Department of Library and Information Science
Bharathidasan University
Tiruchirappalli-620024
Name of the Programme: M.Lib.I.Sc
Course - 4.5: Elective – V
(B) INFORMETRICS AND SCIENTOMETRICS
Course Code:P21MLS20A

Unit-III: Quantitative and Qualitative techniques: Types, Multidimensional scaling, Cluster analysis, Correspondence analysis, Co-word analysis, media and audience analysis.

Course Teacher: DR.C.RANGANATHAN

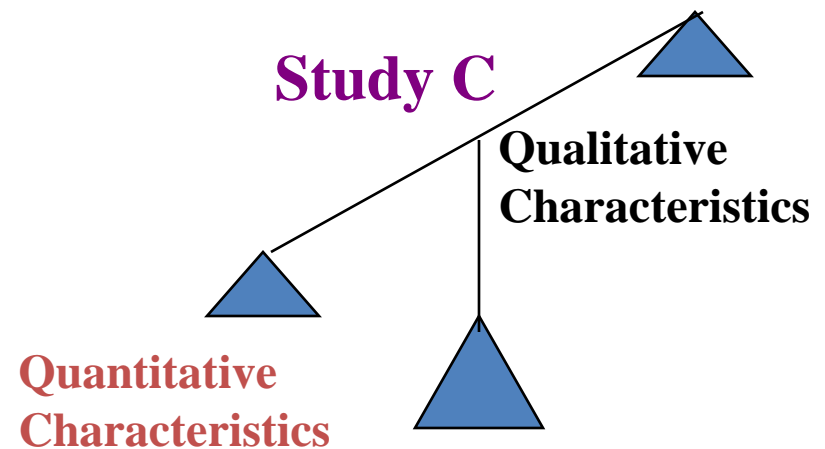Professor
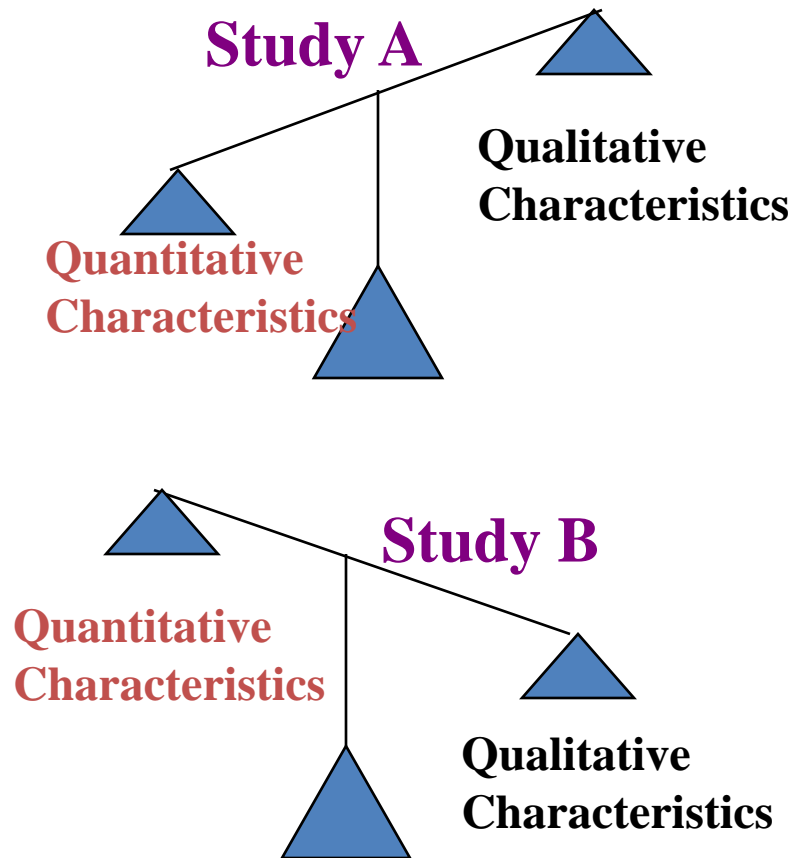
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Quantitative and Qualitative Approaches

Dr.C.Ranganathan

Key Ideas

- Configurations of research
- Development of quantitative research
- Development of qualitative research
- Definitions of qualitative and quantitative research
- The relationship between the research process and qualitative and quantitative research

Three Configurations of Research

Study A

Qualitative Characteristics

Quantitative Characteristics

Study B

Quantitative Characteristics

Qualitative Characteristics

Study C

Qualitative Characteristics

Quantitative Characteristics

Research studies may include characteristics of both approaches, but they are weighted more heavily one way or the other.

The Development of Quantitative Research: Historical Trends

- Statistical Procedures

- Test and Measurement Practices

- Research Designs

Historical Trends: Statistical Procedures

- Correlational procedures
- Comparing groups
- Cause/Effect relationships

Historical Trends: Testing and Measurement

- Testing mental abilities (late 19th century)
- Measuring achievement (e.g. SAT)
- Predicting achievement from standardized measurements

Historical Trends: Research Designs

- Educational Surveys (late 19th century)
- Simple Experiments (early 20th century)
- Multiple groups and tests (by 1935)
- Longitudinal designs
- Books on research design (e.g. Kerlinger 1964)

The Development of Qualitative Research: Major Themes

- Philosophical Ideas

- Procedural Developments

- Advocacy Practices

Qualitative Research: Philosophical Ideas

- Naturalistic Inquiry or Constructivism
  - consider the participants point of view
  - describe participant's view within a setting or context
- This is an alternative perspective to traditional research

Qualitative Research: Procedural Developments

- Central Phenomenon rather than research question or hypothesis

- Methods such as interviews, observations and interviews

- Designs such as case studies, grounded theory and narrative

Qualitative Research: Advocacy Practices

- The qualitative researcher is not objective, politically neutral observer

- The qualitative researcher is an observer of the human condition

- The meaning of the research is plural, political and open

- The project is collaborative and participatory

Characteristics of Quantitative and Qualitative Research in the Process of Research

Quantitative Characteristics	Steps in the Research Process	Qualitative Characteristics
Description of trends and Explanation Oriented	**Identifying a Problem**	Exploratory/ Understanding a Central Phenomenon
•Major Role •Justify Problem	**Reviewing the Literature**	•Minor Role •Justify Problem
•Specific and Narrow •Measurable/Observable	**Specifying a Purpose**	•General and Broad •Participants' Experience
•Pre-determined Instruments •Numeric Data •Large numbers	**Collecting Data**	•Emerging Protocols •Text or image data •Small Number
•Statistical •Description of Trends •Comparisons/Predictions	**Analyze and Interpret Data**	•Text Analysis •Description/Themes •Larger meanings of findings
•Standard and Fixed •Objective and Unbiased	**Report and Evaluate**	•Flexible and Emerging •Reflexive and Biased

