcher knows not only how important each attribute is but also the importance of each level.(Attractiveness of red vs yellow vs blue)
- Results can also be used to simulate various product designs & their acceptances

Multivariate Analysis Of Variance(MANOVA)

- Multivariate Analysis of Variance is appropriate when research problem involves multiple metric dependent variables presumed to be dependent to one or more non metric independent variables (usually referred to as treatments).
- With MANOVA a significance test of mean difference between groups can be made simultaneously for two or more dependent variables.

Multivariate Analysis Of Variance(MANOVA)

- Impact of type of Ad (IV : humorous vs non humorous) on perception of customers about company & its products on several dimensions(DV) such as modern vs traditional, high quality vs low quality can be studied with MANOVA

Canonical Correlation

- It is a logical extension of multiple regression analysis involving several dependent and several independent variables.

- It determines linear association between two sets of variables each consisting of several variables.

Canonical Correlation

- A company conducts a study to find out correlation between service quality of the company & those of the world class companies.

- The study uses questions (50) from published service quality research and includes benchmarking information on the perception of the service quality of world class companies as well as for the company being studied.

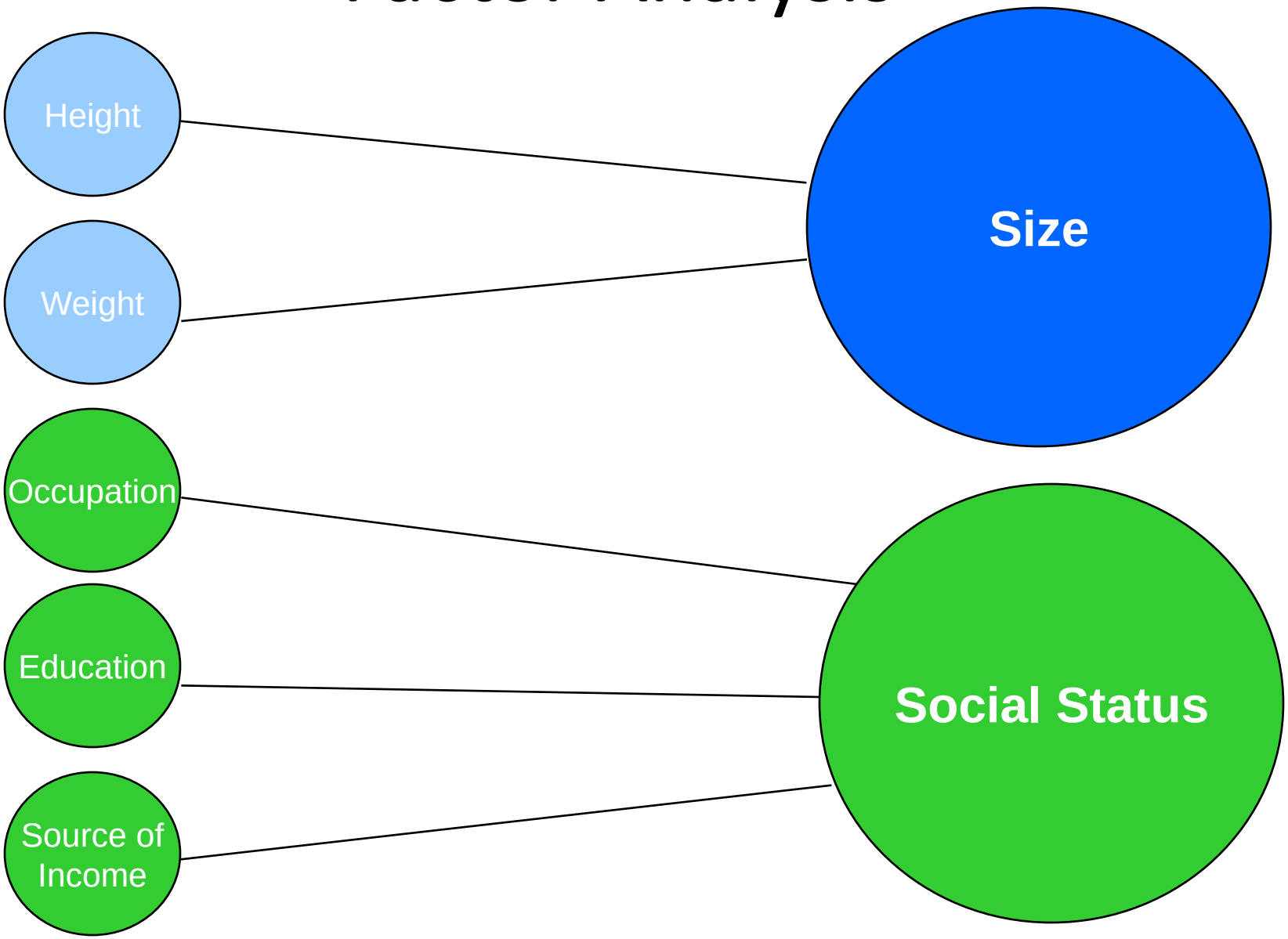
- The technique would provide information on overall correlation of perception as well as correlation between each of 50 questions

Factor Analysis

- A type of analysis used to discern the underlying dimensions or regularity in phenomena.

- Its general purpose is to summarize the information contained in a large number of variables into a smaller number of factors.

