

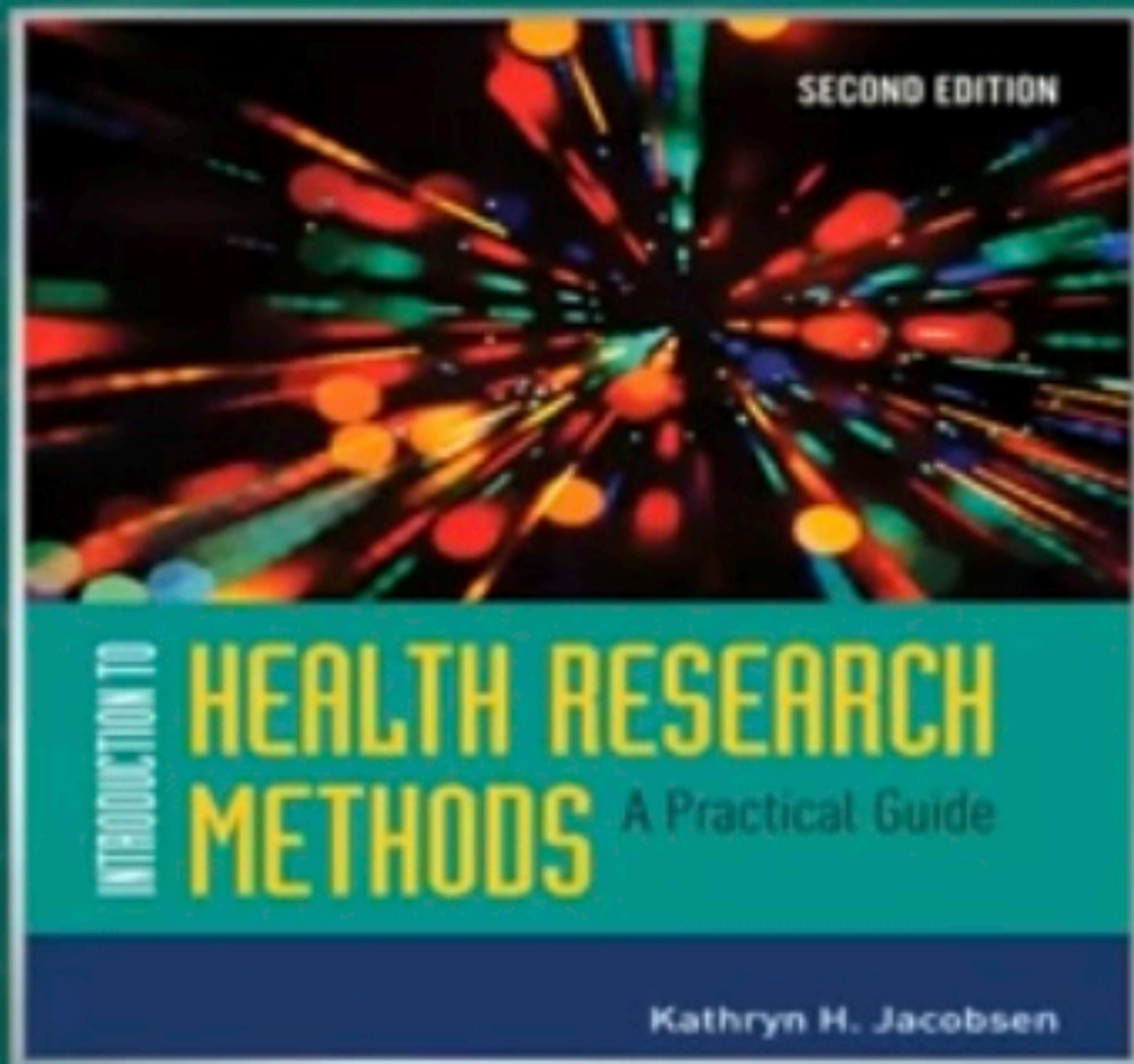
# SCIENTIFIC MEDICAL RESEARCH

## **Week 7**



# Questionnaire Development

## Chapter 18



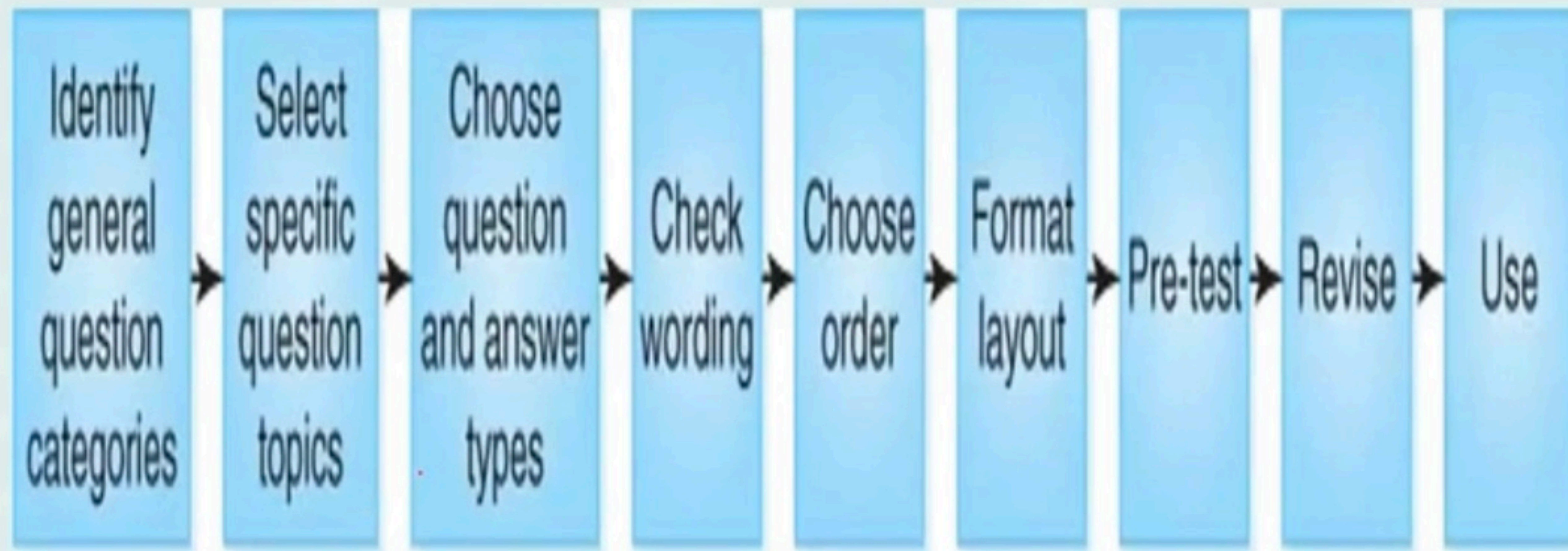


## 18.1 Questionnaire Design Overview

- A ***questionnaire*** (or ***survey instrument***) is a tool for systematically gathering information from study participants.
- Should start with general and specific content.
- Should have logical order
- Formatting should be visually appealing and easy to read.
- Should be pretested.



