

# Construction and Evaluation of Multi-item Scales

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***RCMAR/EXPORT***

September 15, 2008, 3-4pm

<http://www.chime.ucla.edu/measurement/measurement.htm>

<http://www.ispor.org/TaskForces/PROInstrumentsUse.asp>

Developing a new PRO instrument is a labor and time intensive task.

Use of existing instruments is generally preferable to developing a new instrument or modifying an instrument.

If a PRO instrument is modified, additional validation studies may be needed to confirm the adequacy of the modified instrument's measurement properties. The extent of additional validation recommended depends on the type of modification made.

The FDA intends to consider a modified instrument as a different instrument from the original and will consider measurement properties to be version-specific.

<http://www.fda.gov/cder/guidance/6910dft.htm>

# End goal is measure that is “Psychometrically Sound”

- Same people get same scores
- Different people get different scores and differ in the way you expect
- Measure works the same way for different groups (age, gender, race/ethnicity)
- Measure is practical

# Item-scale correlation matrix

	<u>Depress</u>	<u>Anxiety</u>	<u>Anger</u>
Item #1	0.50*	0.50	0.50
Item #2	0.50*	0.50	0.50
Item #3	0.50*	0.50	0.50
Item #4	0.50	0.50*	0.50
Item #5	0.50	0.50*	0.50
Item #6	0.50	0.50*	0.50
Item #7	0.50	0.50	0.50*
Item #8	0.50	0.50	0.50*
Item #9	0.50	0.50	0.50*



\*Item-scale correlation, corrected for overlap.

# Item-scale correlation matrix

	<u>Depress</u>	<u>Anxiety</u>	<u>Anger</u>
Item #1	0.80*	0.20	0.20
Item #2	0.80*	0.20	0.20
Item #3	0.80*	0.20	0.20
Item #4	0.20	0.80*	0.20
Item #5	0.20	0.80*	0.20
Item #6	0.20	0.80*	0.20
Item #7	0.20	0.20	0.80*
Item #8	0.20	0.20	0.80*
Item #9	0.20	0.20	0.80*



\*Item-scale correlation, corrected for overlap.

# Construct validity

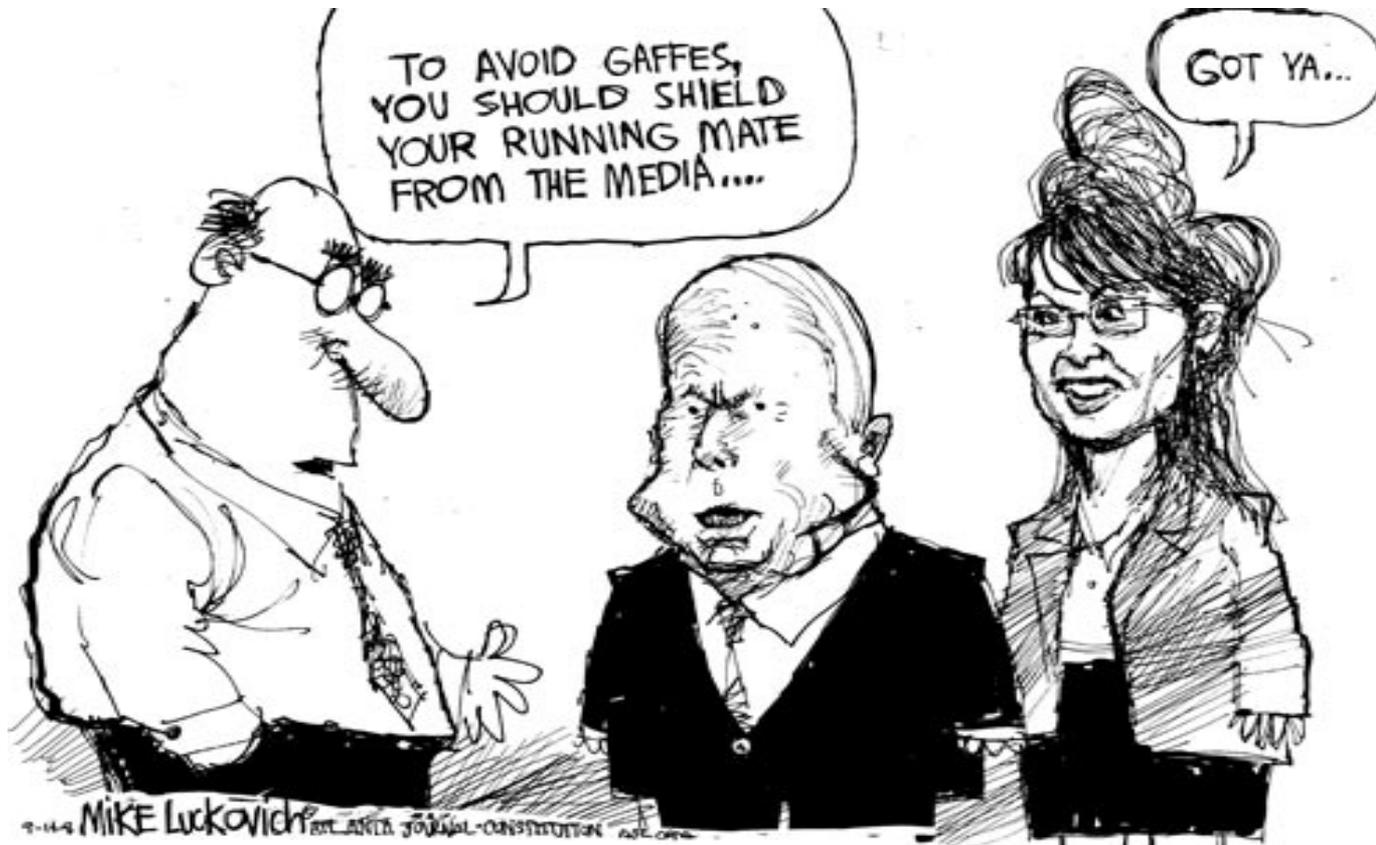
- Requires prior hypotheses about direction and size of associations of measure with other variables, e.g.,
  - *Physical functioning will be negatively associated with age and the association will be of medium size.*