Definitions of Qualitative and Quantitative Research

Quantitative Research

Quantitative *research is an inquiry approach useful for describing trends and explaining the relationship among variables found in the literature. To conduct this inquiry, the investigator specifies narrow questions, locates or develops instruments using statistics. From the results of these analyzes, the researcher interprets the data using prior predictions and research studies. The final report, presented in standard format, display researcher objectivity and lack of bias.*
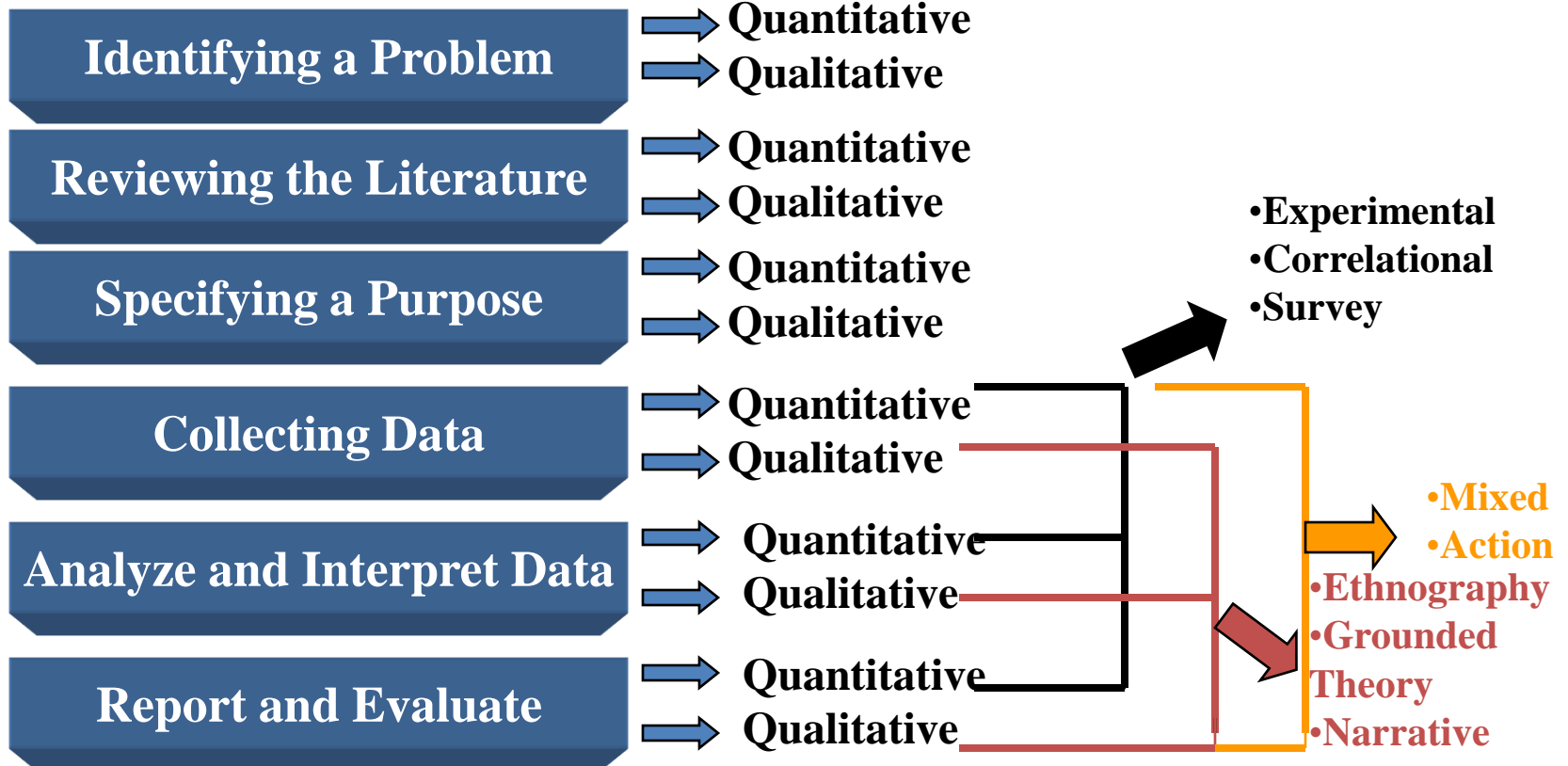
Qualitative Research

Quantitative *research is an inquiry approach useful for exploring and understanding a central phenomenon. To learn about this phenomenon, the inquirer asks participants broad, general questions, collects the detailed views of participants in the form of words or images, and analyzes the information for description and themes. From this data, the researcher interprets the meaning of the information drawing on personal reflections and past research. The structure of the final report is flexible, and it displays the researcher's biases and thoughts.*

Characteristics of Quantitative and Qualitative Research in the Process of Research
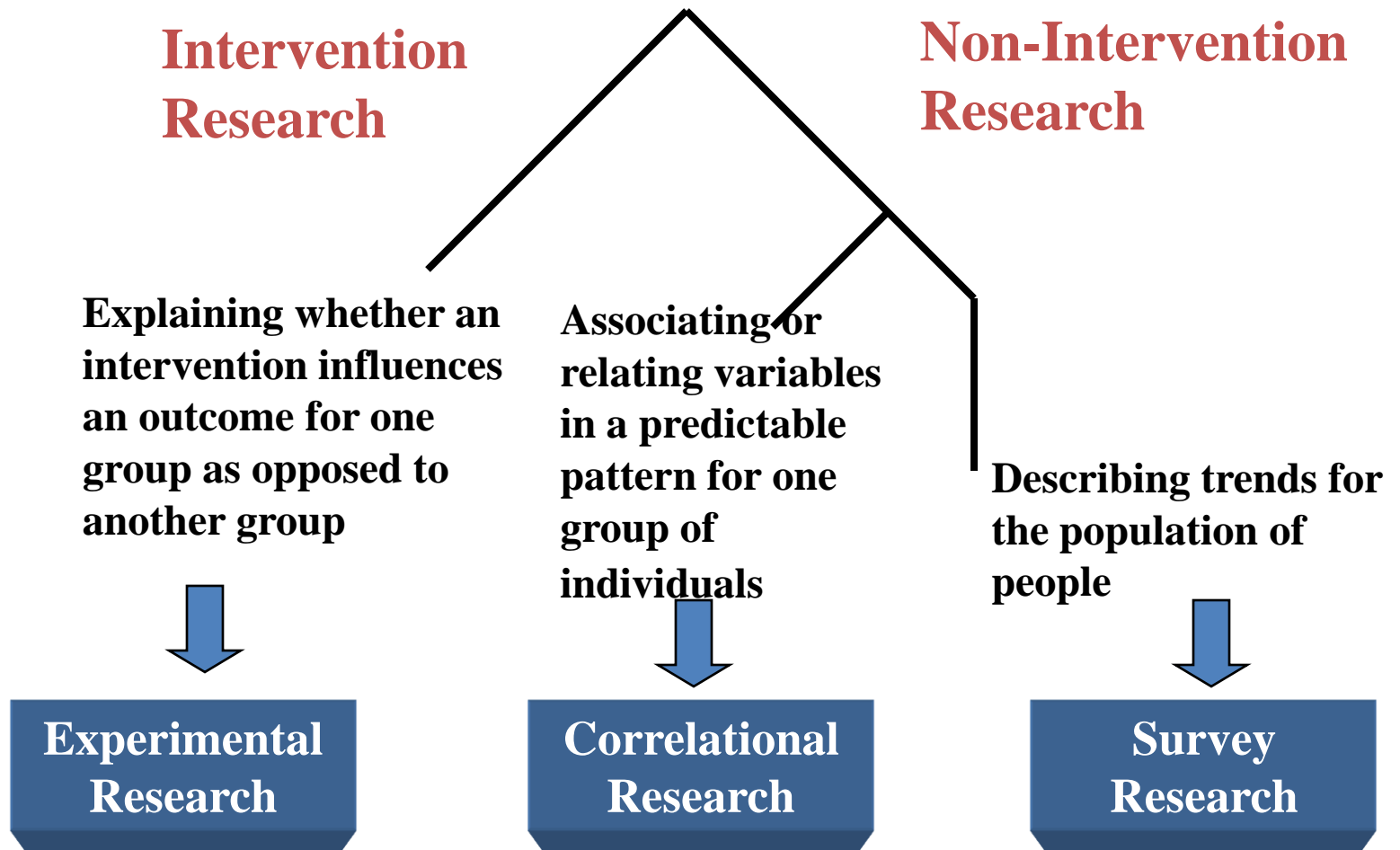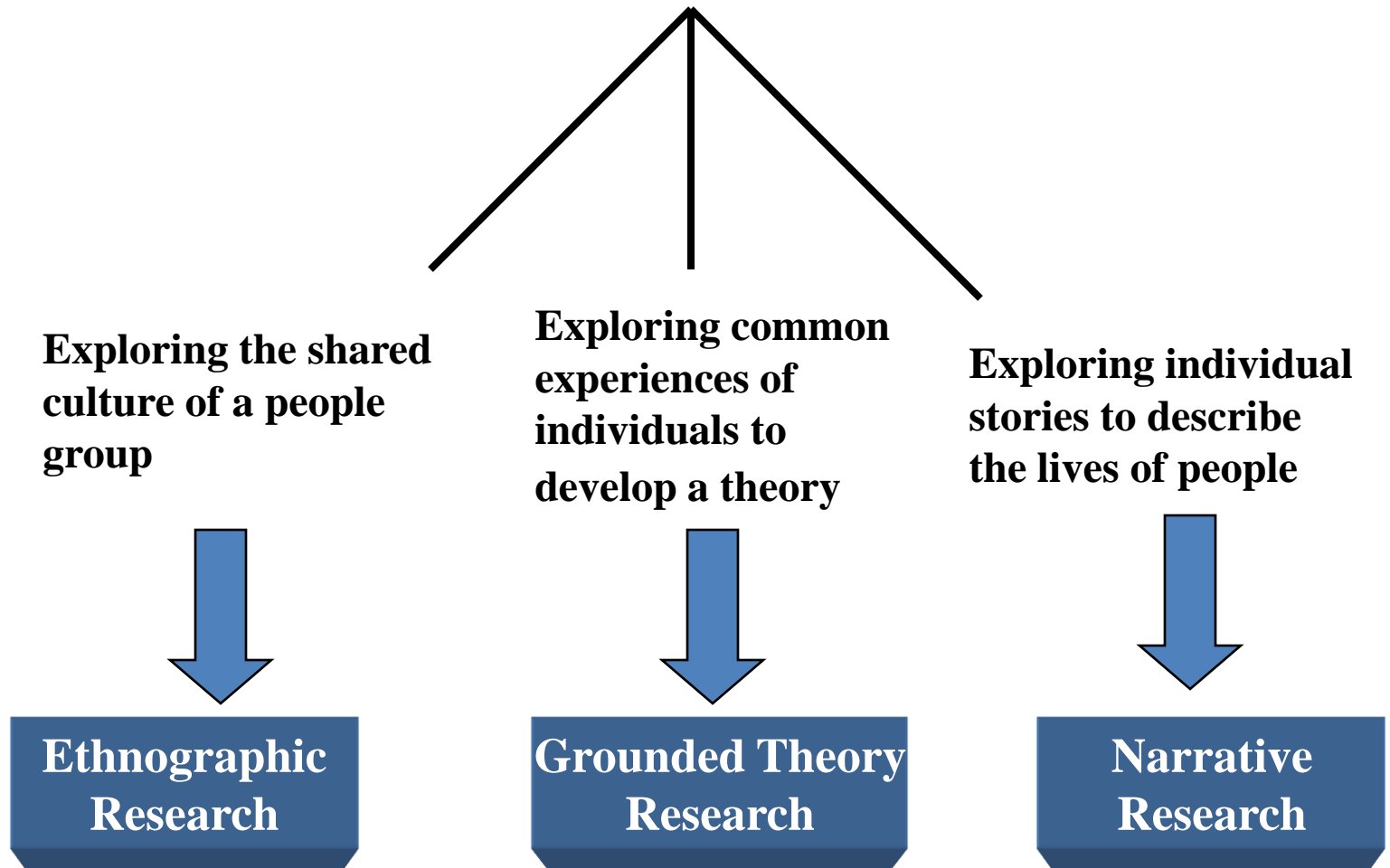
Steps in the Research Process