Factor Analysis



Factor Analysis

- Factors determining buying behaviour of small cars
- Factors determining choice of an airlines
- Factors leading to cigarette smoking
- Underlying dimensions for willingness to donate regenerative & non regenerative body parts
- Factors determining choice of a bank

Cluster Analysis

- A body of techniques with the purpose of classifying individuals or objects into a small number of mutually exclusive groups, ensuring that there will be as much likeness within groups and as much difference among groups as possible

Uses of Cluster Analysis

- It is a multivariate interdependence procedure ideally suited to segmentation application in marketing
- Cluster by definition is a group of similar objects
- Segmentation involves identifying groups of target customers who are similar in buying habits , demographic characteristics or psychographics
- There could be clusters of brands similar to each other & different from other clusters(Soaps on the basis of various characteristics)
- Cluster analysis is also used in selection of test market cities that are sufficiently similar so that no extraneous variation can cause difference between the experimental & control markets.(population, retail sales, number of retail outlets, proportion of various income groups etc)

Multidimensional Scaling

- A statistical technique that measures objects in multidimensional space on the basis of respondents' judgments of the similarity of objects

- If objects A & B are judged by respondents as the most similar compared with all other possible pairs of objects MDS (perceptual mapping) places them closest to each other in terms of distance in multidimensional map

Multidimensional Scaling

- An owner of a Burger King wants to know whether the strongest competitor is McDonald's or Wendy's
- A sample of customers is asked to rate pair of restaurants from most similar to least similar
- The results of MDS shows that Burger King is most similar to Wendy's. So the strongest competition is from Wendy's

Correspondence Analysis

- Correspondence analysis differs from other interdependence techniques in its ability to accommodate non metric data

- It employs contingency table which is the cross tabulation of two categorical variables

Correspondence Analysis

- Respondents brand preferences can be cross tabulated on demographic variables (gender, income categories, occupation)by indicating how many people preferring each brand fall into each category of demographic variables

- Through CA correspondence of brands & characteristics of those preferring each brand are shown in 2or3 dimensional map of both brands & respondent characteristics.

ANY

QUESTIONS

MEASUREMENT

MEASUREMENT

- WHAT IS MEASUREMENT?
- IN SOCIAL RESEARCH, ELABORATE RULES, METHODS AND PROCEDURES ARE EMPLOYED TO MEASURE VARIABLES
- MEASUREMENT PROCESS
  - ABSTRACT CONCEPT TO CONCEPTUAL DEFINITION TO EMPIRICAL REFERENTS OF VARIABLE TO CONCRETE OBSERVATIONS
  - GOAL OF MEASUREMENT IS TO SPECIFY CLEARLY OBSERVABLE REFERENTS OF THE TERMS CONTAINED IN THE HYPOTHESES
    - THEORETICAL WORLD (CONCEPTUALIZATION) TO EMPIRICAL WORLD (OPERATIONALIZATION)

OPERATIONALIZATION

- OPERATIONALIZATION DESCRIBES THE RESEARCH OPERATIONS THAT WILL SPECIFY THE VALUE OR CATEGORY OF A VARIABLE (LOOKING FOR INDICATORS OR EMPIRICAL REFERENTS TO CONCEPTS)
- TYPES OF OPERATIONALIZATION IN DIFFERENT RESEARCH FRAMEWORKS
- SURVEYS
  - VERBAL REPORTS (STRAIGHT-FORWARD SELF REPORTS AND COMPOSITE MEASURES)
    - EXAMPLES (FROM SURVEY IN EATING DISORDERS)
- EXPERIMENTS
- CONTENT ANALYSIS

LEVELS OF MEASUREMENT

- **Nominal**
  - labels or categories
  - dummy numbers; cannot be mathematically manipulated
  - must satisfy exhaustivity and mutual exclusivity of categories
  - chi square and other non-parametric statistics may be used to analyze data
- **Ordinal**
  - ranking of units or categories

- **Interval**
  - equal intervals among numbers or scores

- **Ratio**
  - true zero point in the scale
  - allows complex mathematical operations
  - Pearson ‘r’ and other parametric statistics may be used to analyze

SOURCES OF ERROR

- OBSERVED VALUE = TRUE VALUE + SYSTEMATIC ERROR + RANDOM ERROR
- SYSTEMATIC ERROR
  - FACTORS THAT SYSTEMATICALLY INFLUENCE THE MEASUREMENT IN ONE DIRECTION (EX. GRE SCORES AND CULTURAL BIAS)
    - REACTIVE MEASUREMENT EFFECT (HAWTHORNE EFFECT)
    - SOCIAL DESIRABILITY EFFECT
    - ACQUIESCENCE RESPONSE EFFECT
  - RANDOM MEASUREMENT ERROR
    - CAUSED BY TEMPORARY CHANCE FACTORS IN MEASUREMENT
    - ITS PRESENCE, EXTENT, AND DIRECTION ARE RANDOM OR UNPREDICTABLE
    - RANDOM ERRORS CANCEL EACH OTHER OUT WITH REPEATED MEASUREMENTS

RELIABILITY

Reliability

Deals with stability of measurements over time

Random measurement errors produce imprecise measurements because they lack stability

Higher stability of results over repeated measurements means low random error

Assessment of stability of measurements

Test-Retest reliability method

- Use statistical correlation between sets of scores
- Correlational scores of 0.8 and higher are desirable between repeated measurements
- Limitations: cumulative learning, real change in the interim, triggering produced by earlier measurements

RELIABILITY

Reliability

Also deals with internal consistency or equivalence among items of a composite measure (scale)

Assessment of internal consistency

Split-half technique should produce high correlation among the halves

Alpha test is more comprehensive

- Average of inter-item correlations
- Average of item-total correlations

Intercoder reliability (test for equivalency)

Level of agreement between different researchers (coders) observing the same phenomenon using the same definition

RELIABILITY

Improving reliability

- Preliminary tests (ex. pretests)
- Clear instructions to respondents
- Increasing sample size of composite measures
- Weeding out items in a scale that do not discriminate well between units with different values on a variable
  - Look for items with low correlation values in a item-total correlation score

Disclaimer

- High reliability is not equal to high validity

VALIDITY

Are you measuring what you are supposed to measure?