<b>Correlation</b>	<b>Negative</b>	<b>Positive</b>
Small	-0.3 to -0.1	0.1 to 0.3
Medium	-0.5 to -0.3	0.3 to 0.5
Large	-1.0 to -0.5	0.5 to 1.0

# Documenting content validity

- + Chronology of all item development activities
- + Protocols for qualitative interviews, focus groups, cognitive interviews and other research used to identify concepts, generate items, or revise an existing instrument, including training of interviewers
- + Development of response options, modes of administration and scoring
- + Size, characteristics, location, and (if requested) transcripts of each qualitative interview and focus group
- + Documentation on how saturation was achieved (i.e. no new information was obtained from additional qualitative interviews or focus groups)
- + Description of any pilot test, including cognitive interviewing, cognitive interview transcripts (if requested)
- + Versions of the instrument at various milestones of development
- + Item tracking table that list the source of each item in the final instrument, and how it changed during development
- + A summary statement of qualitative research in support of content validity of the PRO instrument

# 30 Second Break



First law of survey development:  
Do not attempt it at home



# Second law: Know thy respondent



# Third law: Practice before you play

“Cut and try, see how it looks and sounds, see how people react to it, and then cut again, and try again” *Converse & Presser (1986, p. 78)*

Identify problems with

- Comprehension of items (stem/response options)
- Retrieval of information
- Skip patterns
- Response burden

# Fourth law: Keep it simple and short



Use only as many words, items and response options as needed



# Survey Instructions

Thank you for taking the time to fill out this survey. The purpose of this survey is to learn about your experiences as a cancer patient. The information you provide is very important. It will help to improve cancer services for other patients.

Many of the questions ask about your experiences at your “**Cancer Center.**” A Cancer Center refers to the hospital, center, or institute where you receive most of your cancer care. A Cancer Center also refers to the doctors, nurses, and other health care professionals who work with the hospital, center, or institute. In some places, the Cancer Center is all in one building. In other places the doctors, nurses, and other health care professionals who work with the Cancer Center are in different locations.

Many of the questions ask about your “**Cancer Care Team.**” A cancer care team refers to the doctors, nurses, and other health care professionals who provide your cancer care. Your cancer care team might also include social workers, counselors, patient navigators and others who help with your cancer care.

You may feel that some questions are easier to answer and some are harder to answer. Please remember that there are no right or wrong answers! We want to know about your experiences, both good and bad. If you truly do not know the answer to a question, then it is okay to check the box that says “Don’t know.”

# Modified

The purpose of this survey is to learn about your experiences as a cancer patient, both good and bad.

Some of the questions ask about your **“Cancer Center”** and others ask about your **“Cancer Care Team.”**

A Cancer Center is the hospital, center, or institute where you receive most of your cancer care and includes all the health care professionals who work there.

A Cancer Care Team refers to the doctors, nurses, and other health care professionals (social workers, counselors, patient navigators, etc.) who help provide your cancer care.

# Item stem

**During the PAST MONTH, how often have you had trouble sleeping because you...**

**Cannot get to sleep within 30 minutes?**

**Wake up in the middle of the night or early morning?**

**Have to get up to use the bathroom?**

Use a recall period that is as short as possible, but long enough

- Now
- Last 24 hours
- Last 4 weeks versus last month
- Last 6 months
- Last 12 months

# Response options

- None of the time
- A little of the time
- Some of the time
- Most of the time
- All of the time



**A good bit of the time**

# 3-5 response options is enough

Strongly correlated with items when administered using more responses options

Miller, D. G. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. Psychology Review, 2, 81-96.

# Fifth law: Believe the survey respondent, but only so much





**87% OF THE 56% WHO COMPLETED MORE THAN 23% OF THE SURVEY THOUGHT IT WAS A WASTE OF TIME**

# Cognitive interview probe

- *Questions 20 and 21 were similar (read both questions again).*
- *Which answer choices were easiest for you? **Never to always** or **Poor to Excellent**?*
- *Why?*
- *Do you think these two questions measure the same thing?*

# The “age of item response theory”

- Unlimited number of items in the bank
- Different items administered to different people (tailored) 
- Evaluation of how well each person fits the underlying model

# Item characteristic Curves (ICCs)

Models, in probabilistic terms, the relationship between a person's level on the underlying construct and his/her response to a question.