Two Approaches

Research Designs

Identifying a Problem
→ Quantitative
→ Qualitative

Reviewing the Literature
→ Quantitative
→ Qualitative

Specifying a Purpose
→ Quantitative
→ Qualitative

Collecting Data
→ Quantitative
→ Qualitative

Analyze and Interpret Data
→ Quantitative
→ Qualitative

Report and Evaluate
→ Quantitative
→ Qualitative

•Experimental
•Correlational
•Survey

•Mixed
•Action
•Ethnography
•Grounded Theory
•Narrative

Quantitative Designs and Uses

Intervention Research

Non-Intervention Research

Explaining whether an intervention influences an outcome for one group as opposed to another group

Associating or relating variables in a predictable pattern for one group of individuals

Describing trends for the population of people

Experimental Research

Correlational Research

Survey Research

Qualitative Research Designs and Uses

Exploring the shared culture of a people group

Exploring common experiences of individuals to develop a theory

Exploring individual stories to describe the lives of people

Ethnographic Research

Grounded Theory Research

Narrative Research

Combined Designs and Uses

Combining quantitative and qualitative data to best understand and explain a research problem.

Using quantitative and qualitative data for individuals to study problems that they face in their setting

Mixed Method Research

Action Research
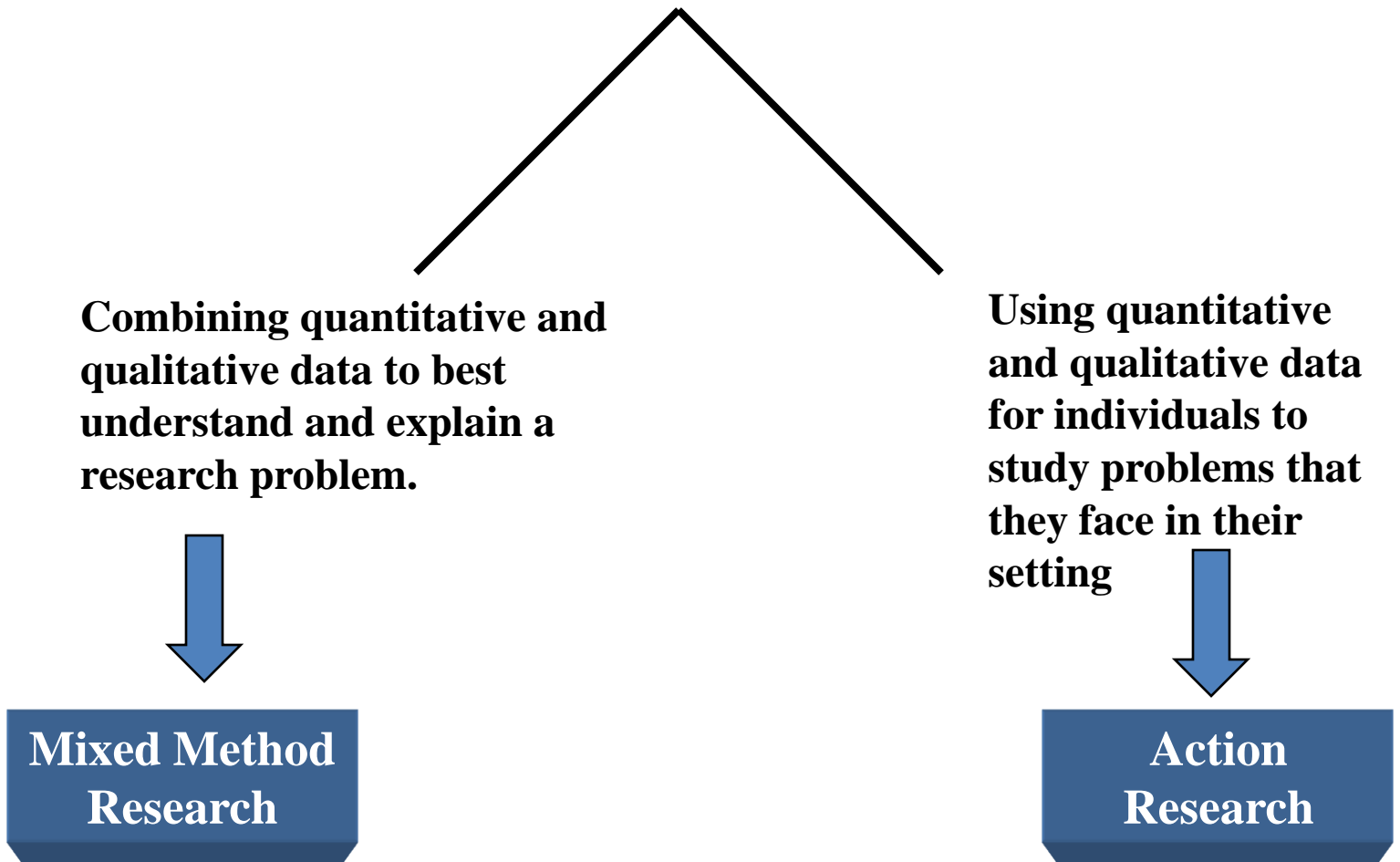
Multidimensional Scaling and Correspondence Analysis

Chapter Outline

1) Overview

2) Statistics Associated with MDS

4) Conducting Multidimensional Scaling

    i.   Obtaining Input Data

        a.   Perception Data: Direct Approaches

        b.   Perception Data: Derived Approaches

        c.   Direct Vs. Derived Approaches

    ii.   Selecting an MDS Procedure

    iii.   Deciding on the Number of Dimensions

    iv.   Labeling the Dimensions & Interpreting the Configuration

5) Correspondence Analysis

6) Relationship between MDS and Factor Analysis

Multidimensional Scaling (MDS)

- **MDS** represents perceptions of respondents spatially.

- Perceived relationships among stimuli are represented geometrically on a multi-D space.

- These spatial representations are called maps.