## Figure 18-1: Questionnaire Design Plan



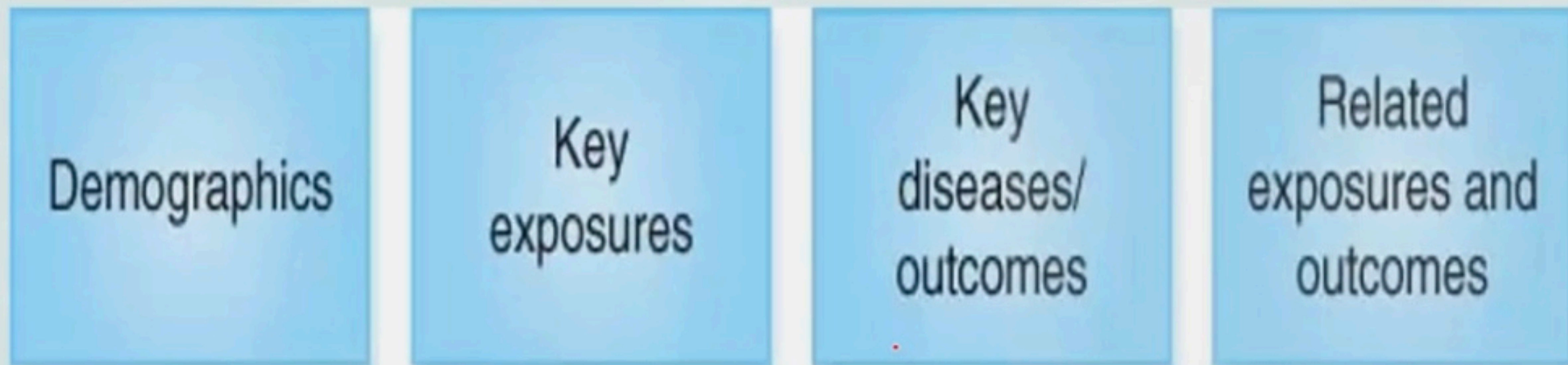


## 18.2 Questionnaire Content

- Start by compiling a list of the topics the survey instrument must cover (Includes EDP).
- Include questions that confirm eligibility to participate, and accurately place participants into key categories (Case/Control, Exposed/Unexposed).
- May include **potential confounders** (factors that might influence the relationships between key Exposures and Outcomes).
- Search literature to identify range of question areas.



## Figure 18-2: Question Areas





## 18.3 Types of Questions

- Decision is based on many conditions including statistical tests
- ***Closed-ended questions*** allow a limited number of possible answers:
  - Date/time
  - Numeric
  - ***Categorical: ordinal*** (ranked) or ***nominal*** (unordered), (Dichotomous if 2 options only).
- ***Open-ended, or free response***, questions allow participants to explain their answers at length.



FIGURE 18-3

Examples of Types of Questions

| Type  | Sample Question  | Sample Response Option for the Sample Question   |
|---|--|--|
| Date  | What is your birth date?   | <div> <div> <div>—</div> <div>—</div> </div> <div> <div>—</div> <div>—</div> </div> <div> <div>—</div> <div>—</div> </div> <div> <div>—</div> <div>—</div> </div> <div> <div>—</div> <div>—</div> </div> <div> <div>—</div> <div>—</div> </div> <div> <div>—</div> <div>—</div> </div> <div> <div>—</div> <div>—</div> </div> </div> <div> <div>m</div> <div>m</div> <div>-</div> <div>d</div> <div>d</div> <div>-</div> <div>y</div> <div>y</div> <div>y</div> <div>y</div> </div>  |
| Numeric   | What is your height without shoes (rounded to the nearest half inch)?  | — — . — inches   |
| Yes/no  | During your lifetime, have you smoked more than 100 cigarettes?  | <input type="checkbox"/> Yes <input type="checkbox"/> No   |
| Categorical/<br>multiple-choice:<br>nominal (no rank) | What is your sex?<br>What is your favorite type of film?   | <input type="checkbox"/> Female <input type="checkbox"/> Male<br><input type="checkbox"/> Action/drama<br><input type="checkbox"/> Comedy/musical<br><input type="checkbox"/> Documentary<br><input type="checkbox"/> Other: _____   |
| Categorical/<br>multiple-choice:<br>ordinal (ranked)  | What is the highest level of education you have completed?<br><br>How much do you agree with this statement?:<br>"No matter how much I exercise, I will not be able to lose weight."<br>On a scale of 1 to 5, with 1 meaning poor and 5 meaning excellent, how would you rate your hearing (without the use of a hearing aid)? | <input type="checkbox"/> Less than high school<br><input type="checkbox"/> High school<br><input type="checkbox"/> Some college but no degree<br><input type="checkbox"/> College/university degree or advanced degree<br><br><input type="checkbox"/> Strongly disagree<br><input type="checkbox"/> Disagree<br><input type="checkbox"/> Neutral<br><input type="checkbox"/> Agree<br><input type="checkbox"/> Strongly agree<br>Poor _____ Excellent<br><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 |
| Paired-comparisons                                    | Do you prefer to drink coffee or tea?  | <input type="checkbox"/> I prefer coffee<br><input type="checkbox"/> I prefer tea<br><input type="checkbox"/> I like coffee and tea equally<br><input type="checkbox"/> I do not drink coffee or tea   |



FIGURE 18-3 (continued)

| Type                         | Sample Question   | Sample Response Option for the Sample Question  |
|------------------------------|---|---|
| Rank-ordering                | List the following four political issues in order from most important to you (1) to least important to you (4): crime/safety, environment/energy, foreign policy/defense, taxes/revenue | Number from 1 (most important) to 4 (least important):<br><input type="checkbox"/> Crime/safety<br><input type="checkbox"/> Environment/energy<br><input type="checkbox"/> Foreign policy/defense<br><input type="checkbox"/> Taxes/revenue |
| Open-ended/<br>free-response | What is your biggest personal health concern at present?  | <input type="text"/><br><input type="text"/>  |



## 18.4 Anonymity

- When anonymity is important, avoid asking questions that could allow the participant's identity to be determined based on his/her responses.
- For many types of studies, there is no need to collect names, contact information, or other identifiable information.



