A New Approach to Measurement of Health Literacy

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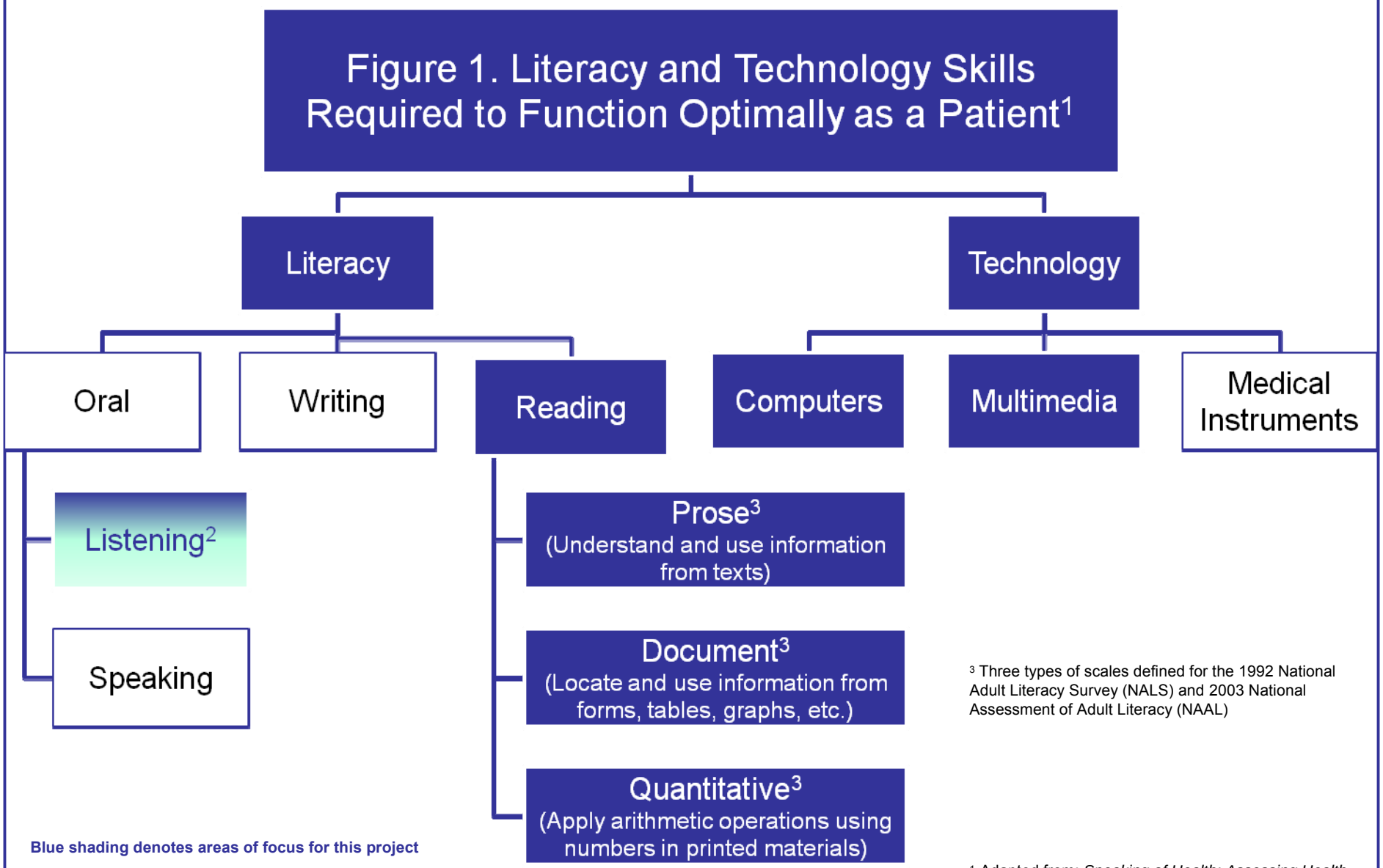
Study Rationale