- The axes of the spatial map denote the underlying dimensions respondents use to form perceptions.
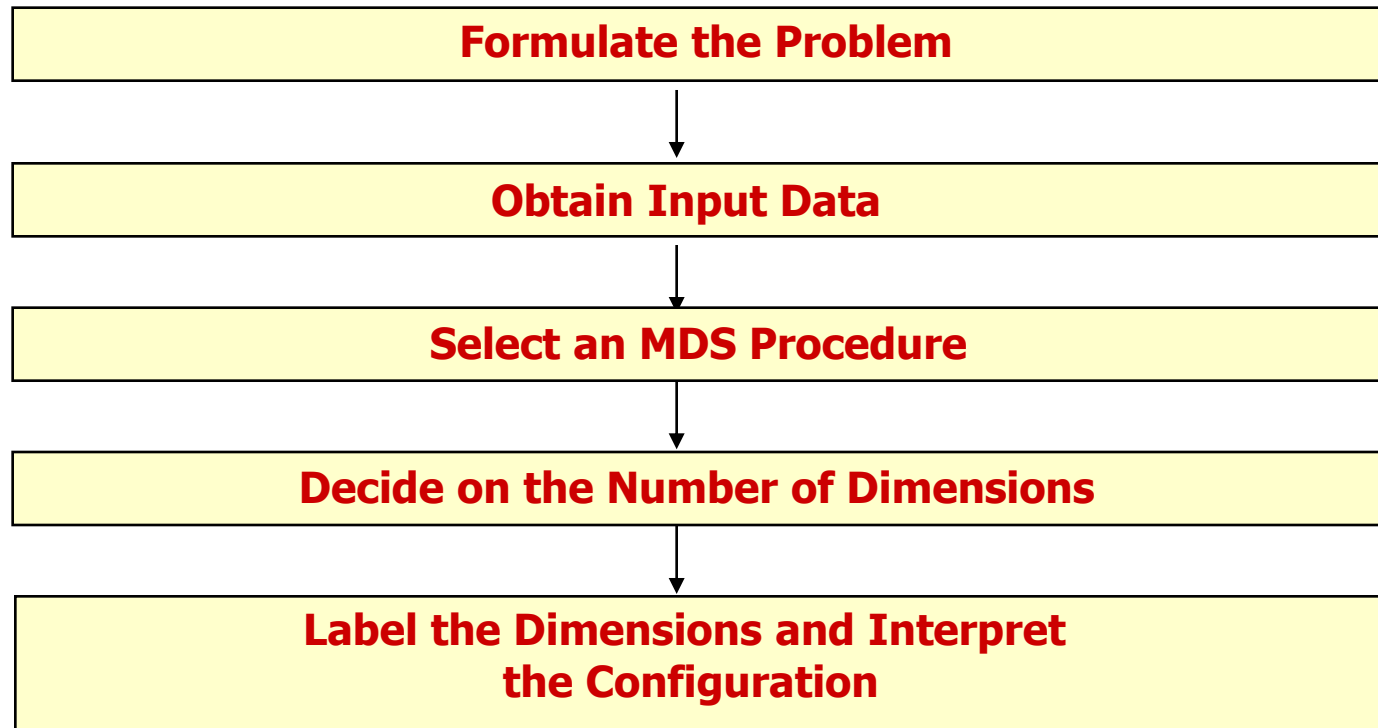
Statistics Associated with MDS

- **Similarity judgments**: ratings on all possible pairs of brands in terms of their similarity using a Likert type scale.

- **Stress**. This is a lack-of-fit measure; higher values of stress indicate poorer fits.

- **R-square:** proportion of variance of the optimally scaled data accounted for by the MDS procedure. This is a goodness-of-fit measure.

Statistics Associated with MDS

- **Spatial map:** Geometric representation of relationships among brands in multi-D space.

- **Unfolding**. The representation of both brands and respondents as points in the same space.