## 18.5 Types of Responses

- Provide clear instructions about the acceptable types of answers for each question.
- Numeric, Categorical, ranked (Likert items)
- Add a response for “Not applicable” when relevant to prevent **information bias**.



**FIGURE 18-4** Examples of Five-Point Responses for Ranked Questions

| <b>Strongly disagree</b> | <b>Disagree</b>       | <b>Neutral</b>                | <b>Agree</b>       | <b>Strongly agree</b> |
|--------------------------|-----------------------|-------------------------------|--------------------|-----------------------|
| Dissatisfied             | Somewhat dissatisfied | Neutral                       | Somewhat satisfied | Satisfied             |
| Very negative            | Somewhat negative     | Neither negative nor positive | Somewhat positive  | Very positive         |
| Poor                     | Fair                  | Good                          | Very good          | Excellent             |
| None                     | Few                   | Some                          | Many               | Very many             |
| Never                    | Rarely                | Sometimes                     | Often              | Always                |
| Not important            | Slightly important    | Somewhat important            | Very important     | Extremely important   |



## 18.6 Wording of Questions

- Check each question and all the response items for clarity and careful wording of responses.



**FIGURE 18-5 Problems to Avoid**

| <b>Problem</b>          | <b>Example</b>  | <b>Problem with the Example</b>  |
|-------------------------|---|--|
| Big words/<br>jargon    | Have you ever had a myocardial infarction?  | Participants may not know that a "myocardial infarction" is a technical term for a heart attack.   |
| Undefined abbreviations | Have you ever been told that you have BPH?  | Participants may not know that BPH is short for benign prostatic hypertrophy or that BPH means an enlarged prostate.   |
| Ambiguous meanings      | What kind of house do you live in?  | Without seeing a list of appropriate responses, it is not clear if the answer should be "an apartment," "a rental," "a split-level duplex," or "a single-family home."   |
| Vagueness               | Do you exercise regularly?  | "Regularly" is not defined. A person who exercises most days of each week might assume that "regularly" means daily and say "no." Another person who exercises once a month may consider that regular. It would be better to ask "In a typical week, how many days do you exercise for at least 30 minutes?" |
| Double negatives        | I did not find this visit with my doctor to be unpleasant.<br><input type="checkbox"/> Disagree<br><input type="checkbox"/> Neutral<br><input type="checkbox"/> Agree | The wording of this question makes it hard to figure out whether a person who was satisfied with a visit should agree or disagree.   |
| Faulty assumptions      | Do your gums bleed during regular dental cleanings?<br><input type="checkbox"/> Yes <input type="checkbox"/> No   | The question assumes that everyone has routine dental cleanings. If "I do not visit the dentist" is not an answer option, a person who does not have dental cleanings is forced to answer no.  |



**FIGURE 18-5** Problems to Avoid (continued)

| <b>Problem</b>                  | <b>Example</b>   | <b>Problem with the Example</b>  |
|---------------------------------|--|--|
| Two-in-one                      | Do you exercise at least 3 times a week and eat a healthy diet?<br><input type="checkbox"/> Yes <input type="checkbox"/> No    | Combines two separate questions: one for exercise and one for diet.  |
| Impossible to recall accurately | How many servings of carrots did you eat most weeks when you were a child?   | Adults will not be able to remember this level of detail about their childhood diets.  |
| Too much detail                 | List any prescription medications you have taken for 1 month or longer in the past 10 years.                                   | Unless the respondent has had very few prescriptions, answering this question is impossible without looking up medical records.  |
| Sensitive questions             | Have you ever hit, scratched, bruised, or otherwise physically injured an intimate partner?                                    | This question is unlikely to be answered truthfully if the response should be yes, and it may raise concerns about confidentiality and potential legal requirements for reporting abuse.                               |
| Hypothetical questions          | Have you ever thought that you would like to lose 10 or more pounds?   | Anyone could have felt this at some point in time, but the question does not clarify whether this is a long-term longing or a thought that crossed the respondent's mind for the first time upon reading the question. |
| Leading questions               | What is your impression of the quality of work done by the dedicated public servants who work at the county health department? | This question clearly intends to lead respondents toward a positive answer (and may unintentionally have the opposite effect).   |



