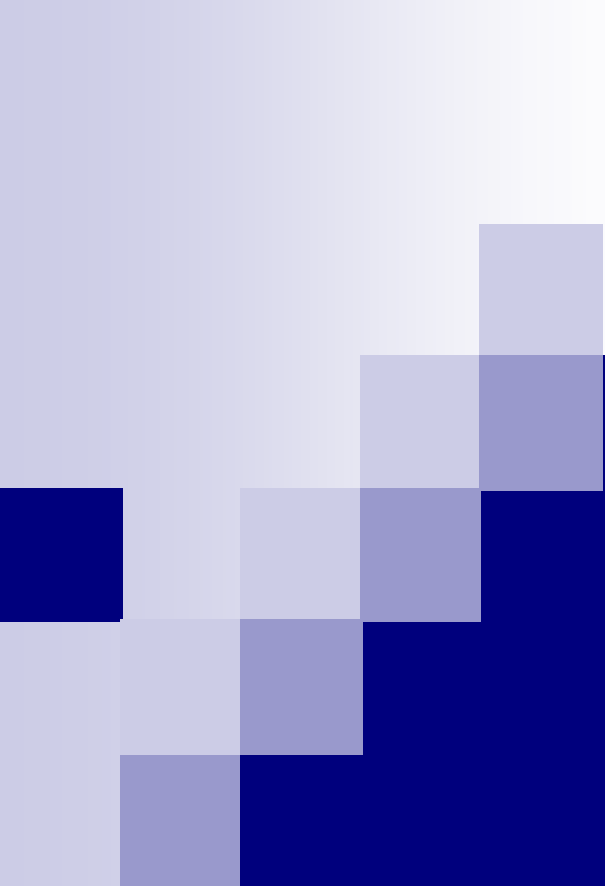




Patient Intelligence Predicts Health and Adherence to Treatment:

New Opportunities for Improving
and Assessing Clinical Care

Linda S. Gottfredson, PhD
School of Education
University of Delaware
Newark, DE 19716



Patient Intelligence Predicts Health and Adherence to Treatment:

