# Chapter 6 Review Questions

1. Designing a research study involves making tradeoffs. What 5 factors, other than validity, should you consider before choosing a measure?
2. Pick the type of measure that would be best given the concern.

Type of Measure Concern/Problem

* 1. Self-report measure \_\_ observer bias
  2. Observer ratings \_\_ subject bias

1. Pick the type of measure that would be best given the concern.

Type of Measure Concern/Problem

* 1. Unobtrusive \_\_ subject bias
  2. Rating scale \_\_ Need sensitive measure
  3. Magnitude estimation \_\_ Need to make ratio statements

1. What is the difference between sensitivity and scales of measurement?
2. Why do we value sensitivity, and how can we maximize it?
3. List the scales of measurement in order from the lowest scale of measurement to the highest.
4. Match the type of data to the measure or question
   1. Nominal data \_\_\_ Ranking
   2. Ordinal data \_\_\_ Rating scale
   3. Interval data \_\_\_ Magnitude estimation
   4. Ratio scale data \_\_\_ Gender
5. Give an example of a measure or question that would produce
   1. Nominal data \_\_\_ ordering
   2. Ordinal data \_\_\_ equal intervals
   3. Interval data \_\_\_ True zero
   4. Ratio scale data \_\_\_ Classifying, categorizing, putting people into types
6. Explain how heart beats per minute could provide ratio scale data if you were interested in heart rate but only ordinal data if you were using heart rate to measure psychological arousal.
7. Match the research question to the lowest scale of measurement needed to answer the question:
   1. Are seniors more likely to experience a different type of love than first year students?
   2. Is drug A more effective than drug B?
   3. Is drug A twice as effective as drug B?
   4. Is the effect of drug A different from the effect of drug B?
   5. What is the functional relationship between amount of drug A given and its effect?
   6. Does drug A help people who are mildly depressed more than it helps people with moderate depression?
   7. Is drug A helpful for introverts but harmful for extraverts?
8. What is face validity? What is the difference between construct validity and face validity? How could face validity harm construct validity?

# Answers to Chapter 6 Review Questions

**Question 1:** Designing a research study involves making tradeoffs. What 5 factors, other than validity, should you consider before choosing a measure?

In addition to validity, you should consider:

1. sensitivity,
2. scales of measurement (scales of measurement and sensitivity are two different things. To review the difference between them, see the answer to question 4),
3. ethics,
4. practical concerns (cost of the measure, acceptance of the measure by the people you hope will use your research), and
5. the measure’s susceptibility to bias.

**Question 2:** Pick the type of measure that would be best given the concern.

Type of Measure Concern/Problem

* 1. Self-report measure \_a\_ observer bias
  2. Observer ratings \_b\_ subject bias

**Question 3:** Pick the type of measure that would be best given the concern.

Type of Measure Concern/Problem

* + 1. Unobtrusive \_a\_ subject bias
    2. Rating scale \_b\_ Need sensitive measure
    3. Magnitude estimation \_c\_ Need to make ratio statements

**Question 4:** What is the difference between sensitivity and scales of measurement?

The sensitivity of a measure affects your ability to detect differences: The more sensitive the measure, the smaller differences you can detect.

The higher the scale of measurement, the more you can say about what a significant difference between group means indicates.

If you have nominal data, the only thing you can say about that difference is that

1. the groups are different;

If you have ordinal data, you can say that

1. the groups are different and
2. the group with the higher score has more of the quality than the group with the lower score;

If you have (equal) interval data, you can say that

1. the groups are different,
2. the group with higher score has more of the quality than the group with the lower score, and
3. you can say how much more of the quality one group has than the other;

If you have ratio data, you can say that the groups

1. are different,
2. that the group with higher score has more of the quality than the group with the lower score,
3. you can say how much more of the quality one group has than the other, and
4. you can say how many times more of the quality one group has than the other.

**Question 5:** Why do we value sensitivity, and how can we maximize it?

Sensitivity is the ability to detect small differences. We are interested in being able to detect small differences because (1) people are affected by many variables, so the effect of any single variable will often be small; (2) small differences can be extremely important; and (3) failing to find a difference means the results are inconclusive (remember, the null hypothesis can’t be proven because the failure to find an effect may reflect a lack of power rather than a lack of an effect).