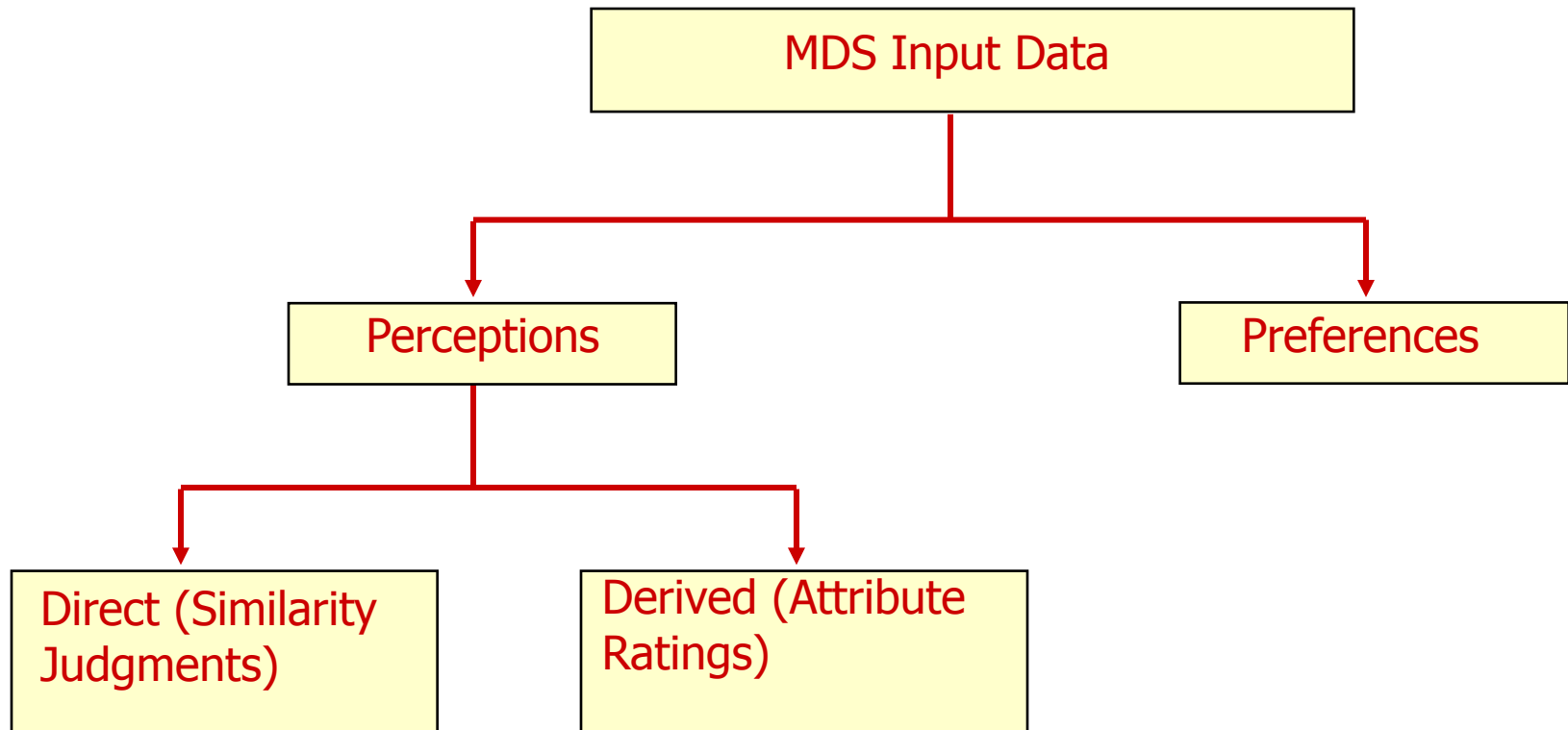# Conducting Multidimensional Scaling

Fig. 21.1

```
┌─────────────────────────────────────────────────┐
│              Formulate the Problem                │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│                 Obtain Input Data                 │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│              Select an MDS Procedure              │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│         Decide on the Number of Dimensions        │
└─────────────────────────────────────────────────┘
                         │
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┌─────────────────────────────────────────────────┐
│          Label the Dimensions and Interpret       │
│                 the Configuration                 │
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Formulate the Problem

- Specify the purpose of MDS.

- Select the brands to be included in the analysis. Usually varies between 8 and 25 brands.

- The choice of number and specific brands should be based on the marketing research problem, theory, and the judgment of the researcher.

Input Data for Multidimensional Scaling

Fig. 21.2

| MDS Input Data |
| Perceptions | Preferences |
| Direct (Similarity Judgments) | Derived (Attribute Ratings) |

Input Data

- **Perception Data: Direct Approaches:** respondents are asked to judge how similar or dissimilar the various brands are. These data are referred to as similarity judgments.

- Consider similarity ratings of various toothpaste brands:

	Very Dissimilar						Very Similar
Crest vs. Colgate	1 2	3	4	5	6	7	
Aqua-Fresh vs. Crest	1	2	3	4	5	6	7
Crest vs. Aim		1	2	3	4	5	6	7
.							
.							
.							
Colgate vs. Aqua-Fresh	1	2	3	4	5	6	7

- The number of pairs to be evaluated is $n(n-1)/2$, where n is the number of stimuli.

Similarity Rating Of Toothpaste Brands

Table 21.1

	Aqua-Fresh	Crest	Colgate	Aim	Gleem	Plus White	Ultra Brite	Close-Up	Pepsodent	Sensodyne
Aqua-Fresh										
Crest	5									
Colgate	6	7								
Aim	4	6	6							
Gleem	2	3	4	5						
Plus White	3	3	4	4	5					
Ultra Brite	2	2	2	3	5	5				
Close-Up	2	2	2	2	6	5	6			
Pepsodent	2	2	2	2	6	6	7	6		
Sensodyne	1	2	4	2	4	3	3	4	3	

Input Data

- **Perception Data: Derived Approaches: A**ttribute-based approaches requiring the respondents to rate the brands on the identified attributes using semantic differential or Likert scales.

Whitens   Does not
teeth ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ whiten teeth

Prevents tooth   Does not prevent
decay   ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ tooth decay
                     .
                     .
                     .
                     .
Pleasant   Unpleasant
tasting   ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ tasting
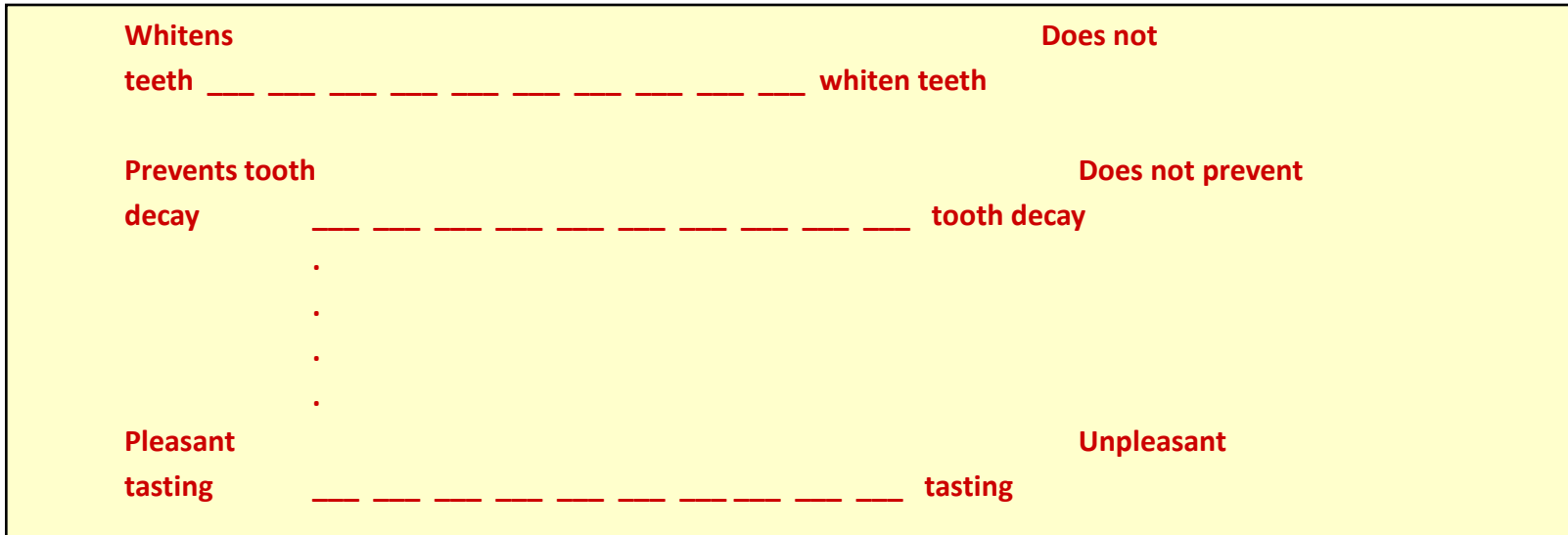
- If attribute ratings are obtained, a similarity measure (such as Euclidean distance) is derived for each pair of brands.

Direct Vs. Derived Approaches

- The direct approach has the following advantages and disadvantages:

  1. The researcher does not have to identify a set of salient attributes.

  2. The disadvantages are that the criteria are influenced by the brands or stimuli being evaluated.

  3. Furthermore, it may be difficult to label the dimensions of the spatial map.

Direct Vs. Derived Approaches

- The attribute-based approach has the following advantages and disadvantages:

  1. It is easier to label the dimensions.

  2. A disadvantage is that the researcher must identify all the salient attributes, a difficult task.

- Use both these approaches. Direct similarity judgments used for obtaining the spatial map, and attribute ratings used to interpret dimensions of the perceptual map.

Select an MDS Procedure

Selection of a specific MDS procedure depends upon:

- Whether perception or preference data are being scaled, or whether the analysis requires both kinds of data.

- The nature of the input data is also a determining factor.

  - **Non-metric MDS** procedures assume that the input data are ordinal, but they result in metric output.

  - **Metric MDS** methods assume that input data are metric. Since the output is also metric, a stronger relationship between the output and input data exists.

  - The metric and non-metric methods produce similar results.

- Another factor influencing the selection of a procedure is whether the MDS analysis will be conducted at the individual respondent level or at an aggregate level.

Decide on the Number of Dimensions

- ***A priori* knowledge -** Theory or past research

- **Interpretability of the spatial map -** Difficult to interpret in more than three dimensions.

- **Elbow criterion -** A plot of stress versus dimensionality.

- **Statistical approaches -** Statistical approaches are also available for determining the dimensionality.

Plot of Stress Versus Dimensionality

Fig. 21.3

21-34
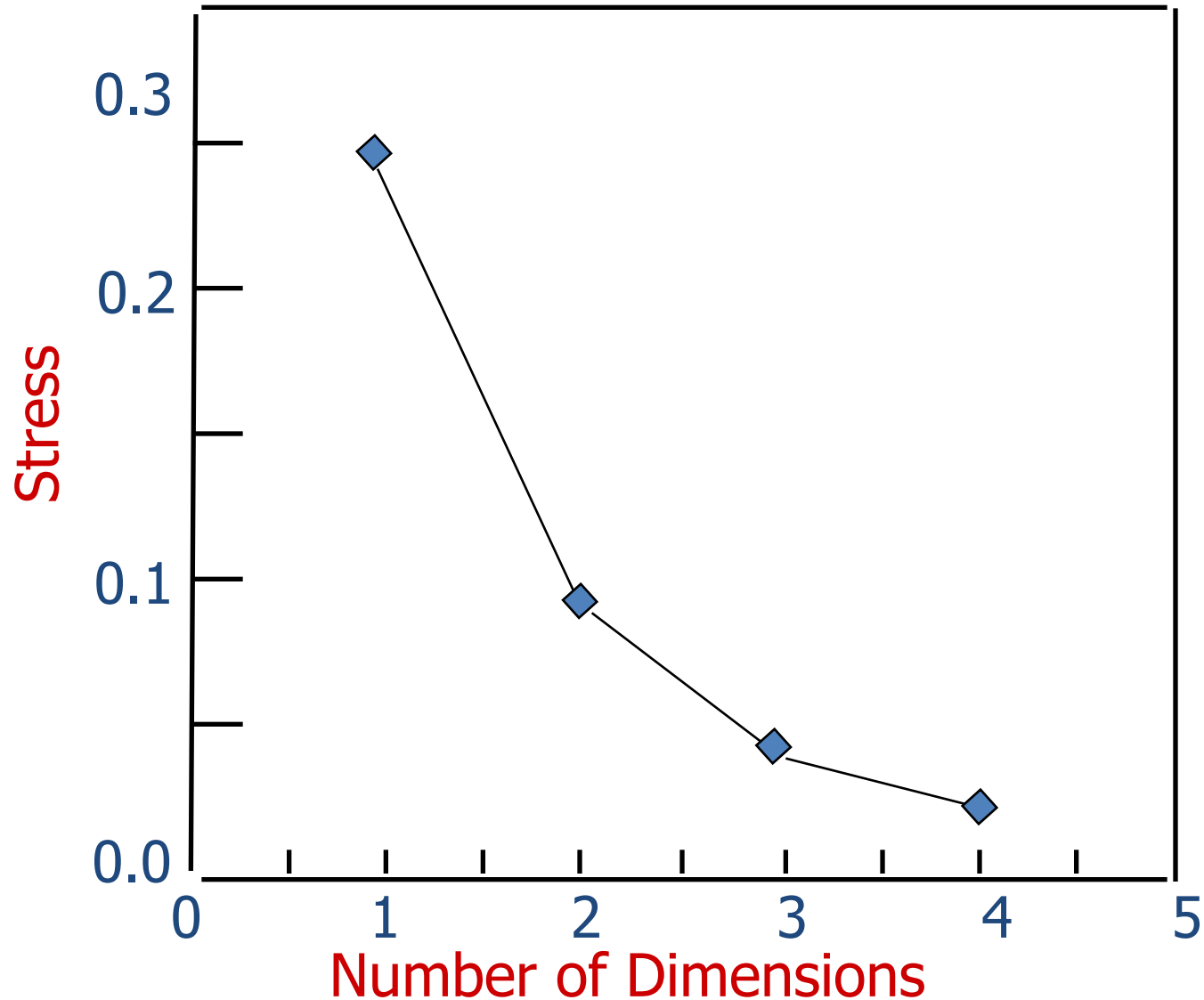
A Spatial Map of Toothpaste Brands

Fig. 21.4
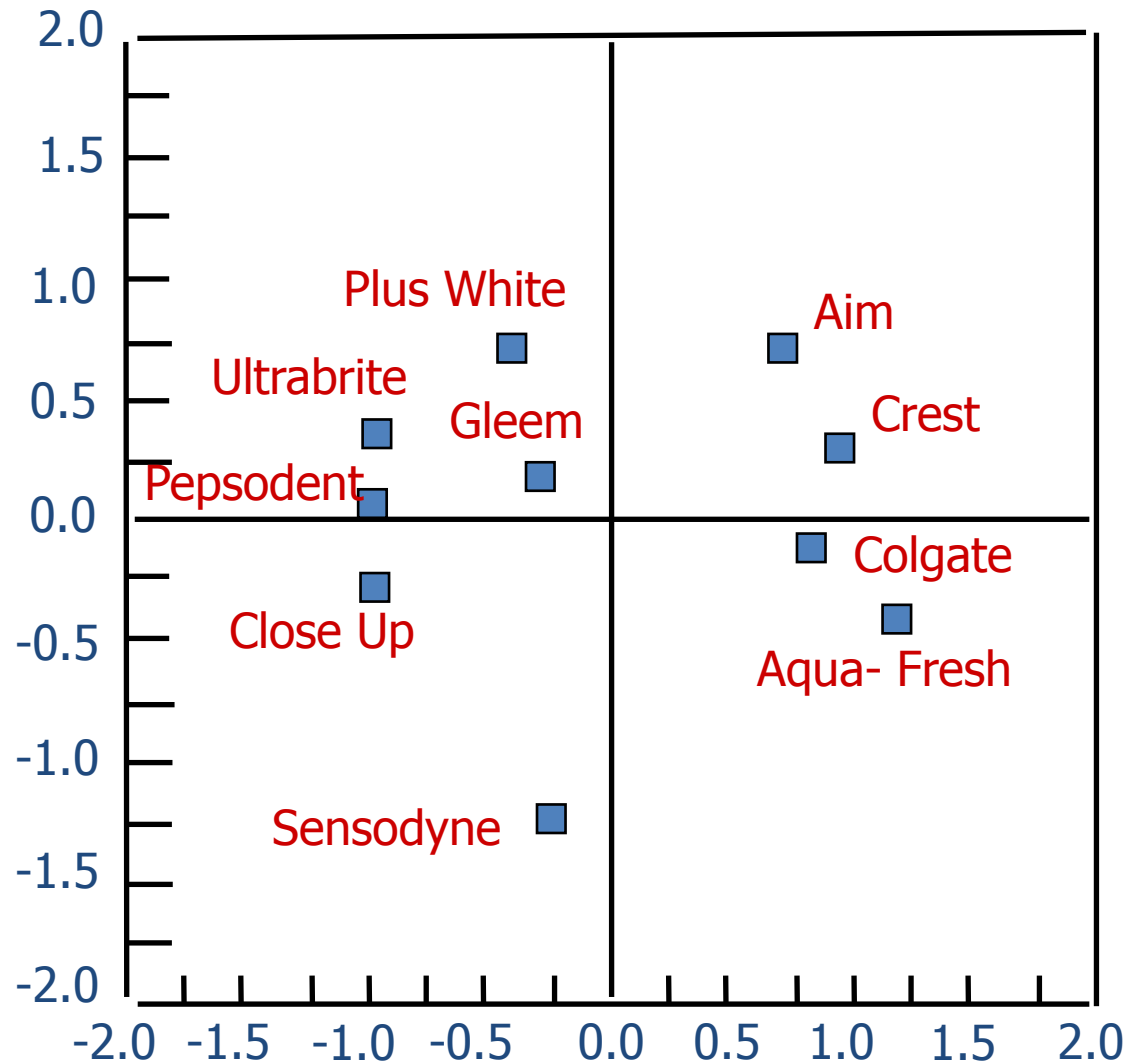
Label and Interpret Dimensions

- Even with direct similarity judgments, ratings of the brands on attributes may still be collected. These attribute vectors may be fitted in the spatial map.