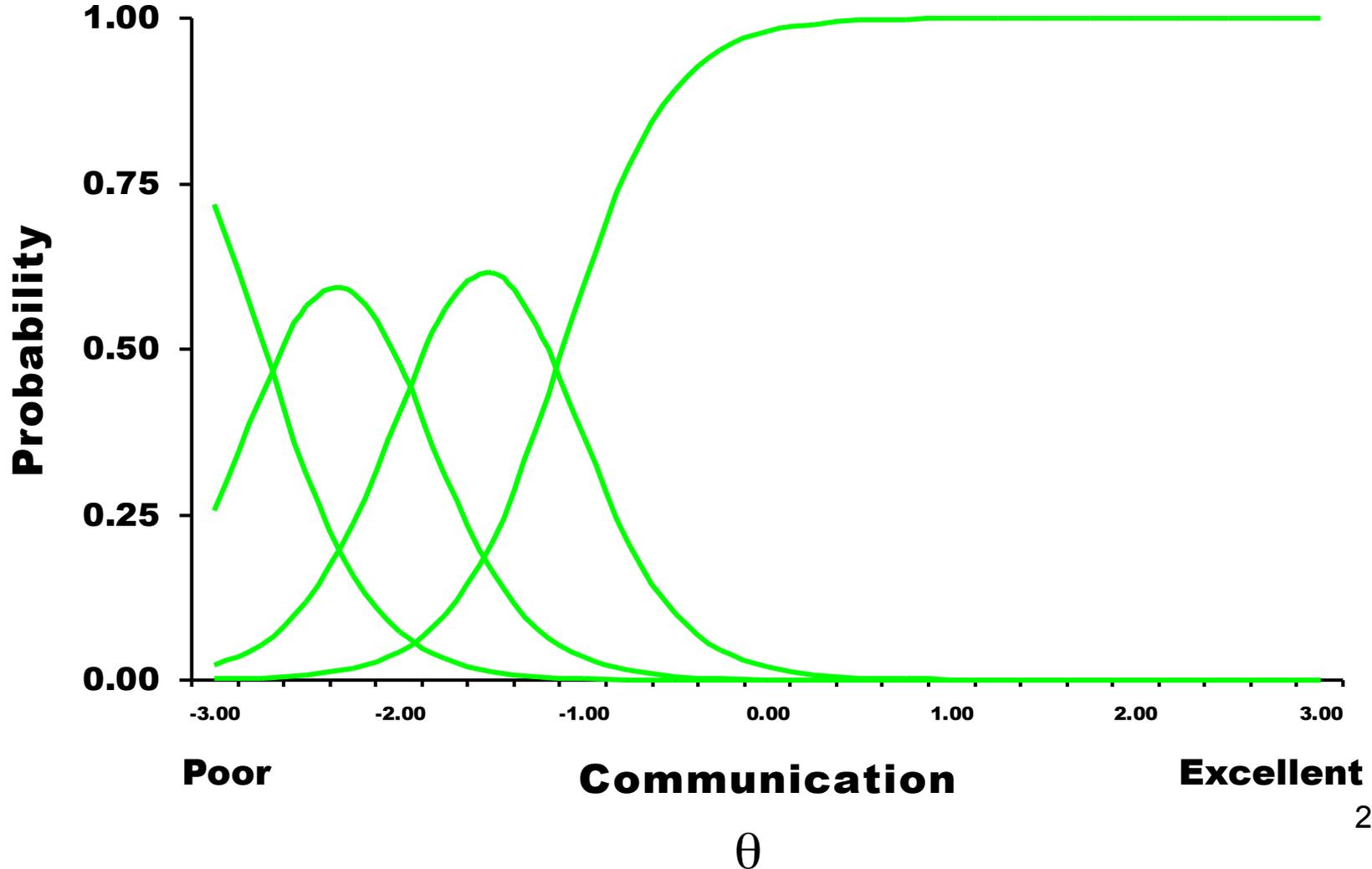
{Thanks to Bryce Reeve for IRT analyses summarized in the next set of slides.}

# ICCs tell us for each item

- The appropriate number of response categories
- Where the person needs to be located on the underlying construct to endorse each response category