**FIGURE 18-5** (continued)

| <b>Problem</b>             | <b>Example</b>  | <b>Problem with the Example</b>   |
|----------------------------|---|---|
| Leading answers            | What is your impression about the quality of services provided by Center City Hospital?<br><input type="checkbox"/> Fair <input type="checkbox"/> Good<br><input type="checkbox"/> Great <input type="checkbox"/> Excellent | This question's response options clearly are intended to lead to a positive response; there is no "poor" option.  |
| Answers with a poor scale  | How many hours a week do you watch television?<br><input type="checkbox"/> 0 <input type="checkbox"/> 1–3 <input type="checkbox"/> 4–7<br><input type="checkbox"/> 8 or more  | Even though most people watch more than 1 hour of television daily, which would put them in the "8 or more" response category, they may not want to choose an "extreme" answer. Their inaccurate responses will lead to a false report. Alternatively, these response options may cause respondents to misread the question as how many hours a <i>day</i> they watch television. |
| Lack of specificity        | What is your income?  | It is not clear if income refers to earnings per hour, week, month, or year, or whether it refers to pre- or post-tax income.   |
| Missing answer options     | What color are your eyes?<br><input type="checkbox"/> Brown <input type="checkbox"/> Blue   | Many possible eye colors are missing.   |
| Overlapping answer options | In a typical week, how many days do you eat fish?<br><input type="checkbox"/> 0 <input type="checkbox"/> 1–3<br><input type="checkbox"/> 3–5 <input type="checkbox"/> 5–7   | Participants who eat fish 3 days a week or 5 days a week will not know which response to select.  |



## 18.7 Order of Questions

- Start with easy questions before moving to more difficult or sensitive questions.
- Avoid **habituation**: occurs when respondents have given the same answer to so many questions (agree...agree...agree...) that they continue to reply with the same response (to avoid, mix up questions).



## 18.8 Layout & Formatting

- Organized, Easy to read, and easy to record answers.
- Use readable & large fonts, and include adequate white space.
- Provide instructions.



**FIGURE 18-6** Example of a Self-Response Questionnaire

### Basic Information

---

1. What is today's date?

— — - — — - — — — —  
m m d d y y y y

2. What is your date of birth?

— — - — — - — — — —  
m m d d y y y y

3. What is your sex?

☐ Female ☐ Male ☐ \_\_\_\_\_

Health History (*Check one answer box for each question.*)

4. Have you ever been  
diagnosed with breast  
cancer?

☐ Yes ☐ No

→ If **No**, then skip  
to Question 8.

5. Have you had a mastectomy  
(either partial or complete)?

☐ Yes ☐ No



## FIGURE 18-7 Example of a Telephone Interview Script

Fill in today's date.

— — - — — - — — — —  
m m d d y y y y

Read: *Thank you for agreeing to participate in this health study.*  
I'm going to start by asking you some basic questions.

1. What is your date of birth? — — - — — - — — — — ☐ Refused to answer  
m m d d y y y y
2. What is your sex: female or male? ☐ Female ☐ Male ☐ Other: \_\_\_\_\_

Read: *Now I'm going to ask you a few questions about your medical history.*

3. Have you ever been diagnosed with breast cancer? ☐ Yes ☐ No → If **No**, then skip to Question 7.
4. Have you had a mastectomy (either partial or complete)? ☐ Yes ☐ No ☐ Refused to answer



## 18.9 Reliability & Validity (1 of 2)

- ***Reliability/precision***: consistent answers are given to similar questions
  - Look for internal consistency (Cronbach's alpha, KR-20) and test-retest reliability (All expressed as a number between 0-1).
- ***Validity/accuracy***: the responses or measurements are correct