- Respondents may be asked to indicate the criteria they used in making their evaluations.

- If objective characteristics of the brands are available these could be used to in interpreting the subjective dimensions of the spatial maps.

Using Attributes to Label Dimensions

Fig. 21.5
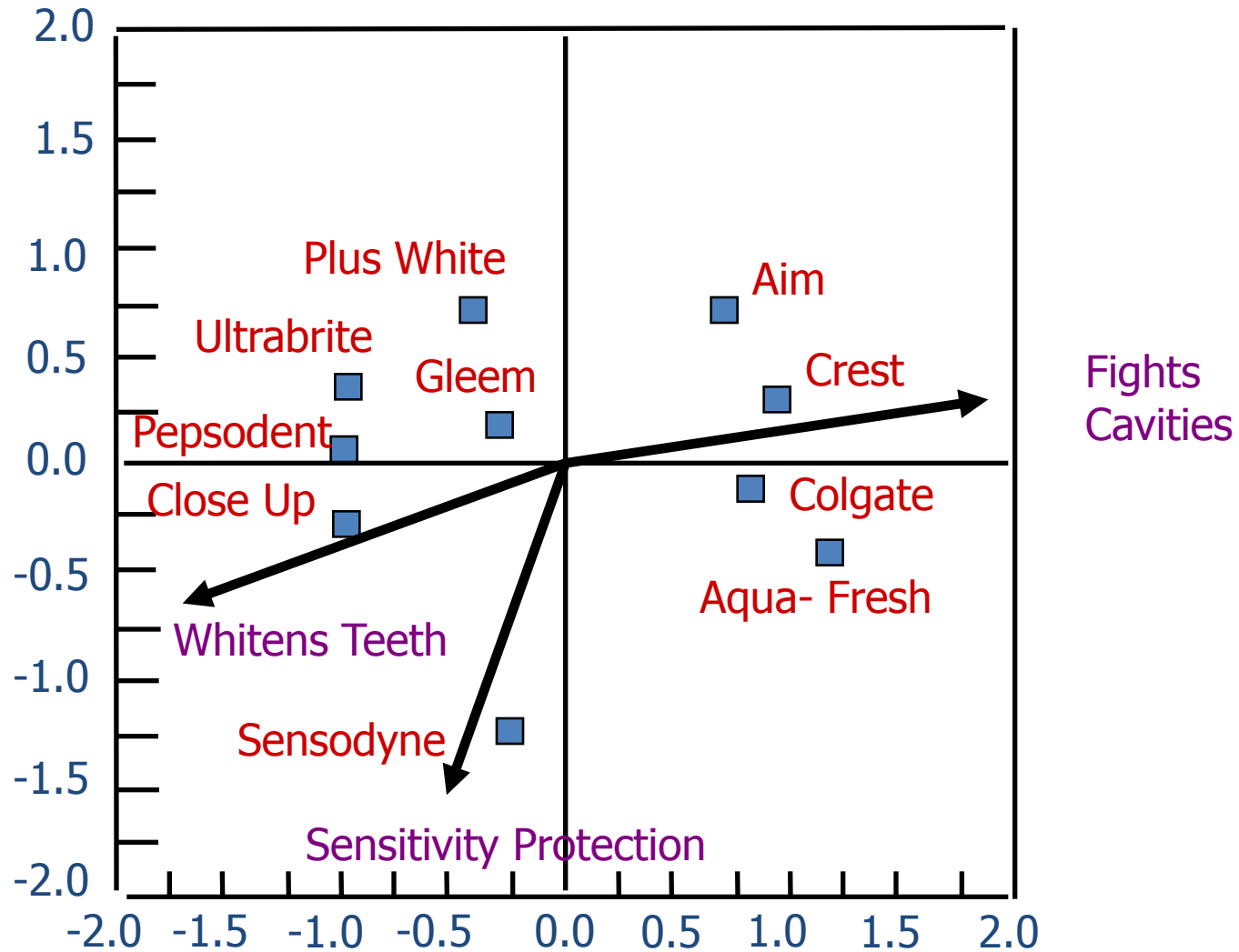
Assess Reliability and Validity

- On the **index of fit**, or *R-square* values of 0.60 or better are considered acceptable.

- **Stress values** measure badness-of-fit, or the proportion of variance of data that is not accounted for by the MDS model. Stress values of less than 10% are considered acceptable.

Assumptions and Limitations of MDS

- It is assumed that the similarity of stimulus A to B is the same as the similarity of stimulus B to A.

- MDS assumes that the distance (similarity) between two stimuli is some function of their partial similarities on each of several perceptual dimensions.

- When a spatial map is obtained, it is assumed that interpoint distances are ratio scaled and that the axes of the map are multidimensional interval scaled.

- A limitation of MDS is that dimension interpretation relating physical changes in brands or stimuli to changes in the perceptual map is difficult at best.

HATCO Example for MDS

- To benchmark HATCO vis-à-vis 9 competitors
- 18 managers representative of HATCO's customers provided input
- They gave similarity judgments on 45 pairs of brands on a 9-point scale
- 1=Not at all similar

  9=Very similar
- The 18 responses were combined in a table of mean similarity ratings

Correspondence Analysis

Correspondence Analysis (CA)

- It is an interdependence technique

- It is a compositional technique

- Advantages of CA:

  i) Used on categorical data

  ii) Can represent brands and attributes on a joint-space map

  iii) If original data not in categorical form it can easily be transformed to categories

Correspondence Analysis

- General procedure for Corresp Analysis

  1. Form Contingency table

  2. Perform chi-square test on table

  3. Create metric distance measure from chi-square association measure

  4. Decompose resulting matrix into orthogonal dimensions

  5. Place categories on these dimensions so as to best account for associations

Correspondence Analysis

- Six-stage model building for CA

- Stage 1: Objectives

    a. Association among row or column categories

    b. Association between row and col. categories

- Stage 2: Research design

    - Requires only data matrix of non-negative entries e.g. cross tabulations

Correspondence Analysis

- Stage 3: Assumptions

    a. Relative freedom from assumptions

    b. Cross tabulated data represents both   linear and non linear relationships

- Stage 4: Deriving results and assessing fit

    a. Deriving results

        i. Chi-square values obtained for each cell

        ii. Chi-squared values standardized and converted to distance measure

Correspondence Analysis

- Stage 4: Deriving results and assessing fit (contd.)

    a. Deriving results (contd.)

        iii. Resulting matrix decomposed to obtain basic components or lower dimension solutions

        iv. These "factors" simultaneously relate rows and/or columns in a single joint
    plot

Correspondence Analysis

- Stage 4: Deriving results and assessing fit (contd.)

  b. Assessing fit

        i. Identify appropriate number of dim.

        ii. Assess importance of each dim. by their eigenvalues

- Stage 5: Interpretation of results

  a. Identify a category's association with other categories

Correspondence Analysis

- Stage 5: Interpretation of results (contd.)

    b. Select type of normalization

    c. Determine whether comparisons are to be made between row, column, or row and column categories

- Stage 6: Validation of results

    a. Ensure generalizabilty

    b. Evaluate sensitivity of results to

        addition/ deletion of objects, attributes

Knowing your audience

Dr.C.Ranganathan

Associate Professor

Library and Information Science

Why is understanding the audience important?

- "The writer frequently takes too much for granted, assuming that merely by speaking his mind he can change the reader's.

- If he fails, however, to utilize available bridges to create new ones, his writing will not be effective.

- Thus it is not enough that bridges exist; they must be used – and therein lies much of the art of rhetoric." From Young, Becker and Pike (1970, 172 cited in Schriver, 1997, 163).

Remember the communication process

Context

Purpose ➲ Writer ➲ **Document** ➲ Reader ➲ Outcome
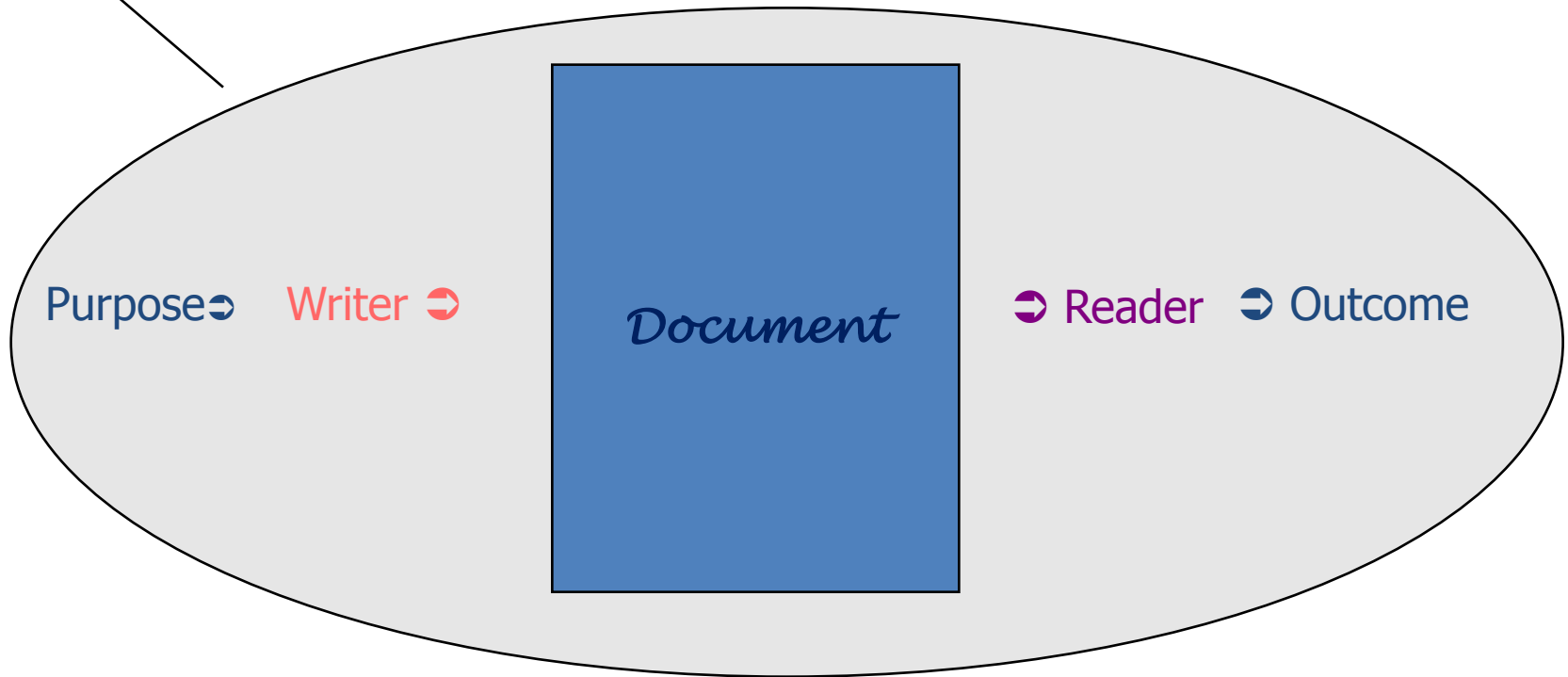
EXHIBIT 11.1 A model of the interaction between readers and documents

User characteristics	User behaviour	Document characteristics
Background characteristics • Intelligence • General knowledge • Cognitive style • Reading level • Social and demographic characteristics: age, gender, education level • Experience with type of document • Existing knowledge of subject area	Perform tasks with document	Text (message or content) Organisation (structure) Syntax Lexicon (language/jargon) Physical characteristics (size, shape, layout, design, colour)