- unclear at what level low health literacy begins to adversely affect health and health care utilization
  - this may be due to the lack of precision for categorizing individuals in the marginal health literacy category
  - improving measurement in the “middle zone” will help:
    - estimate the size of the population at risk from low health literacy
    - identify vulnerable patients within a clinical setting
- clinicians and researchers need precise, brief measures
  - that can be individually administered and scored in real-time
  - to enable tailoring for the patient’s health literacy level
  - to provide reliable & valid scores for use in testing interventions
- need to distinguish between Literacy and Language Barriers
  - English and non-English measures must yield equivalent information

Figure 1. Literacy and Technology Skills Required to Function Optimally as a Patient[1]



Blue shading denotes areas of focus for this project

[2] **Listening skills are needed to hear the recorded literacy questions, but these skills will not be specifically measured**

[3] Three types of scales defined for the 1992 National Adult Literacy Survey (NALS) and 2003 National Assessment of Adult Literacy (NAAL)

[1] Adapted from: *Speaking of Health: Assessing Health Communication Strategies for Diverse Populations, 2002; and Health Literacy: A Prescription to End Confusion, 2004.*

Definition of Health Literacy for Measurement Purposes

Health Literacy is the degree to which individuals have the capacity to:

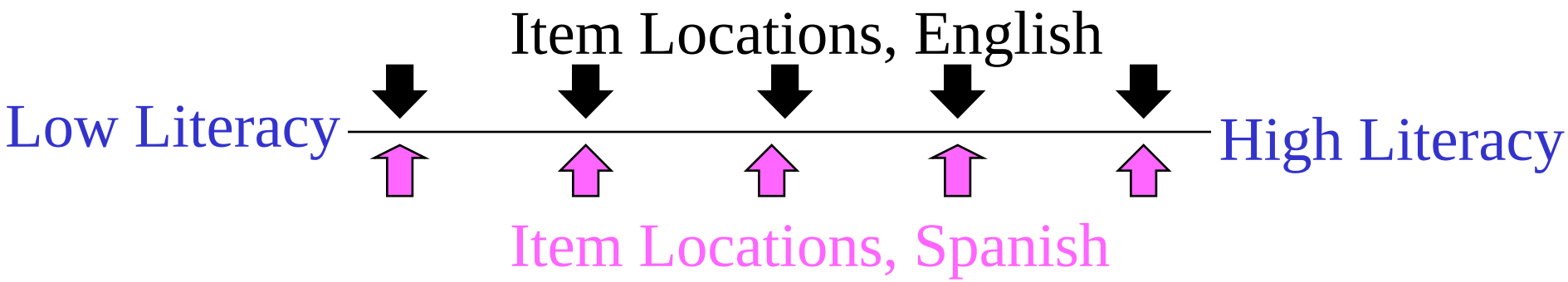
read and comprehend health-related print material,

identify and interpret information presented in graphical format (charts, graphs, tables),

and perform arithmetic operations,

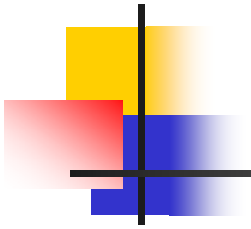
in order to make appropriate health and care decisions.

Item Response Theory (IRT) Item Banks



- the bank of questions defines an underlying trait
- enables test instruments of various lengths and even computerized adaptive tests (CATs)
- the definition of the trait, and the meaning of each item, should be the same across all participant characteristics

  - otherwise, differences due to measurement bias could incorrectly be interpreted as real differences between groups

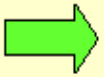


Item Examples

After a medical test or procedure, be sure to get the results. Ask whether you will get them in person or by phone or by mail. Also ask when you will get the results. Do not assume the results are fine if you do not get them when expected. If you do not get them, call your doctor.

You should _____ all test results.

mail	estimate	obtain	protect



Medications for Mr. Beta

Medication	Start Date	End Date	Instructions
Hanebrex: 200 mg tablets	Aug. 27	Sept. 26	1 Tablet daily
Yostatin: 250 mg tablets	Mar. 8	None	1 Tablet twice daily
Nandozol: 90 mcg per puff	Mar. 8	None	1-2 Puffs by mouth every 4-6 hours as needed
Cellacillin: 250 mg tablets	Apr. 22	Apr. 29	2 Tablets on the first day, then 1 Tablet daily after that

Look at the Medications for Mr. Beta. How many tablets of Cellacillin should he take on the third day?