- Level of congruence between conceptual definition and operational definition

Assessments of validity (subjective)

- Face validity
- Content validity

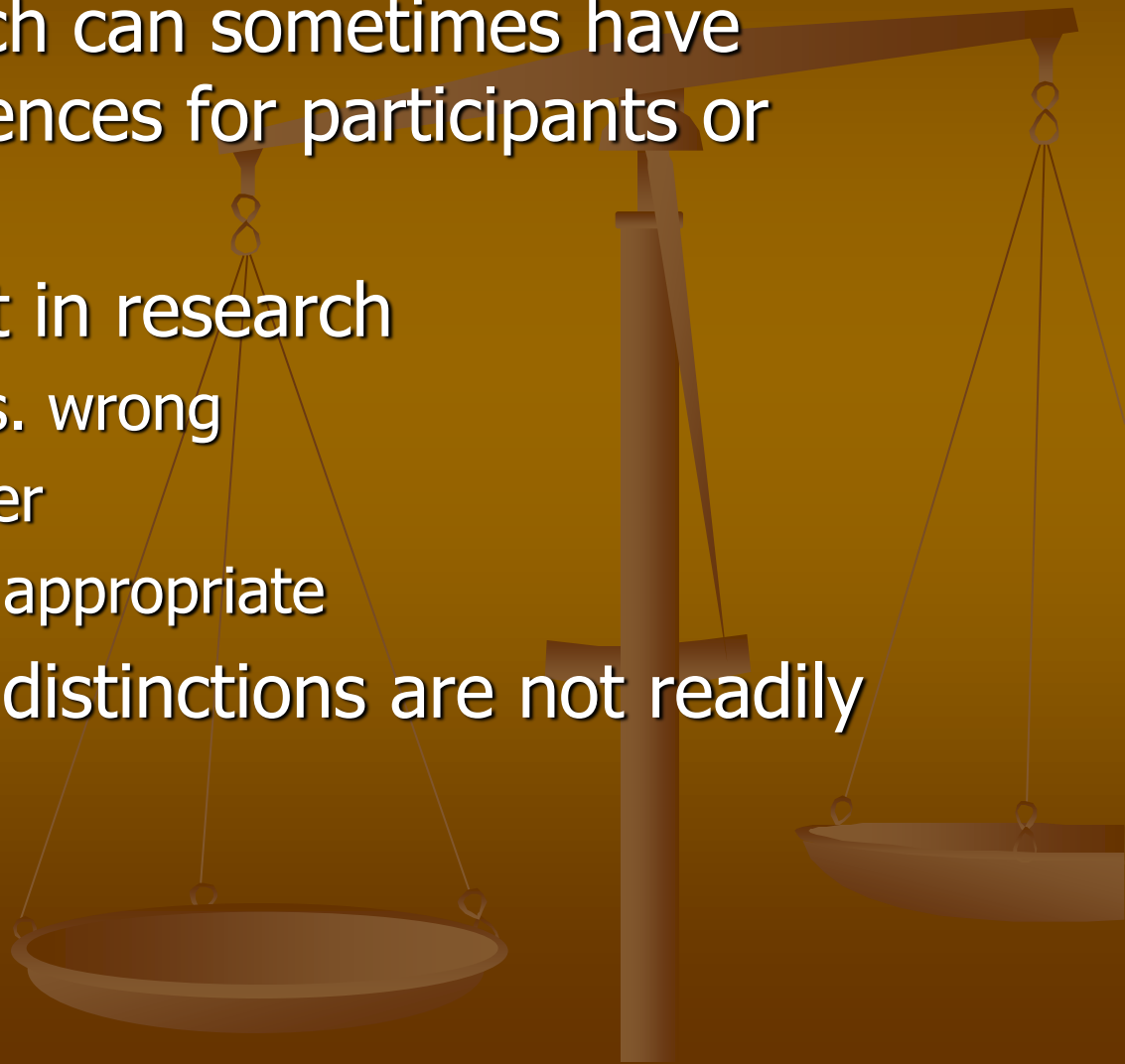
Assessments of validity (Objective)

- Criterion-related validity test
  - Could be predictive of the future or distinguish between groups in the present time
  - Make sure all criteria are covered for high validity

Research Ethics

Research Ethics

- Practice of research can sometimes have negative consequences for participants or society
- Ethics is important in research
  - Deals with right vs. wrong
  - Proper vs. improper
  - Appropriate vs. in appropriate
- Many times these distinctions are not readily apparent