Formulate questions about the document. Develop strategies to navigate, find information within, and make sense of, the document

User's task
• Read
• Fill in
• Sign
• Transfer information

Expectations about document

Specific needs and motivations in regard to document content

Purpose of the document within the organisation or system

Social and physical context of using document

Who are our readers? Questions to consider

- **What key things don't they know?**

- **How great is your readers' technical knowledge or how much relevant background knowledge do they have about the topic of your brochure?**

- **Do your readers have any communication preferences you should take into account?**

- **Where and how will your readers use the document?**

What is the Rhetorical Approach?

- **Karen Schriver (1997) says it is the dominant approach for teaching of professional writing and document design**

- **Originated with Aristotle's "The Rhetoric", a primer on public speaking**

- **Three main dimensions: Ethos, Pathos, Logos**

Ethos

- **Ethos is an appeal based on the character of the speaker.**

- **An ethos-driven document relies on the reputation and credibility of the author.**

- **Spelling mistakes can ruin this appeal.**

Pathos

- **Pathos is an appeal based on emotion. Advertising tends to be pathos-driven. Use of motive appeals such as appealing to the family, loved ones, the community, global peace, sex and money are examples.**

Logos

- **Logos is an appeal based on logic or reason. Documents distributed by companies or corporations are logos-driven, eg company reports. Scholarly documents are also mainly logos-driven.**

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Different reasons people read

… according to Schriver, 1997,171

- **Reading to enjoy** – characterised by the satisfaction that people get by interacting with the text, the pleasure of engaging with the content eg novels, stories, poems, magazines, newspapers

- **Reading to assess** – characterised by the goal of evaluating the relevance or value of the document's content before committing to read it eg marketing/letterbox brochures, business correspondence, reports, catalogues etc

Different reasons people read …

according to Schriver, 1997,171

- **Reading to learn** – characterised by the intention of using a document in order to perform a task eg instruction manuals, forms, employee handbooks, online help, bus schedules, cookbooks

- **Reading to learn to do** – characterised by engaging with the content in order to acquire background knowledge needed in order to do something else eg studying a textbook

Professional analysis of audiences

- **You need to research your audience's needs. Survey, interview, observation.**

- **There may be more than one audience; documents may be filed away to be taken out much later on. Audiences change.**

- **Real audiences vs potential audiences**

Everyday analysis of audiences

- We all try to second guess what our intended audience really requires

- We imagine our audience reading our documents and try to satisfy them

- We guess their informational needs, their preferences for design, their appreciation of our choice of fonts

Ask the readers what they want and how they will use the text

- **How will you use this, what do you want? Do people really know this?**

- **Use open-ended questions**

- **Likert scales**

- **Information preferences – text style, graphics**

- **Show them different styles**

- **Answers not generalisable between different audiences**

Evaluate reader's attitudes

- **Hostile or favourable to your message**

- **Do you need to use strong argument?**

- **Mindset towards the task, the organisation, the message**

- **Avoid a totally expert or alienating tone of voice which may put people off – how will people react to the language you use?**

Preferred communication style

- **Brevity vs detail**

- **Text vs graphics**

- **Drawings vs photographs**

- **Formality vs informality**

- **Often shaped by organisational or corporate culture**

Two methods

- **Brainstorm ideas – work out possible questions, answers, forwards, backwards, contents, index?**

- **Just ask them or ask other professionals in the field.**

- **E.g. Floreak (1989) used a pre-design audience analysis of 25 low literate parents. Used open ended questions, Likert scales and observation to show audience preferences.**

Audience attitudes

- **Need to consider the audience's standpoint**

- **Manuals are the last resort, after frustration and friends fail (RTFM motto)**

- **Is the audience hostile towards the document?**

- **E.g. giving a presentation on a politically insensitive topic**

Audience roles

- **What kinds of roles do audience members adopt?**

- **Decision makers, Advisers, Consultants,Implementers?**

- **Often a person might adopt all these roles**

- **What communication style will suit the reader? Brevity, summaries, fonts, colour, formality?**

Company culture

- **Much of the individual preferences will be shaped by the corporate culture**

- **Locate other company documents – reports, advertising brochures – mimic or depart from this image**

- **UWS's changing image of itself**