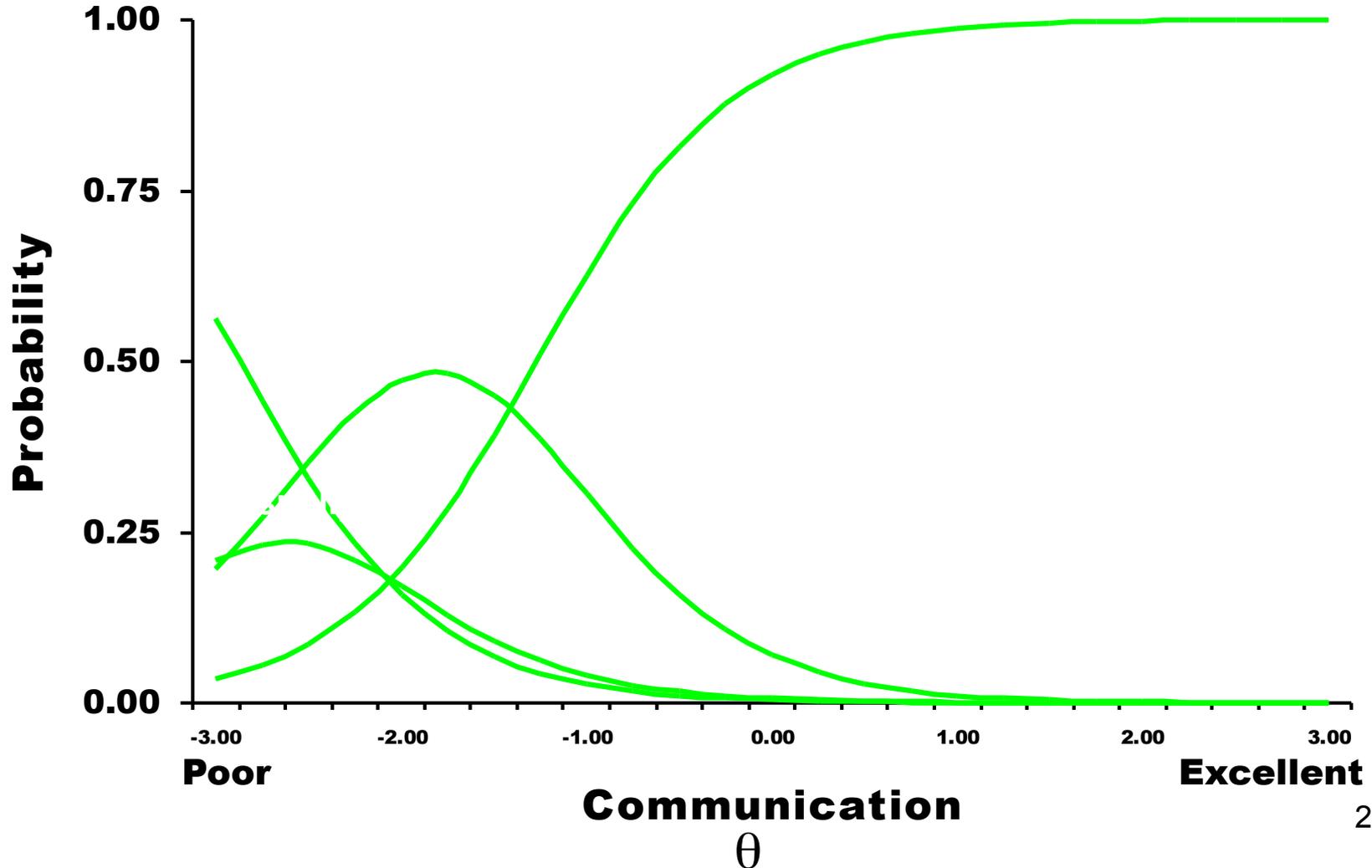
# CAHPS Item

**B16. ...your follow-up care doctor listen carefully to you?**

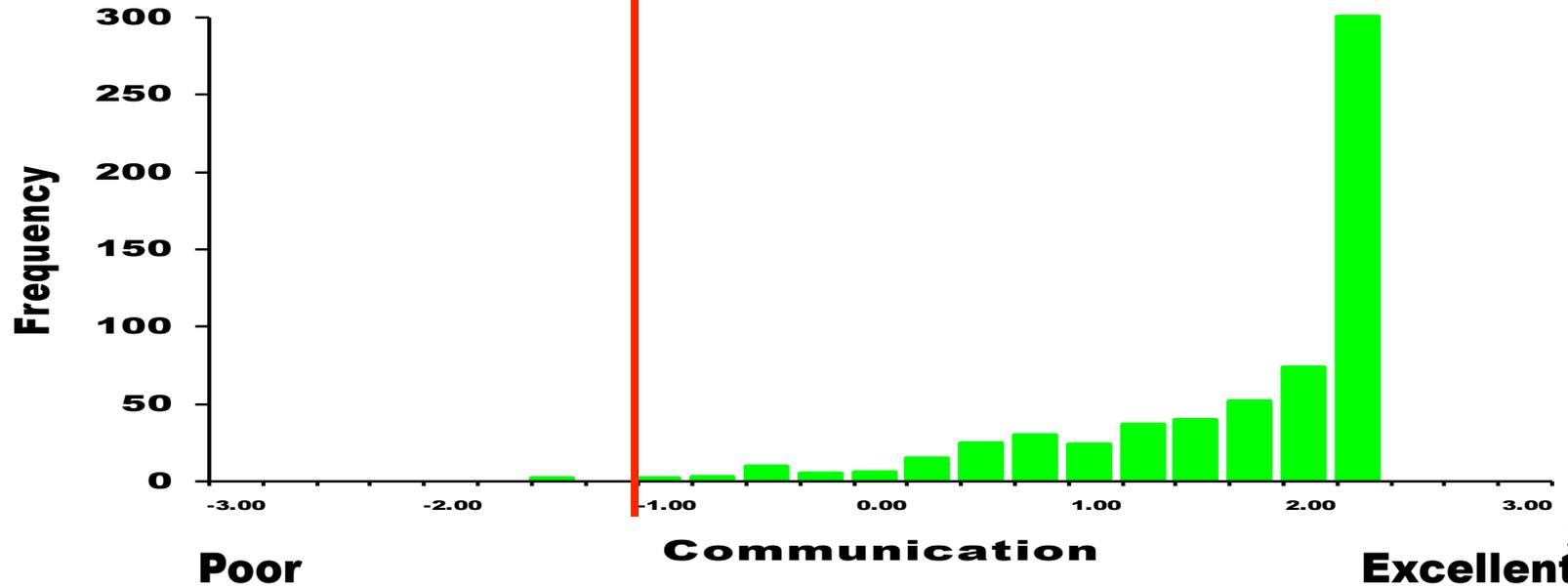
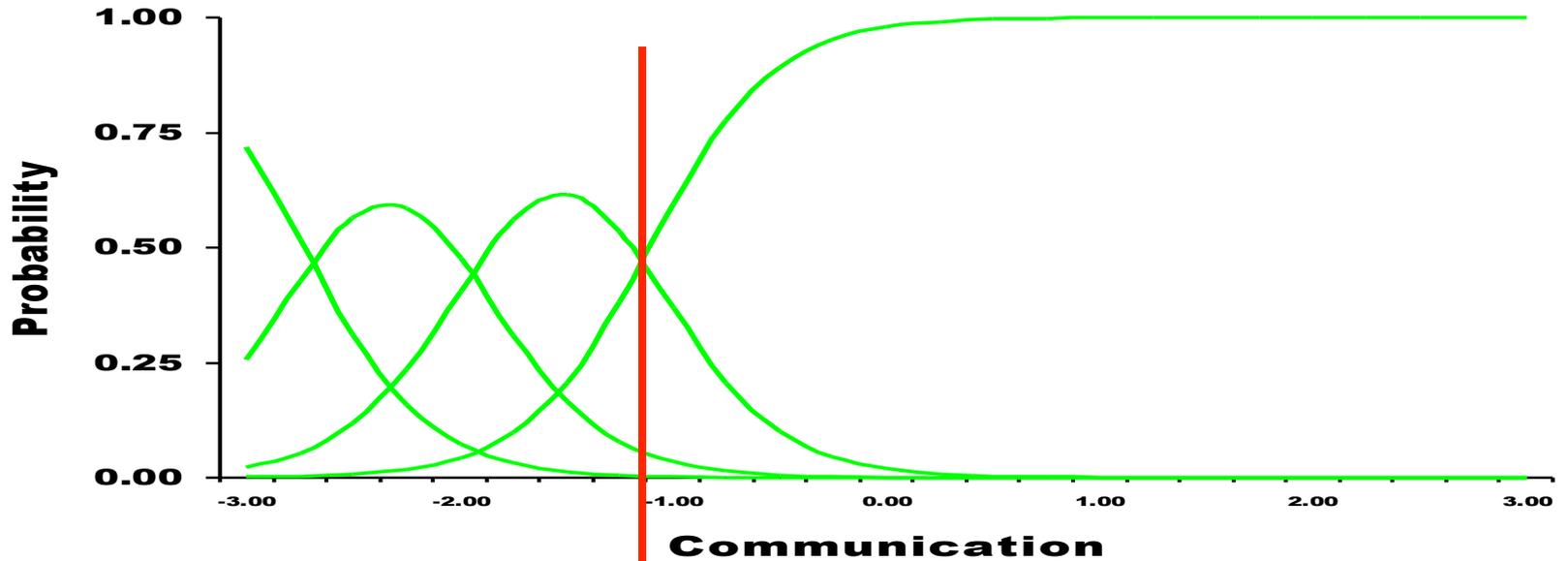