We can maximize sensitivity by maximizing reliability (random error is like fog that prevents us from finding differences, so reducing random error lets us find differences), maximizing validity, making sure our measure allows participants to get a wide range of scores (often by adding scale points or adding questions), and by trying to measure the construct as directly as possible.

**Question 6:** List the scales of measurement in order from the lowest scale of measurement to the highest.

Ordering the scales of measurement from the least informative to the most informative, remember (**NOIR**): **N**ominal, **O**rdinal, **I**nterval, **R**atio. For more details, see the answer to Question **4.**

**Question 7:** Match the type of data to the measure or question.

* 1. Nominal data \_b\_\_ Ranking
  2. Ordinal data \_c\_\_ Rating scale
  3. Interval data \_d\_\_ Magnitude estimation
  4. Ratio scale data \_a\_\_ Gender

**Question 8:** Match the type of data to the characteristic or goal of that type of data

* 1. Nominal data \_\_b\_ ordering
  2. Ordinal data \_\_c\_ equal intervals
  3. Interval data \_\_d\_ True zero
  4. Ratio scale data \_\_a\_ Classifying, categorizing, putting people into types

**Question 9:** Explain how (heart) beats per minute could provide ratio scale data if you were interested in heart rate but perhaps only ordinal data if you were using heart rate to measure psychological arousal.

If you are interested in heart rate for its own sake, beats per minute could be a ratio scale measure. There is an absolute 0 –no heart beats, and 120 beats per minute is 2X as fast as 60 beats per minute.

If, however, you are using heart rate as an indicator of psychological arousal, you do not have a ratio scale. It would be a stretch to make a ratio statement like claiming that someone with a heart rate of 120 was 2X as excited as someone with a heart rate of 60. It would even be a stretch to claim that you have the equal intervals that an interval scale requires. For example, it would be hard to justify saying that an increase of heart rate from 70 to 80 is the same increase in psychological arousal as an increase in heart rate from 160 to 170. Probably the safest thing to say is that you have an ordinal scale: higher heart rates represent higher levels of psychological arousal.

**Question 10:** Match the research question to the lowest scale of measurement needed to answer the question:

* 1. Are seniors more likely to experience a different ***type*** of love than first year students? **Nominal**
  2. Is drug A more effective than drug B? **Ordinal**
  3. Is drug A twice as effective as drug B? **Ratio (ratio of 2-1)**
  4. Is the effect of drug A different from the effect of drug B? **Nominal**
  5. What is the functional relationship between amount of drug A given and its effect? **Interval (need to know how much of an effect different treatment levels produce)**
  6. Does drug A help people who are mildly depressed more than it helps people with moderate depression? **Interval because you are comparing a change at one part of the scale (e.g., from 7 to 5) with a change at a different part of the scale (e.g., from 20 to 19) and saying that the difference between 5 and 7 is greater psychologically than the difference between 19 and 20. That is, you are assuming that you have equal intervals: the psychological difference between a score and the next highest score—such as a 5 and 6 or a 19 and a 20 is the same throughout the scale. To take an analogy, if you are saying that someone who ran from 5th Street to 7th Street ran farther than someone who ran from 19th Street to 20th, you could be wrong if the blocks are not all equally long.**
  7. Is drug A helpful for introverts but harmful for extraverts? **Ordinal**

**Question 11:** What is face validity? What is the difference between construct validity and face validity? How could face validity harm construct validity?

Face validity is whether the measure looks, on the surface, to be valid. It is superficial—it is like judging a book by its cover or a person by their face. Whereas the average person might use face validity to unscientifically decide that a measure is valid (e.g., the question in face validity is: “Does it look valid to me?”), the scientist, as discussed in Chapter 5, makes the case for construct validity using a variety of scientific approaches, such as

1. establishing that the measure does more than just measure random error (by looking at the measure’s reliability)
2. establishing that the measure correlates with other measures and indicators of that construct (convergent validity)
3. establishing that the measure’s items seem to be measuring the same thing (by calculating a measure of internal consistency)
4. making the case that the measure has enough items that cover the relevant aspects of the construct (content validity)
5. making the case that the measure is not measuring (a) a different, unrelated construct (by showing that it does not correlate with measures of unrelated constructs and does not correlate too strongly with measures of related constructs (discriminant validity)

Face validity could harm construct validity because it may make the measure more vulnerable to self-report biases. For example, high face validity means that participants would know what the measure was measuring and thus could shade their responses to either impress the researcher or to support the researcher’s hypothesis.