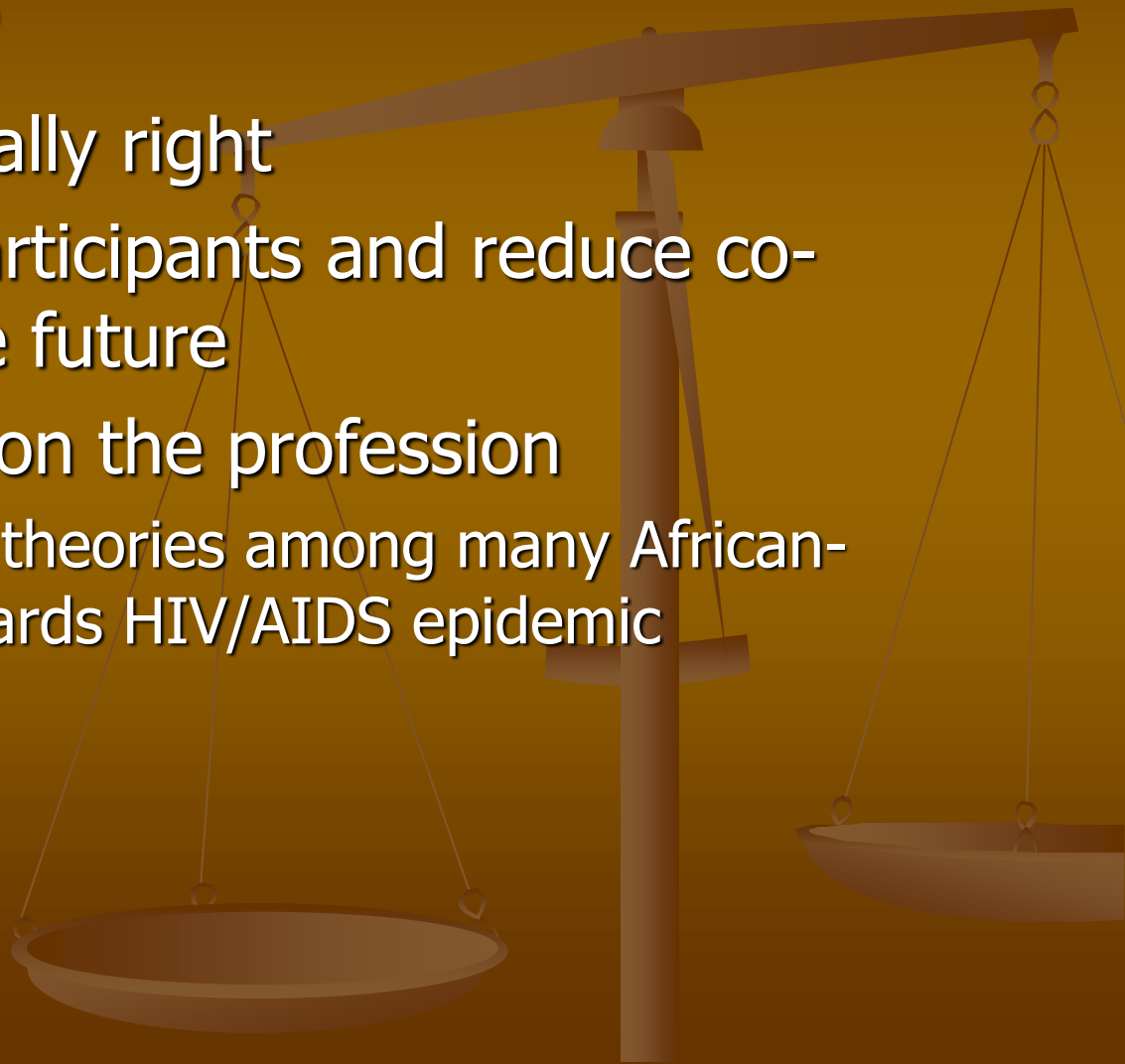


Research Ethics

- At other times, unethical practices are very obvious
  - Tuskeegee experiments on African Americans
- Guiding principle should be
  - Balance needs/practices/benefits of research with the welfare of the participants/community/society
  - Prevent or minimize negative effects on participants

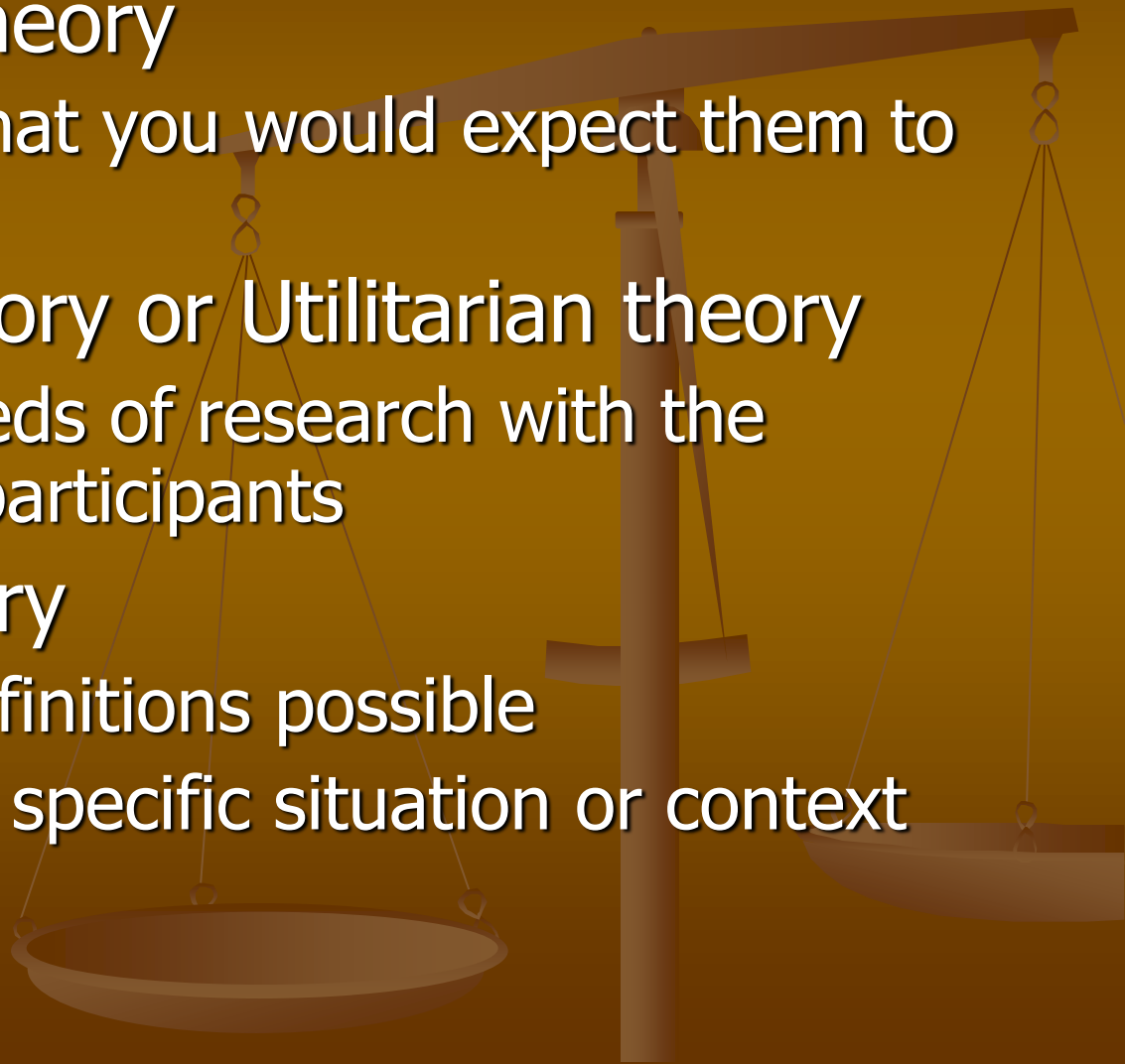
Why be ethical?