# New Item

**B25. ...you leave your follow-up care doctor's office or clinic with unanswered questions related to your cancer?**



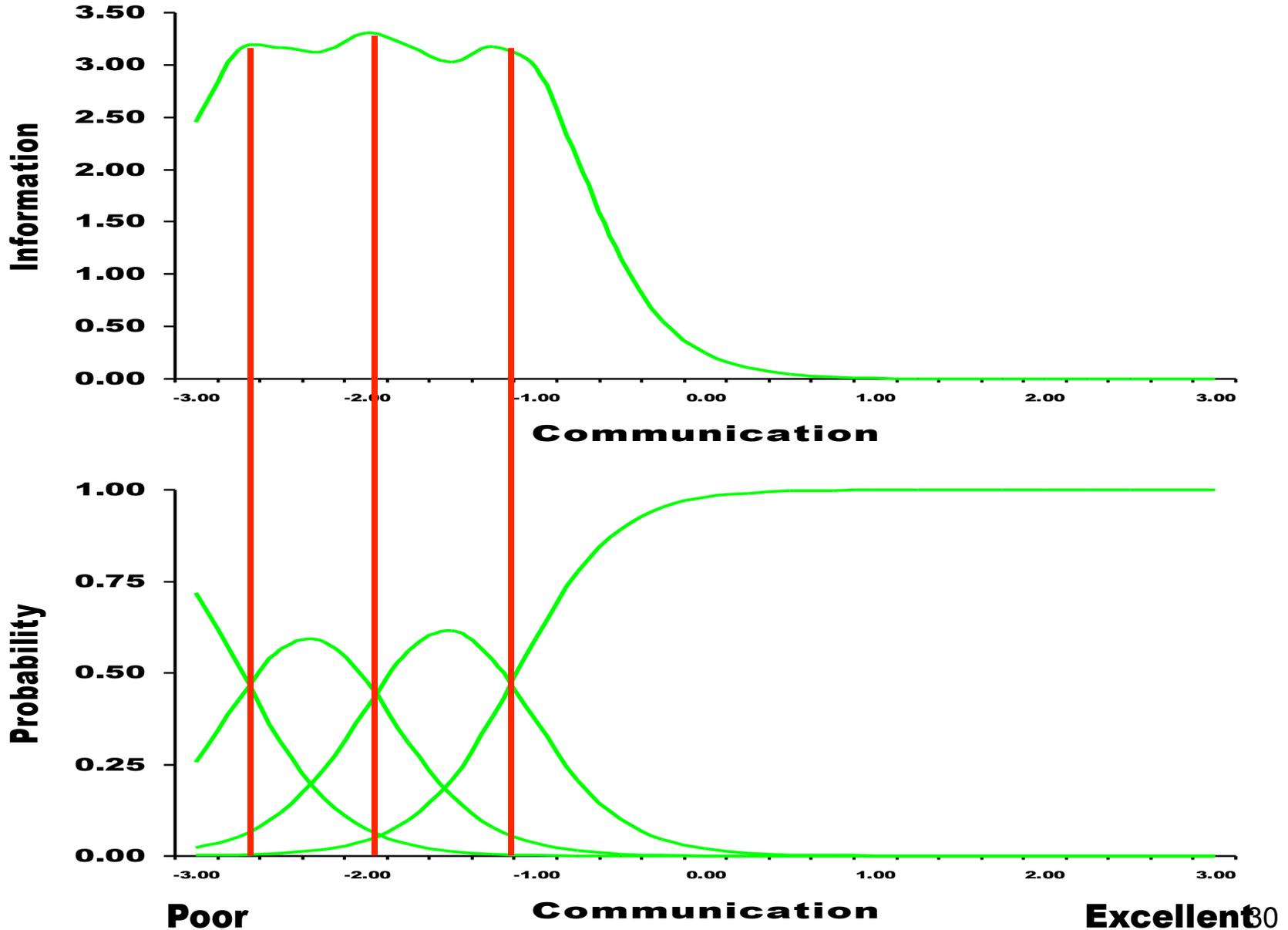
# B16\* ...your follow-up care doctor listen carefully to you?