- **Changing online opinions of what makes a good website**

REMEMBER

acon

RED RIBBON APPEAL
WORLD AIDS DAY · 1 DECEMBER
www.redribbonday.org.au

UP
YA
BUM

Use condoms with water based lube

acon

Keep it slippery when wet...
plenty of lube can help prevent
condoms from breaking

up
ya
bum,
mate

Use condoms with water based lube

acon

If you're not too drunk to get it up on
Australia Day, you're sober enough
to get a condom on

UP
YA
BUM

Use condoms with water based lube

acon

Carry your own gift wrapping with you
these holidays – condoms are portable!

UP
YA
BUM

acon

Wanna fuck him? Make your animal
urges known: reach for the condoms

Different approaches for different readers – the case of Venus & Mars

Different approaches for different readers – the case of Venus & Mars

Audience
Analysis

"Who are these people anyway?"

Why is it important?

- Audiences are egocentric. (WIIFM?)
- Audiences will judge a speech based on what they already know and believe.
- To be an effective public speaker, you must relate your message to an audience's existing interests/concerns, knowledge, and beliefs.

Stages of Audience Analysis

- Examine the demographic traits of the audience:
  - age
  - gender/sex
  - racial, ethnic, or cultural background
  - religious views
  - group membership
  - occupation, SES, education, intelligence

Second Stage of Audience Analysis

- Examine the features of the audience unique to the situation:
  - consider the size of the audience
  - consider the physical setting
  - consider the audience's disposition toward the:
    - topic
    - speaker (you)
    - occasion

Recap

- Questions to consider about your audience:
    - What is your audience's experience with your topic?
    - What terms and concepts will they probably not understand?
    - What do you need to tell them so that they understand your meaning?
    - What misconceptions might they have?

The Top Six Audience Needs

1. *"We need you to know our demographics."*
2. *"We need you to know where we come from literally and figuratively."*
3. *"We need you to be culturally sensitive."*
4. *"We need to be ethical."*
5. *"We need you to know the logistics of your speaking event."*
6. *"We need a reason to stay awake."*

How You Get More Information

➢ *Verbal communication*

➢ *Talk to a representative*

➢ *Hold focus groups*

➢ *Conduct surveys*

Fallacies

- **Misusing facts**
- **Using stats deceptively**
- **Defective testimony**
- **Ad hominem argument**
- **Post-hoc fallacy**
- **Non-sequitur fallacy**

- **Hasty generalizations**
- **Straw man fallacy**
- **The either-or fallacy**
- **The bandwagon**
- **The slippery slope**
- **The red herring**

- Misusing facts: Changing your facts to support your cause.

- Using statistics deceptively: Skewing your statistics to make them fit your cause.

- Defective testimony: Misconstruing the expertise of the person you're quoting. For example, if you say you've spoken with an "expert" from the Food and Drug Administration, make sure it's not someone in the mail room!

- Ad Hominem Argument: In Latin, "Attack on the man." Attacking the individual instead of the argument. ("Those abortionists are all murderers and are going to hell!"—Although you may believe this, you should not have to tear someone down to give credibility to your case.)

- <u>Post Hoc</u>: Association implies a cause and effect relationship. ("Eating vegetables can prevent cancer. I eat vegetables. Therefore, I won't get cancer."

- <u>Non-Sequitur</u>: In Latin: It does not follow. ("Replace your Ford Explorer AT Wilderness Tires with Goodyear Tires. The seat-belts in the Explorer are bad, too.")

- <u>Hasty Generalization</u>: Stereotyping a group of people based on limited information. ("My grandfather tips poorly in restaurants, therefore all senior citizens tip poorly in restaurants.")

- <u>Straw Man Fallacy:</u> Exaggerating your opponent's position to make it easier to argue. ("Senator Doe won't support a bill for cleaner air. He wants everyone to have lung cancer.")

- <u>Either-Or</u>: Implying that there are only two ways to solve a problem. ("It's either my way or the highway.")

- <u>Bandwagon</u>: The premise that "everybody's doing it" so we should be doing it, too.

- <u>Slippery Slope</u>: Fallacy of catastrophic expectation. ("If this college doesn't get childcare, then mothers won't be able to go to school, get good jobs, or feed their children.")

- <u>Red Herring</u>: Slipping in extraneous information, hoping your opponent won't notice that you've diverted them from the original argument. ("Sorry you're getting an "F" in the course, but, hey, did you see Survivor last week?")

Questions to Ask Yourself

- What devices will I use in the introduction to gain attention and interest of your audience?

- What steps will you take in the introduction to relate the topic to your audience?

- What are the main points, and why are you using these particular main points for this audience?

- What steps have you taken to make your language clear and appropriate to this audience?

- What adjustments will you make in delivery—rate of speech, volume, tone of voice, gestures, etc., to communicate to this audience?