- Why be ethical?
  - Do what is morally right
  - May alienate participants and reduce co-operation in the future
  - Reflects poorly on the profession
    - Ex. Conspiracy theories among many African-Americans towards HIV/AIDS epidemic



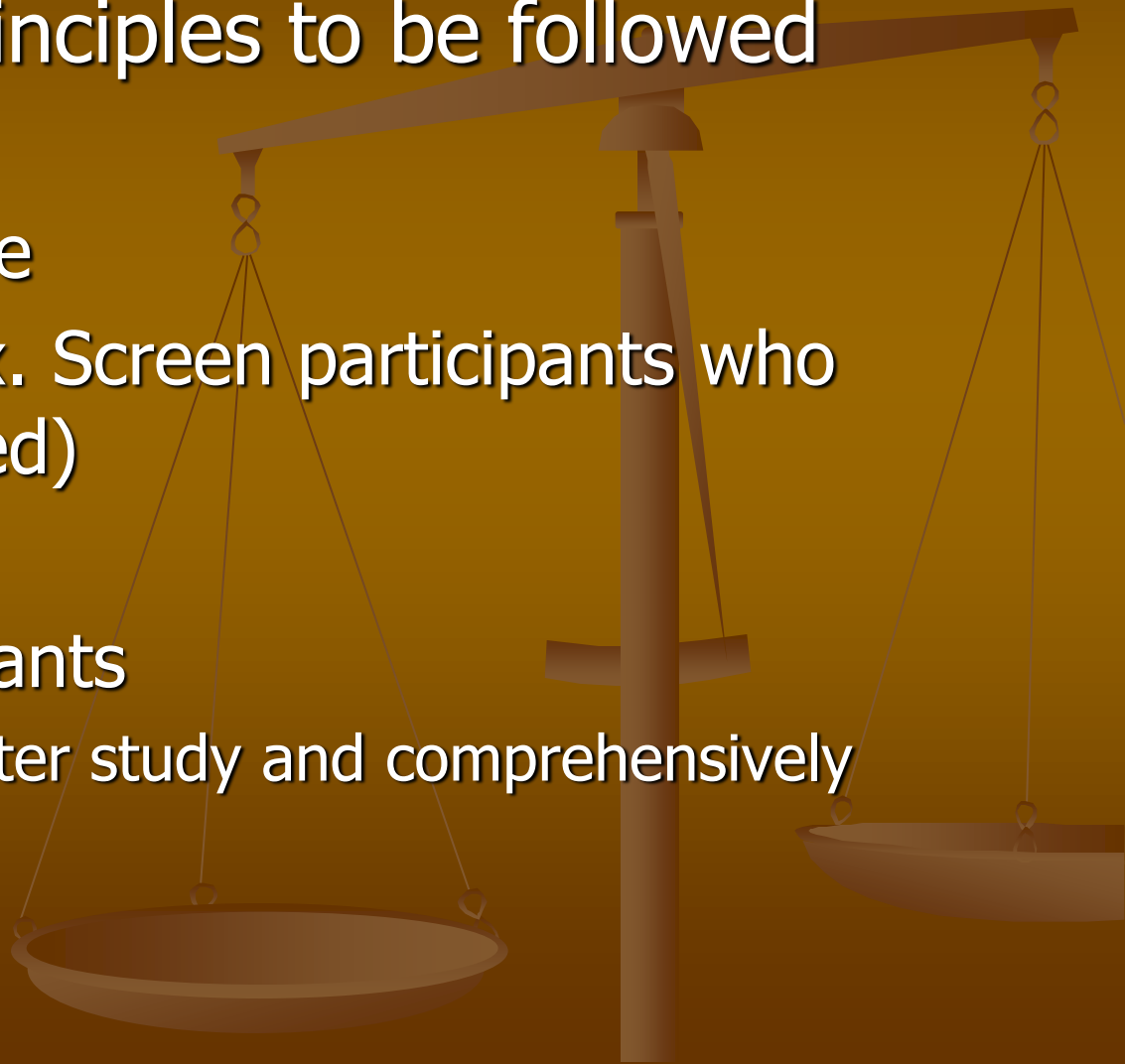
Theories in Ethics

- Deontological theory
  - Do to others what you would expect them to do to you
- Teleological theory or Utilitarian theory
  - Balance the needs of research with the welfare of the participants
- Relativistic theory
  - No universal definitions possible
  - Depends of the specific situation or context