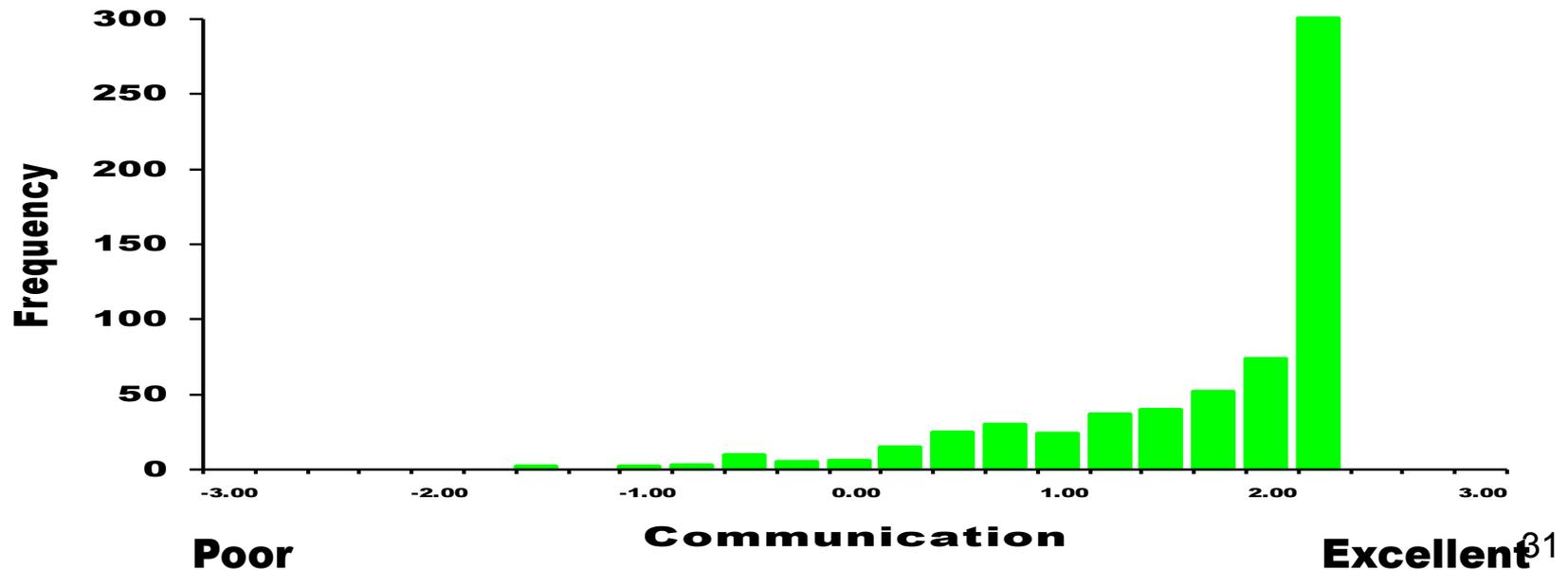
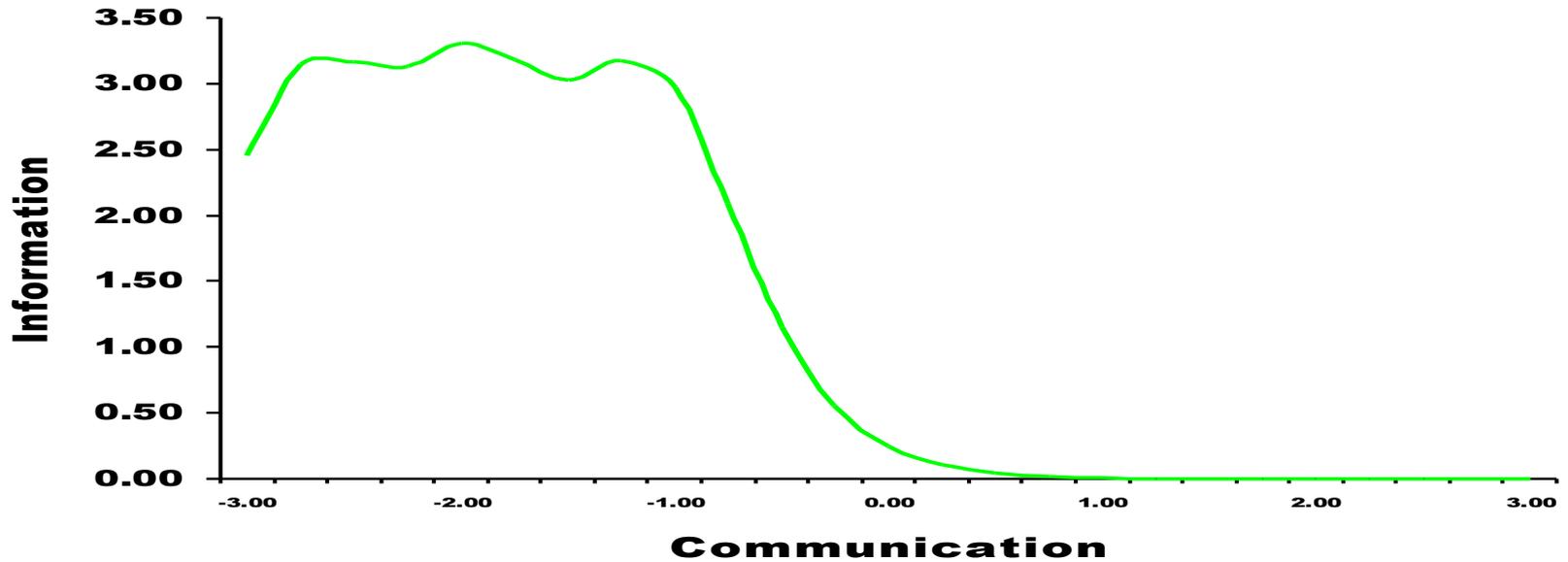
# Information curves