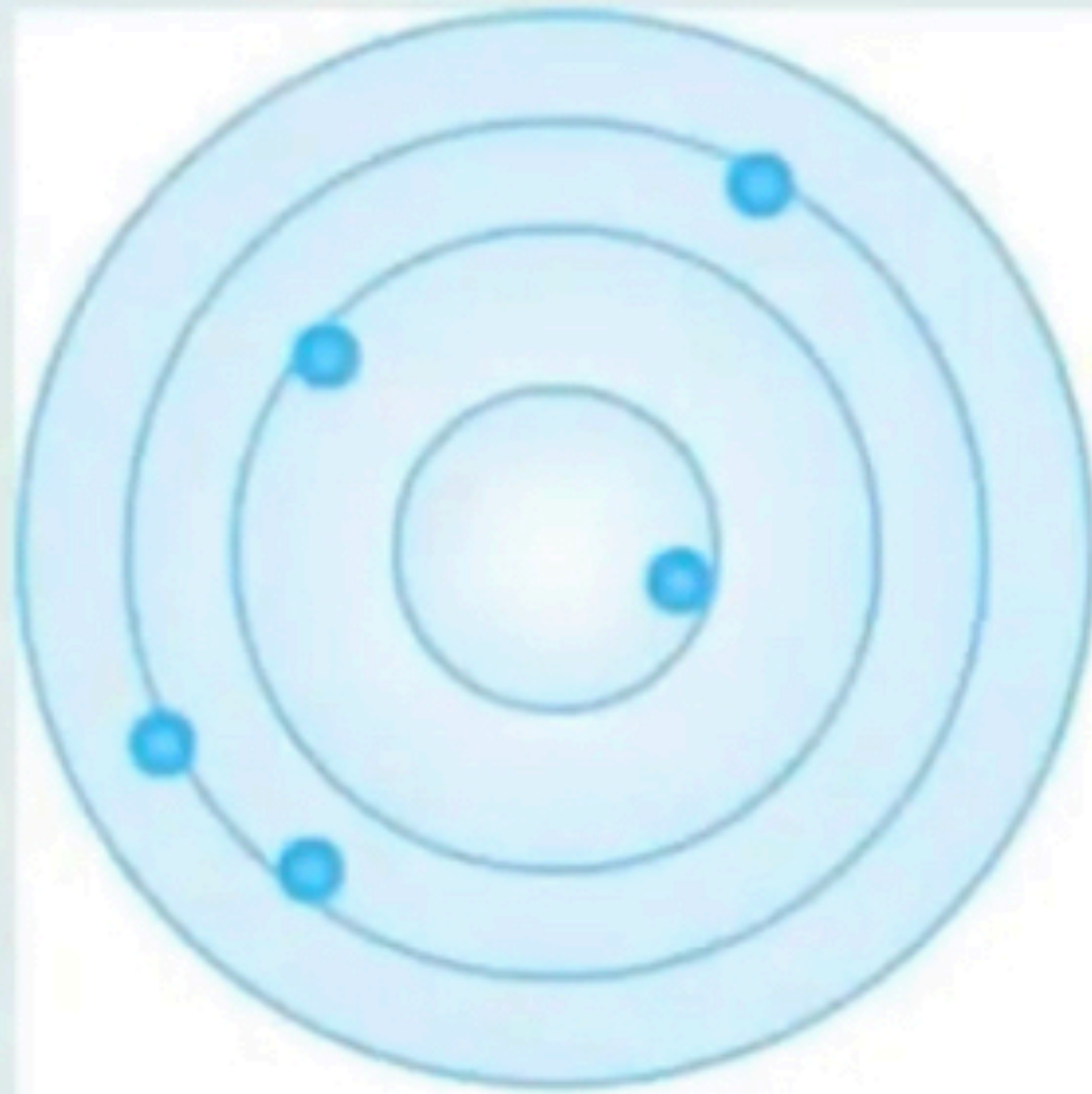


## 18.9 Reliability & Validity (2 of 2)

- ***Content (logical) validity***: Subject matter experts agree that the questionnaire captures the most relevant details about the study domain.
- ***Face validity***: content experts and users agree that a survey instrument will be easy for study participants to understand and correctly complete.
- ***Construct validity***: The test measures the theoretical construct it intended to assess.
- ***Criterion (concrete) validity***: A new test yields results similar to a standard test for a similar theoretical construct (Concurrent vs. Predictive).