Ethical Principles in Research

- Some ethical principles to be followed
  - Autonomy
  - Non-meleficence
  - Beneficence (ex. Screen participants who might be harmed)
  - Justice
  - Debrief participants
    - Immediately after study and comprehensively

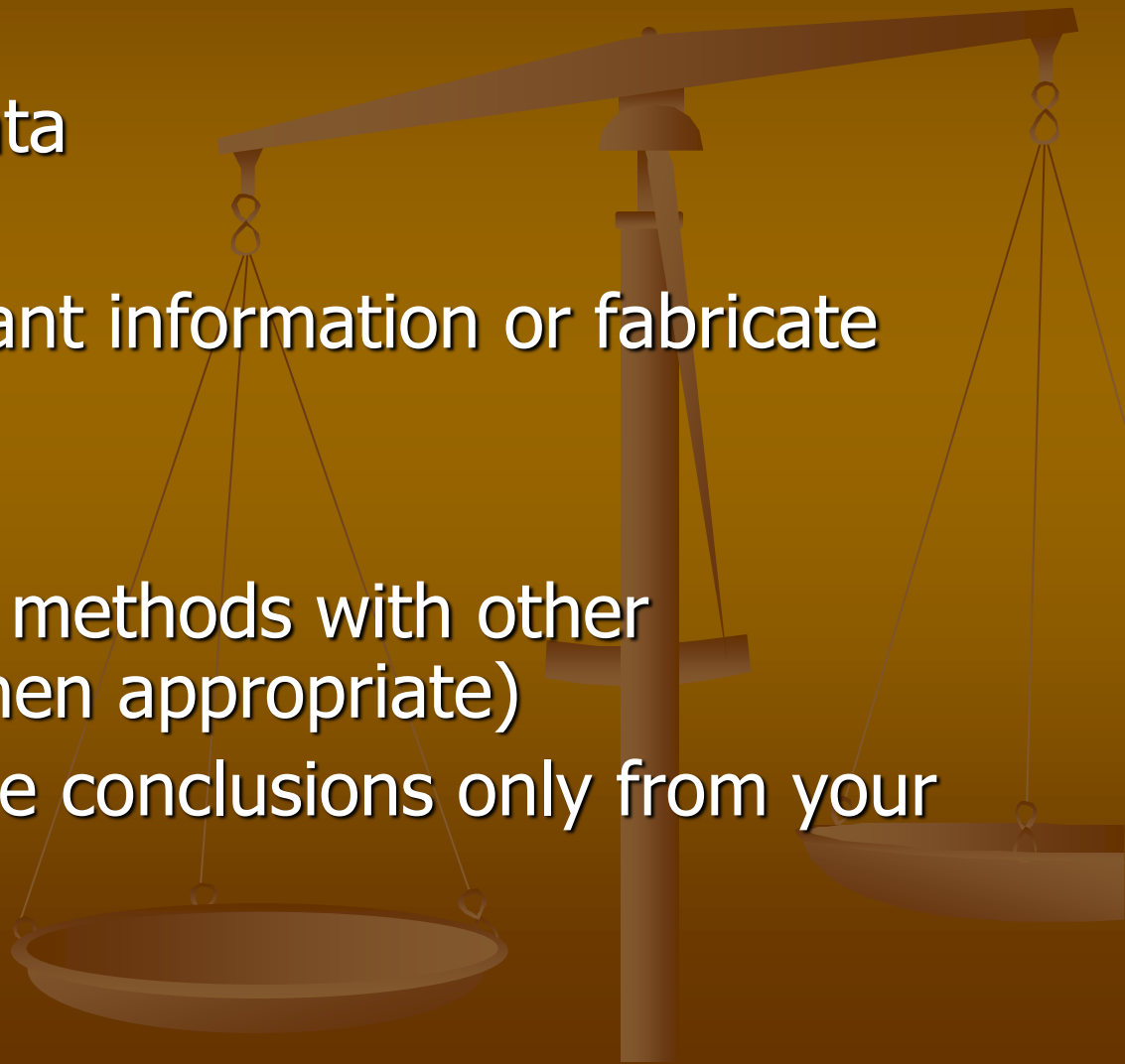


Ethical Problems

- Federal Guidelines provided through HSRB
- Some ethical problems encountered
  - Lack of voluntary participation & informed consent (esp. in field experiments and covert participation studies)
  - Concealment
  - Deception
  - Violate privacy (esp. negative aspects of behavior)
  - Deny anonymity
    - Anonymity vs. confidentiality