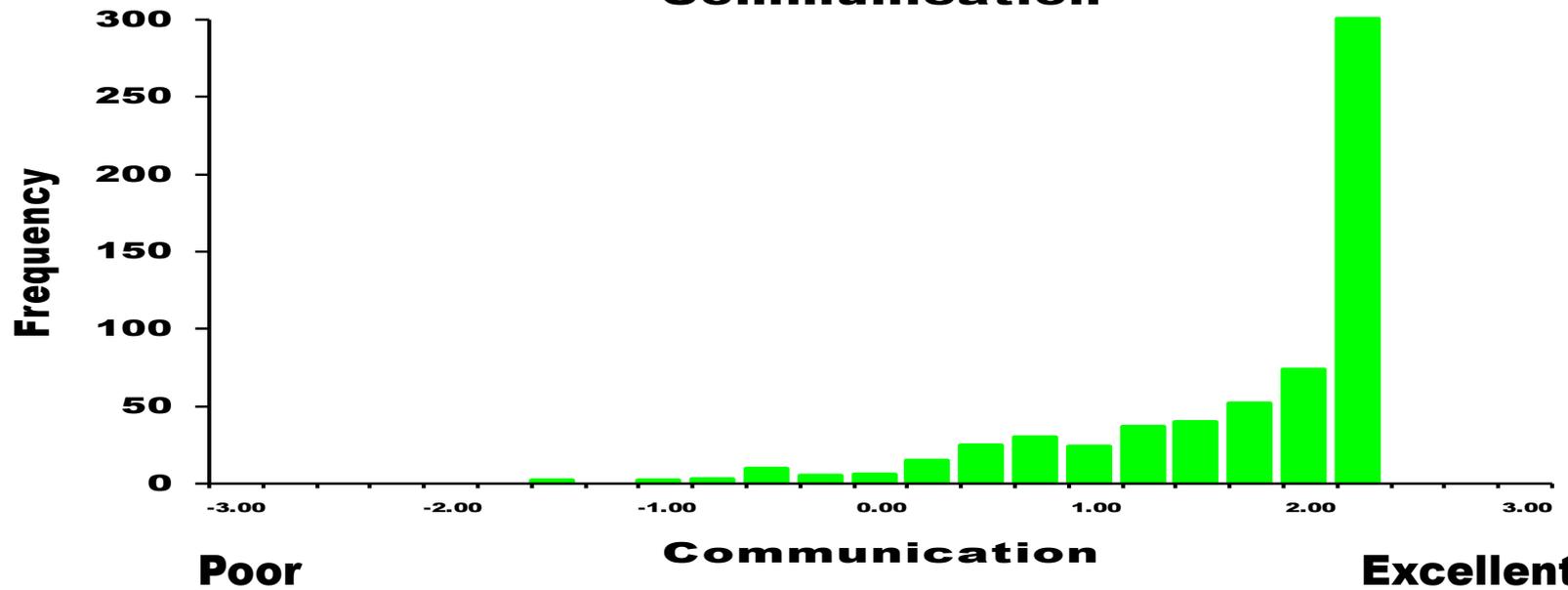
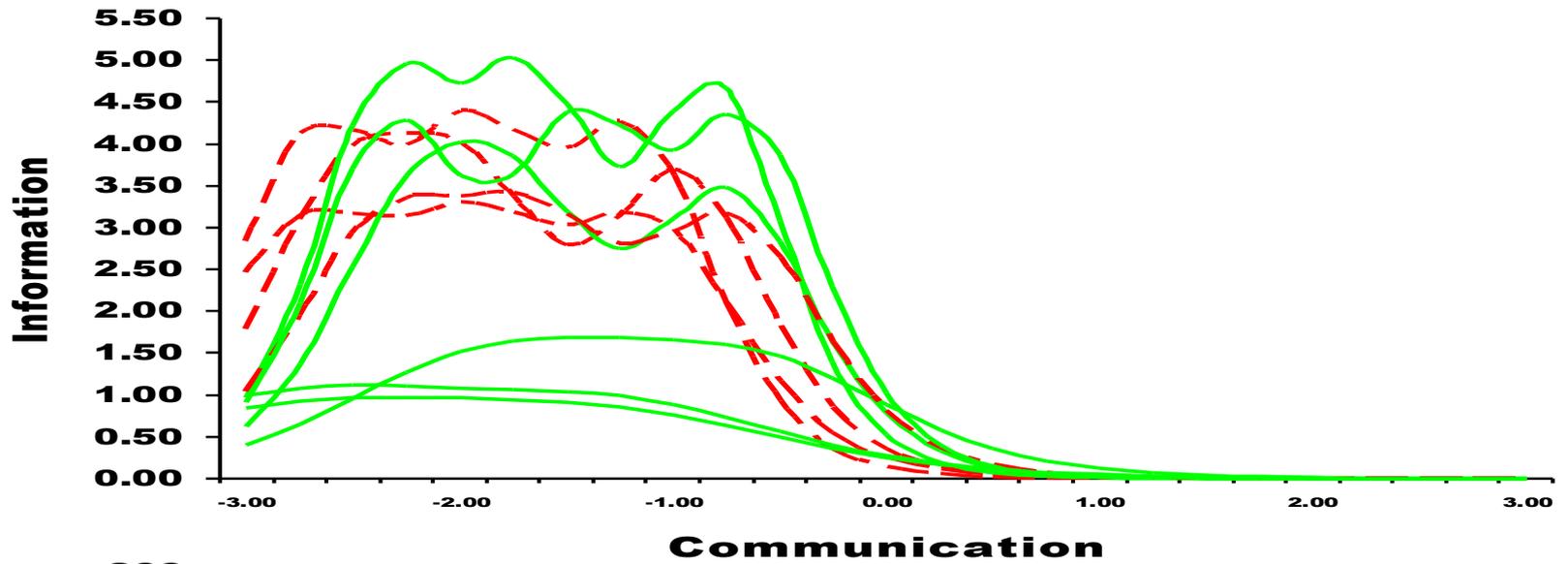
Information curves indicate the range over the measured construct where an item (or scale) is best at differentiating among individuals. Higher information denotes more precision for measuring a person's perception of communication.