1 | 2 | 3 | 4

Sample Body Mass Index Chart

		Weight in Pounds					
		145	155	165	175	185	195
Height in Inches	66	23.4	25.0	26.6	28.2	29.9	31.5
	67	22.7	24.3	25.8	27.4	29.0	30.5
	68	22.0	23.6	25.1	26.6	28.1	29.6
	69	21.4	22.9	24.4	25.8	27.3	28.8
	70	20.8	22.2	23.7	25.1	26.5	28.0
	71	20.2	21.6	23.0	24.4	25.8	27.2
	72	19.7	21.0	22.4	23.7	25.1	26.4
	73	19.1	20.4	21.8	23.1	24.4	25.7
	74	18.6	19.9	21.2	22.5	23.8	25.0
	75	18.1	19.4	20.6	21.9	23.1	24.4
	76	17.6	18.9	20.1	21.3	22.5	23.7

Underweight

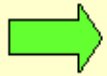
Normal

Overweight

Obese

Look at the Sample Body Mass Index Chart. In what category would a body mass index of 23.2 be?

Underweight | Normal | Overweight | Obese



Patient Characteristics

(*n*=618 English-speaking primary care patients)

Female		51%
Age, years	21-39	28%
	40-49	27%
	50-64	41%
	65-77	4%
Race, ethnicity	Hispanic	12%
	Black, non-Hispanic	67%
	White, non-Hispanic	16%
	Other	5%
Education	< HS	18%
	HS / GED	38%
	Some college	31%
	College degree	13%
Computer Use	Never	14%
	Not in past 12 months	10%
	Monthly	13%
	Weekly	63%

Patient Characteristics
(*n*=618 English-speaking primary care patients)

Self-rated health	Poor	8%
	Fair	25%
	Good	40%
	Very Good	21%
	Excellent	6%
Trouble reading printed health materials	None of the time	71%
	A little of the time	9%
	Some of the time	16%
	Most or All of the time	4%
Trouble reading everyday things like a newspaper	None of the time	86%
	A little of the time	5%
	Some of the time	6%
	Most or All of the time	3%

Patient Evaluation of the Touchscreen

Overall rating of screen design	Poor or Fair	4%
	Good	24%
	Very Good	32%
	Excellent	39%
Burden of 30 health literacy questions	Too many	15%
	About right	56%
	Could have answered more	28%
Rating of study participation	Worse than expected	2%
	About the same as expected	22%
	A little better than expected	29%
	A lot better than expected	47%

Patient Evaluation of the Touchscreen

- Most patients reported that it was easy to use, even if they had never used a computer before:
  - *It was nice. I especially liked the questions that talked to me.*
  - *It was complicated at first because I never used one before. Then I became a pro.*
  - *It was easy to do. I was amazed how I was able to answer the questions by myself.*
  - *It was easy and more convenient. It gives you more privacy.*
  - *It was easy; you can answer the questions at your own pace.*
  - *I liked it, it's cool, makes it easier. Can I have one?*

Patient Evaluation of the Touchscreen (cont'd)