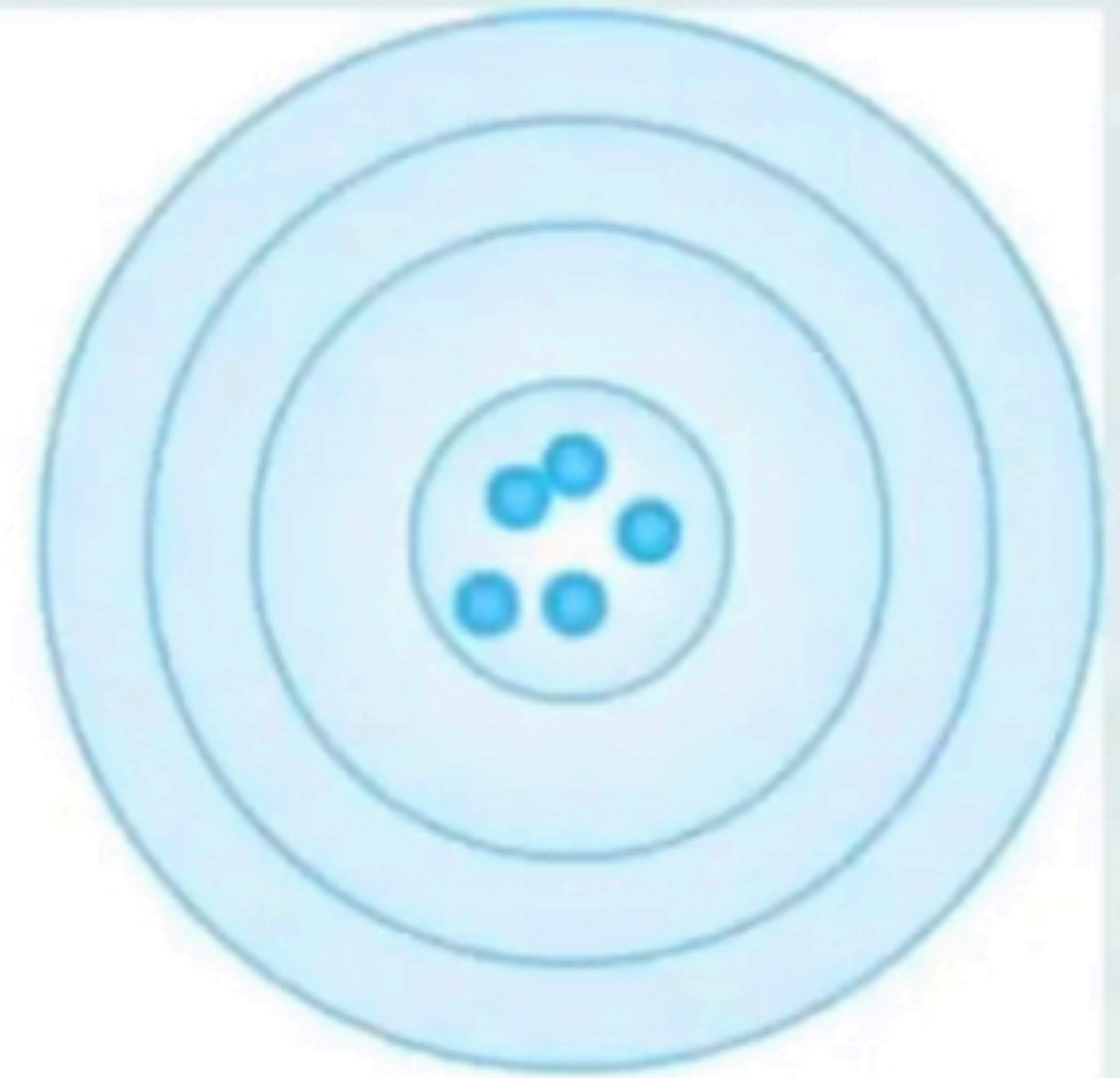
## Figure 18-8: Reliability & Validity



Neither reliable (precise)  
nor valid (accurate)



Reliable (precise) but  
not valid (accurate)



Both reliable (precise)  
and valid (accurate)



## 18.10 Commercial Research Tools

- Already-validated survey instruments may be useful for incorporation into a new study.
- These may be free OR need to be purchased.



## 18.11 Translation

- ***Back translation (double translation)*** ensures that the meanings of the original survey are maintained in the translated version.
- Another way is to have 2 independent translators



## 18.12 Pilot Testing

- A ***pilot test (or pretest)*** allows the researcher to correct problems with the survey instrument prior to data collection from participants including clarity, order, willingness to participate, responses given, and time.



**The End  
Good Luck**