# B16\* ...your follow-up care doctor listen carefully to you?

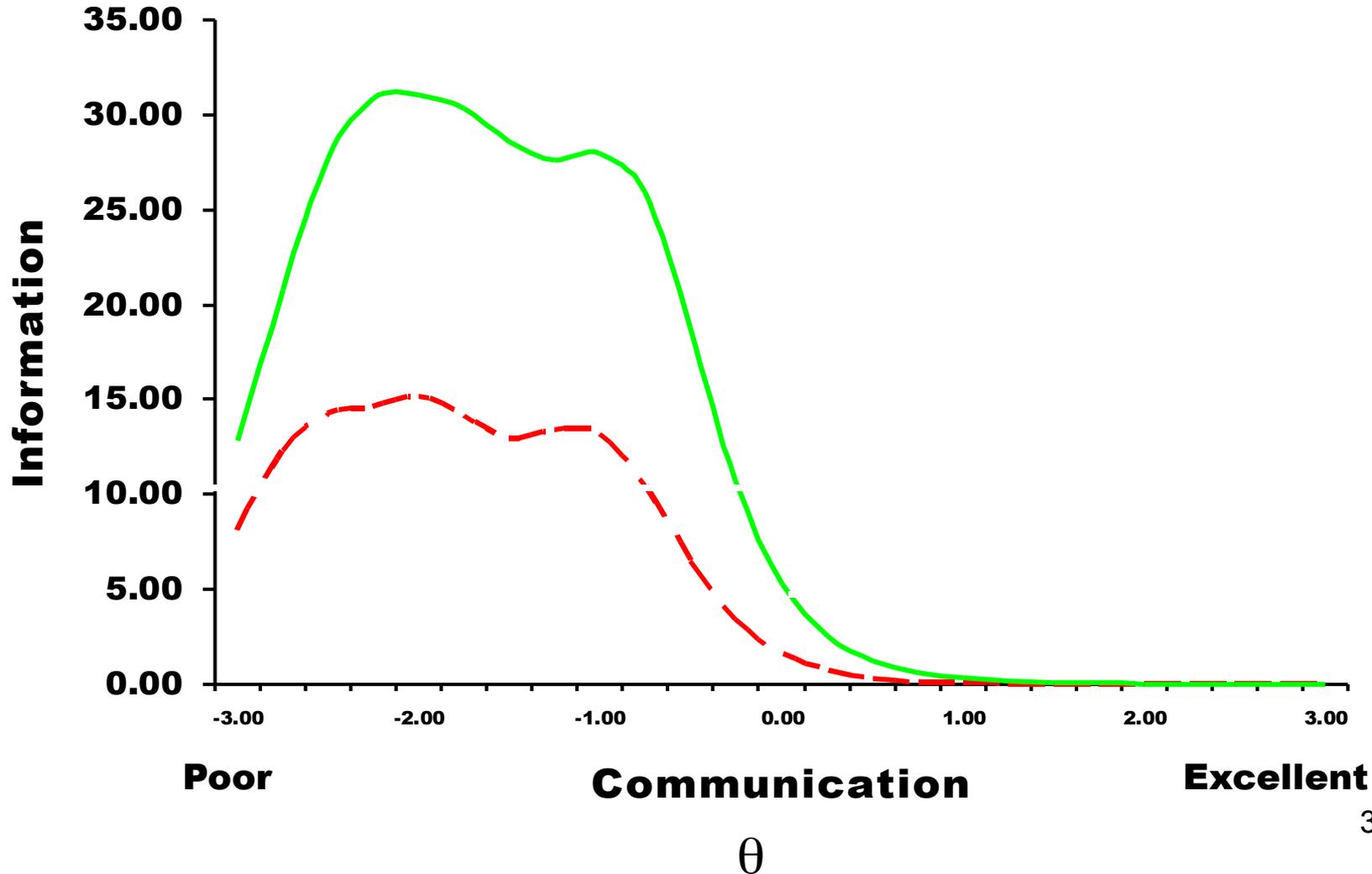


# B16\* ...your follow-up care doctor listen carefully to you?





# Scale Information



# Thank you