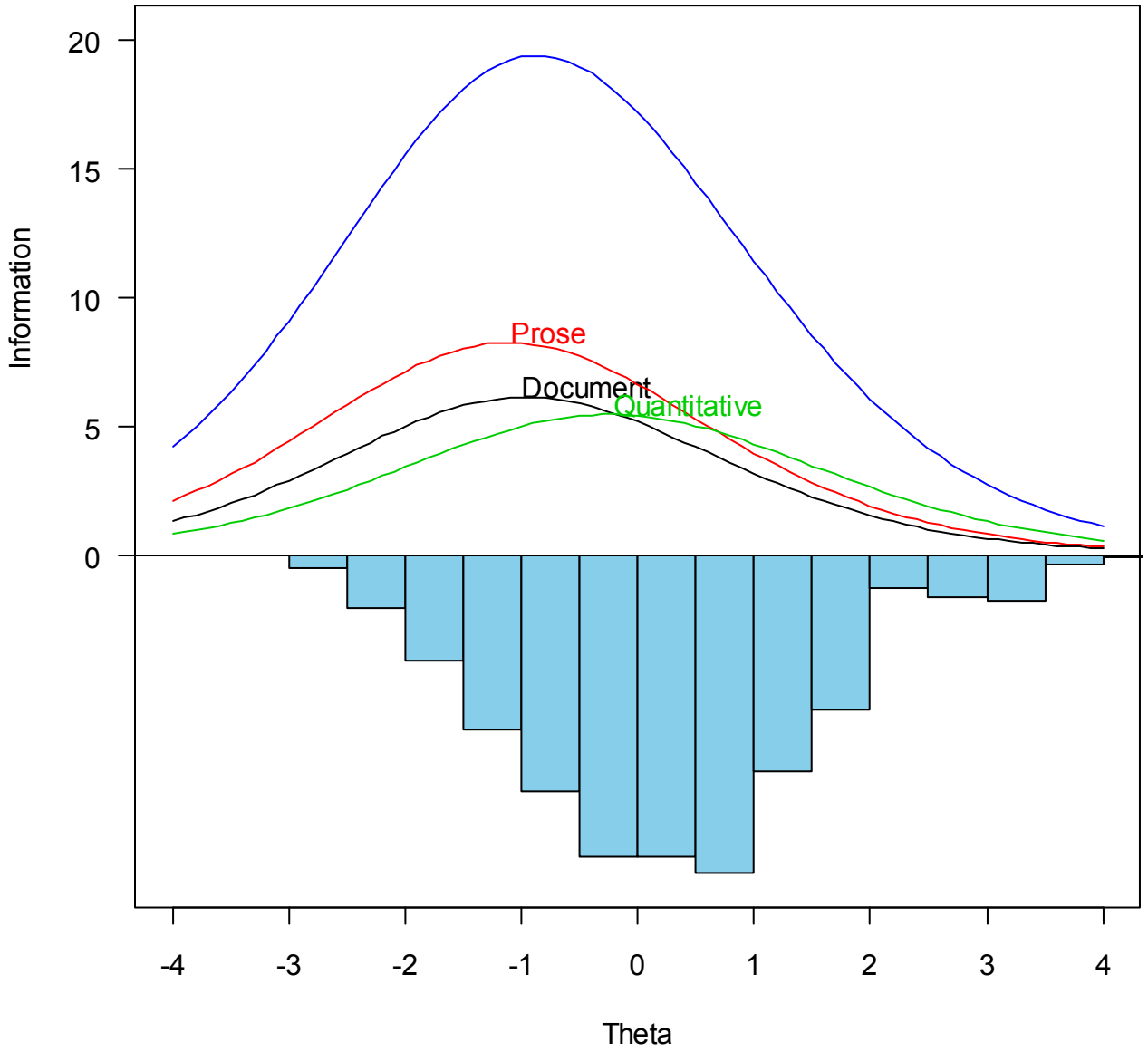
- Many patients reported that they learned something:
  - *It was nice because it showed me and educated me on drug addiction, mammograms, and how to read charts.*
  - *Very interesting; learned a lot.*
  - *It was very interesting. It showed me about my diabetes and cancer and high blood pressure.*
  - *It's very informative about different illnesses. It educates and teaches us how to take control of our health.*
  - *Very informative; learned a lot of things I didn't know about my health.*

Item Response Theory Analysis Results
(*n*=616 English-speaking primary care patients)

1-p model (1-parameter logistic; Rasch model)

		proportion correct				adjusted point-biserial correlation			
Item Type	No. Items	Mean	SD	Min	Max	Mean	SD	Min	Max
Document	27	0.704	0.135	0.368	0.881	0.365	0.109	0.167	0.538
Prose	37	0.724	0.156	0.287	0.950	0.435	0.093	0.289	0.617
Quantitative	26	0.554	0.202	0.148	0.888	0.351	0.148	0.060	0.564
All Items	90	0.669	0.179	0.148	0.950	0.390	0.121	0.060	0.617

Item Response Theory Analysis Results (1-p model)
(*n*=616 English-speaking primary care patients)