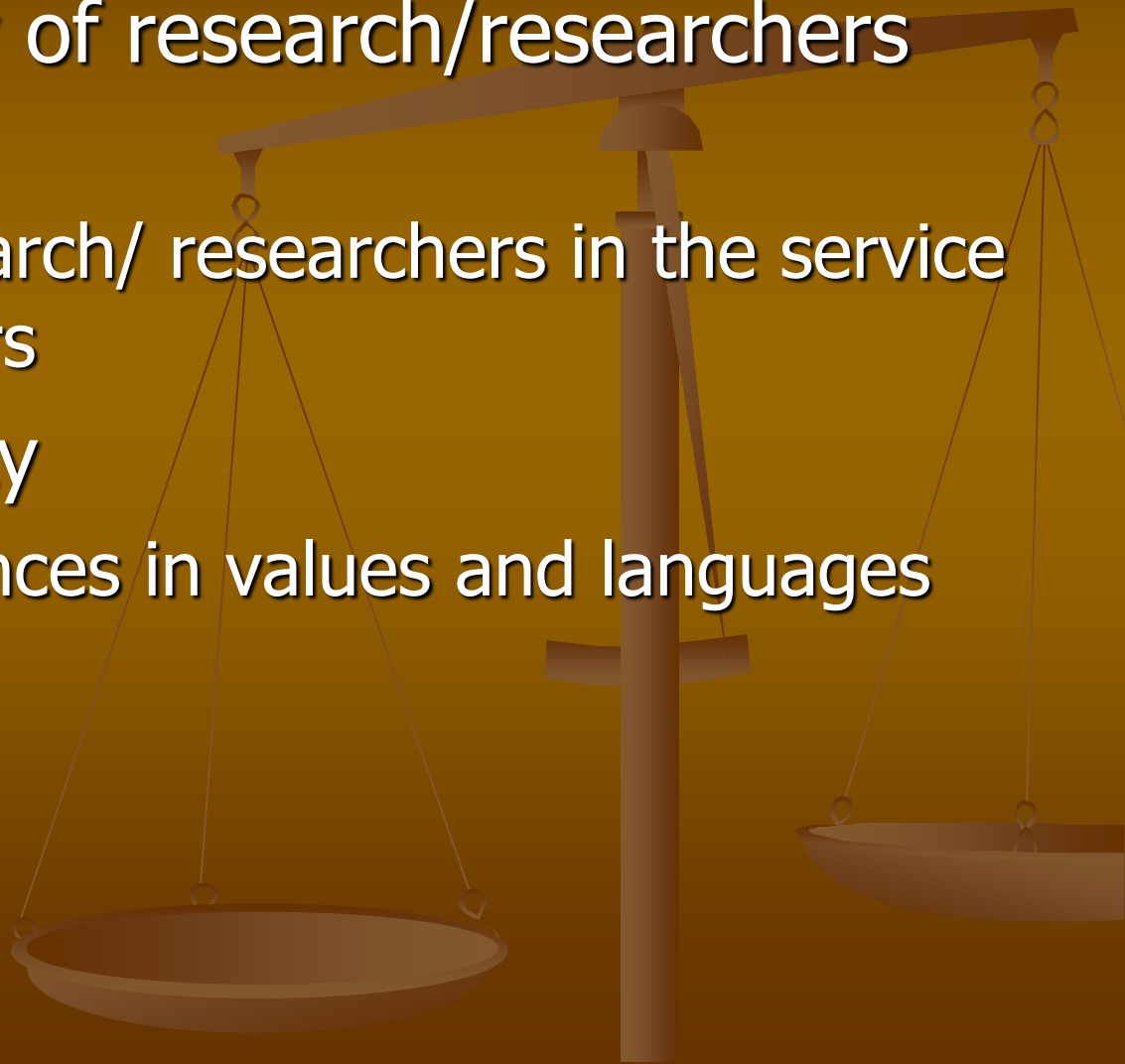
Ethics in Data Analysis & Reporting

- Do not
  - Tamper with data
  - Plagiarize
  - Conceal important information or fabricate data
- Do
  - Share data and methods with other researchers (when appropriate)
  - Draw reasonable conclusions only from your data



Science and Society

- Value Neutrality of research/researchers
  - Often is a myth
  - May place research/ researchers in the service of their sponsors
- Cultural relativity
  - Cultural differences in values and languages



SAMPLING

SAMPLING

Why sample?

- Cost, time constraints involved in studying large number of cases
- Ability to generalize results to target population
- Sample studies are more accurate and efficient than studying the total population
- Census vs. sample

Universe

- Target Population (sampling frame)
  - Sample
- Very large populations may not have sampling frames

SAMPLING DESIGNS

- Probability Sampling
  - Known probability of selection of units in the sample (Random Sampling)
  - May or may not be highly representative of the population
  - Essential for making generalizations from sample to population because laws of probability may be applied
  - Amount of sampling error can be computed (accuracy of sample estimates)
  - Eliminates bias in selection of units to samples
  - Necessary for inferential statistics

PROBABILITY SAMPLING DESIGNS

Random selection

Known probability of selection (i.e. rule states that every unit in the target population has an equal chance of being selected in the sample)

Simple Random Sampling (SRS)