Item Response Theory Analysis Results (1-p model)
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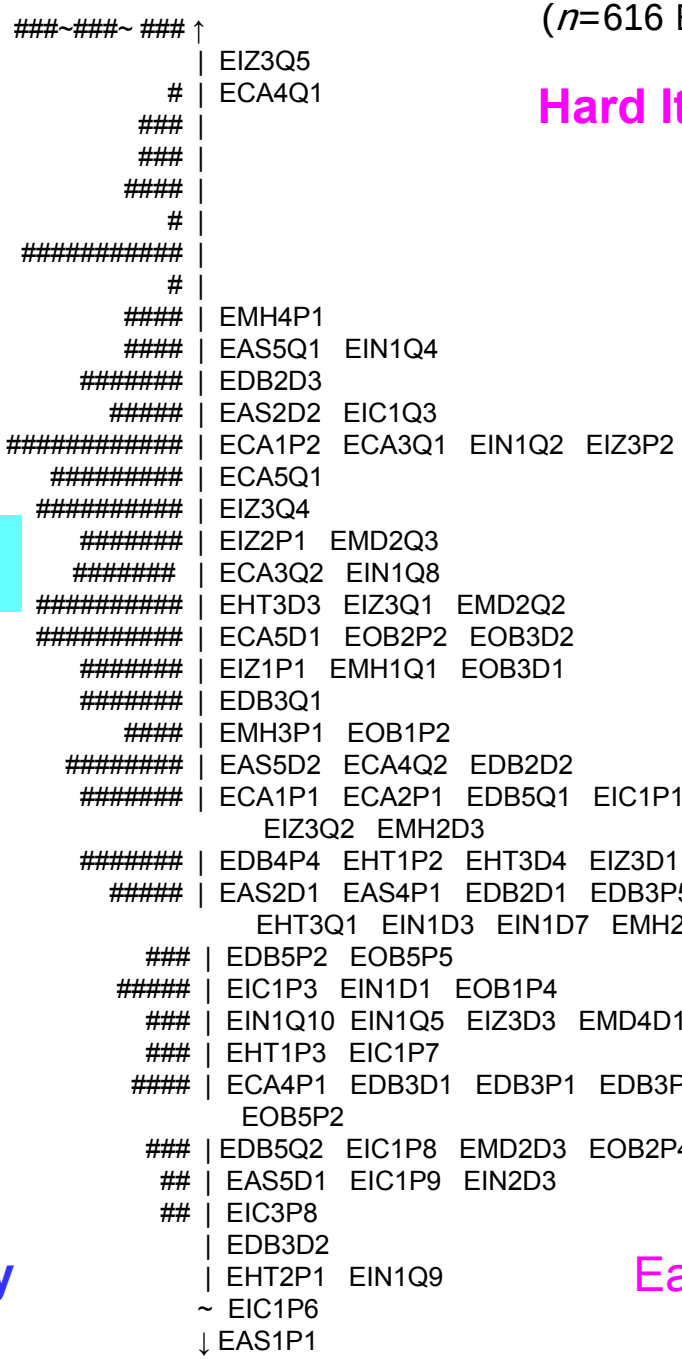
High Literacy

 # represents 3 patients

Hard Items

Mean Patient Score ⟶



⟵ Mean Item Difficulty

Low Literacy

Easy Items

Conclusions and Implications for Policy, Practice or Delivery

- new health literacy items have good content validity, covering a variety of topics that are relevant to primary care patients and their healthcare providers
- Talking Touchscreen (TT) is easy to use and acceptable for self-administration of a health literacy test
- self-administration should reduce staff burden and costs, reduce interview bias, and reduce stigma of low literacy
- TT will increase access of underserved populations to new technologies, and contribute information about the experiences of diverse populations with new technologies
- TT is easy to integrate with PRO assessments

Challenges and Opportunities

- Distinguishing Between Literacy & Language Barriers
  - Item Response Theory (IRT) is a more sensitive method to determine whether some items are culturally or linguistically biased
  - this new tool will provide better opportunities to determine the independent effects of limited English proficiency and limited health literacy
- Increasing measurement precision & decreasing burden
  - difficult to measure literacy accurately and rapidly due to the wide range of reading skills among U.S. adults
  - fixed-length tests can be embarrassing for individuals with low literacy, and inefficient for individuals with high literacy
  - a computer-adaptive tool allows precise and rapid measurement of health literacy (individuals complete min. # questions to achieve an accurate score)
- Improving the measurement of health literacy
  - will better enable researchers to evaluate the magnitude of heath literacy, changes in literacy over time, links between literacy and outcomes, factors that influence literacy, and effectiveness of interventions (*Health Literacy*, 2004)
  - this project seeks to give clinicians and healthcare systems a way to practically assess patients' health literacy in clinical practice

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