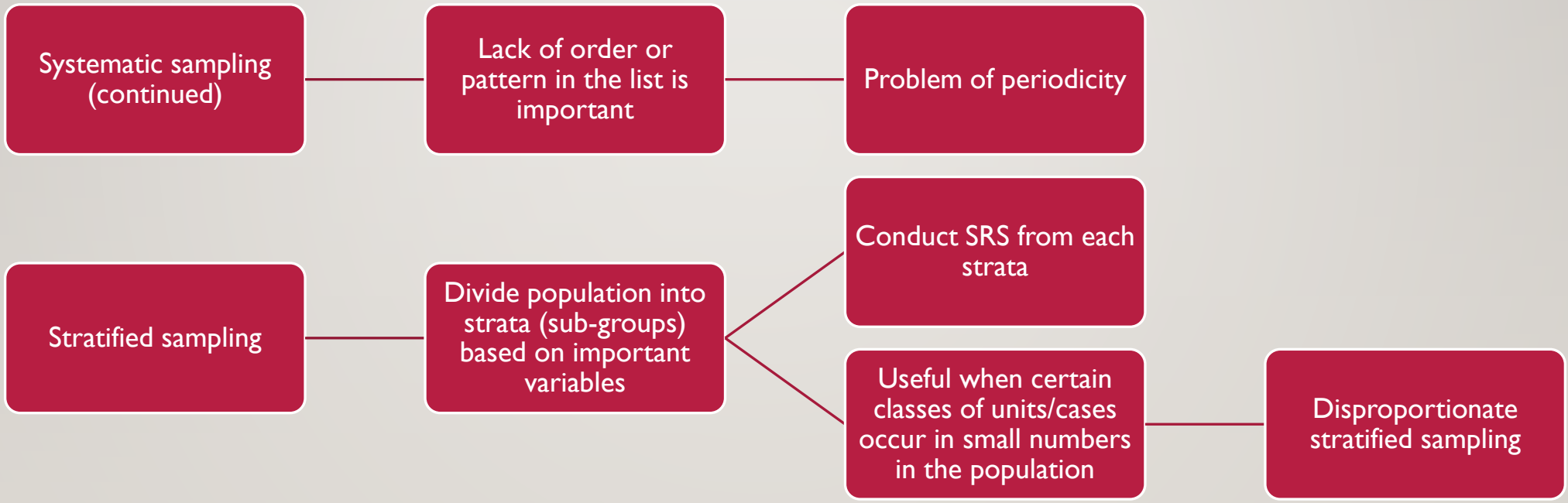
Need a complete list of all the units/cases in the population (called sampling frame)

Systematic Sampling

Need a complete list but does not need to be numbered as in SRS

- Sampling interval and random start required
- Sampling interval = Size of sampling frame/Sample size
- Random start

PROBABILITY SAMPLING DESIGNS



PROBABILITY SAMPLING DESIGNS

- Stratified sampling (continued)
  - Has the potential for lowest sampling error when compared with all other probability sampling designs (SRS, systematic, multistage cluster sampling)
    - Accuracy is dependent on reducing variance within the sample (low standard deviation)
    - Greater homogeneity of units in the sample help to reduce variance (lower std. deviation)
    - Accuracy is dependent on larger sample size
    - Error = std. deviation/Square root of N
  - Under similar conditions, a smaller sample size (of stratified sampling) would have the same accuracy of a larger SRS

PROBABILITY SAMPLING DESIGNS

- Multistage cluster sampling
  - Does not need a master list of the population
  - Sampling is done in multiple stages
  - Has the potential for highest sampling error when compared with all other probability sampling designs (SRS, systematic, stratified samples)
  - Sampling error occurs at every stage and add up

NON-PROBABILITY SAMPLING DESIGNS

- Non-Probability sampling
  - Sometimes only feasible option
    - No list of units available/impractical to construct list/very few cases available for study
  - Used in exploratory studies
  - Does not use any known probability of selection (like probability sampling)
    - So, degree of accuracy or sampling error cannot be computed
    - Probability statistics theory cannot be invoked
    - Cannot generalize to the population

NON-PROBABILITY SAMPLING DESIGNS

- Types of non-probability sampling designs
  - Convenience sample or available sample
  - Purposive or judgement sample
    - Some attempt to be representative of the population
  - Quota sample
    - Some attempt to be representative of the population
    - Use fixed quotas to select cases, which are representative of the actual distribution of strata in population (do not confuse this with stratified probability sampling)
  - Volunteer samples
  - Snowball samples

FACTORS AFFECTING CHOICE OF SAMPLING DESIGNS

- Some preliminary considerations
  - Stage of research and data use
    - Studies that need high precision (low error) and need to generalize to population
      - Need to use probability sampling designs
      - Need to use large sample sizes
        - Ex. General Social Survey (GSS)

FACTORS AFFECTING CHOICE OF SAMPLING DESIGNS

- Stage of research and data use
  - Exploratory studies/pilot studies are generally descriptive
    - Do not need to generalize to population
    - Less precision is required
    - Non-probability sampling designs could work here (ex. Convenience sample)
- Available resources (time, money, personnel, etc.)
  - Need to balance the availability of resources with type of sampling design selected
  - Could use probability or non-probability designs depending on research objectives

FACTORS AFFECTING CHOICE OF SAMPLING DESIGNS

- Population Heterogeneity
  - Heterogeneity is the degree of variance (dissimilarity) among cases in a population
    - Depends on the population as well as the variable under question
- Type of research design selected
  - Surveys: Mostly probability sampling designs
  - Content analysis: Mostly probability sampling designs
  - Experiments: Non-probability sampling (ex. Convenience)
    - However, randomization is used to distribute cases between experimental/control groups

CONCLUSION

- Sampling errors are random errors
  - Produced by errors caused by random selections from population
  - This can be reduced as described earlier
- Systematic sampling bias is more damaging
  - Deliberate attempts to bias the sample selection
    - Coverage error (ex. Using telephone books as sampling frames)
    - Non-response or non-cooperation bias (need a return of at least 70%)

CONCLUSION

- Generalizability is also dependent on other factors
  - Historical time of the study (will another time make a difference?)
  - Research setting (will another place make a difference?)
  - Operational definitions (will another op. definition make a difference?)
- Social scientific ideal is to establish theoretical propositions that hold under all conditions