- *Really?*
- *So what?*

New Opportunities for Improving and Assessing Clinical Care

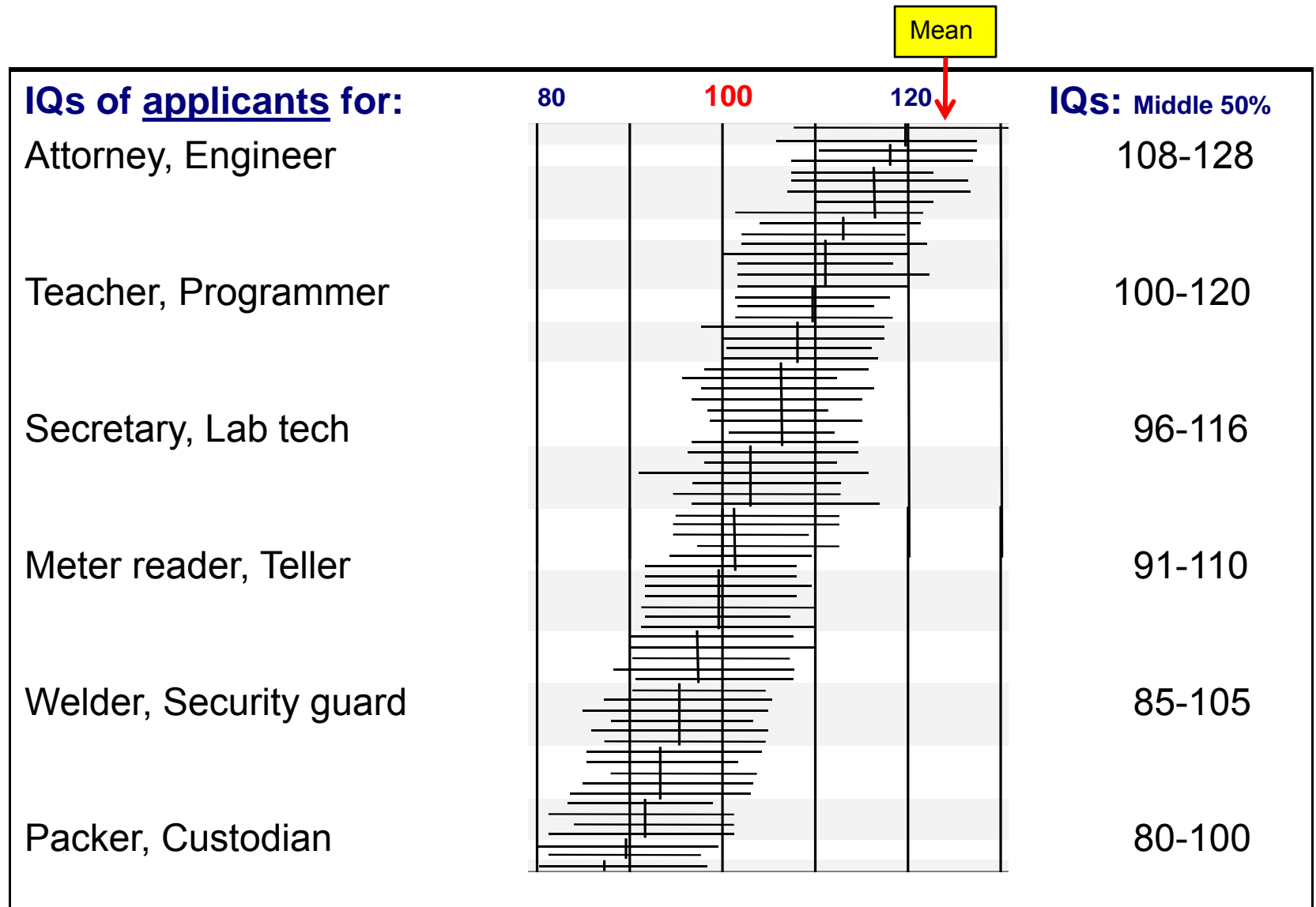
Assess + Audit **➔** *Target + Adjust*

Usual Focus: Physician Error

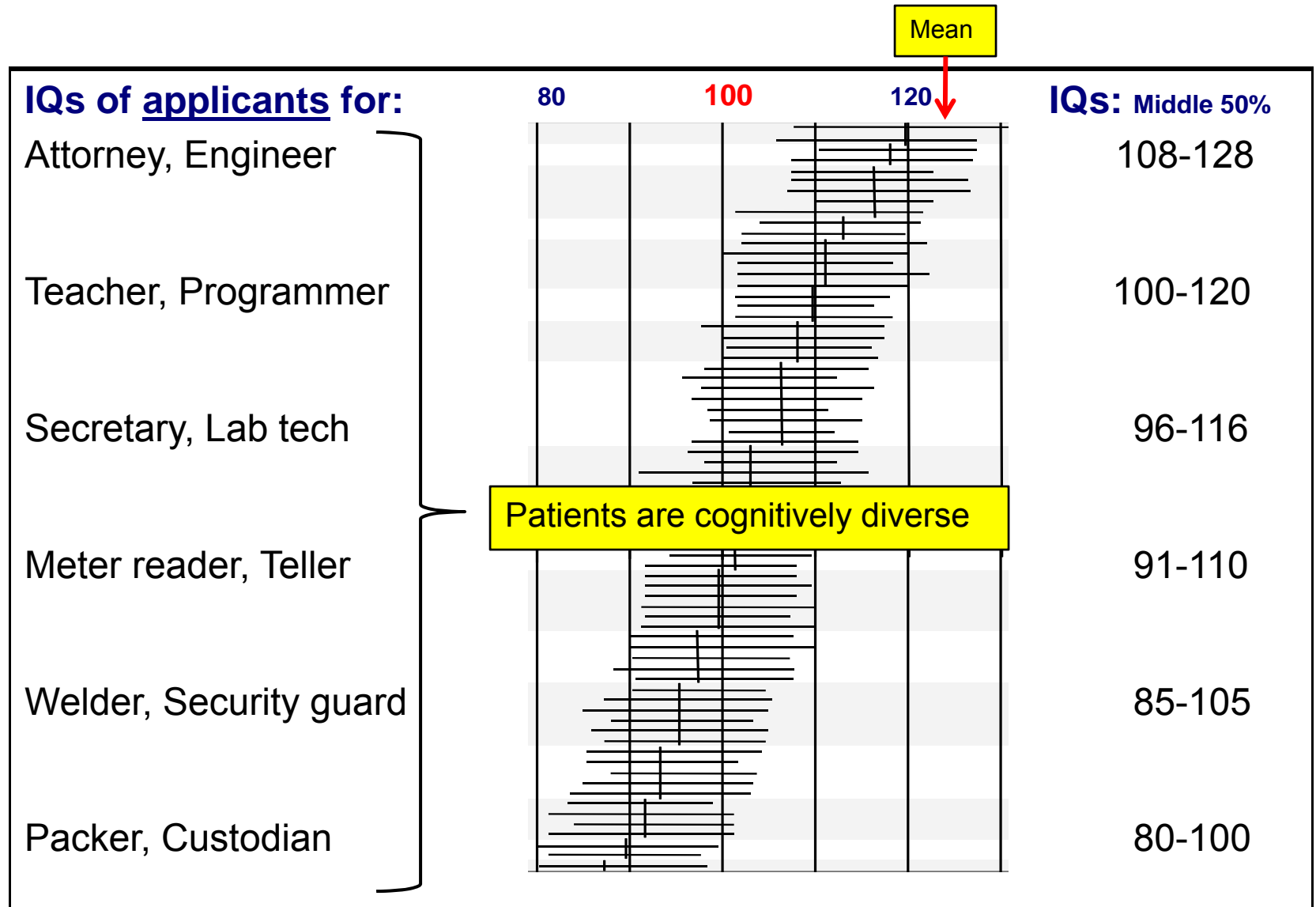


Select
Train
Certify
Regulate

Physician IQs Very High



Physician IQs Very High





$\text{IQ} \approx g \approx \text{general intelligence}$
score factor construct

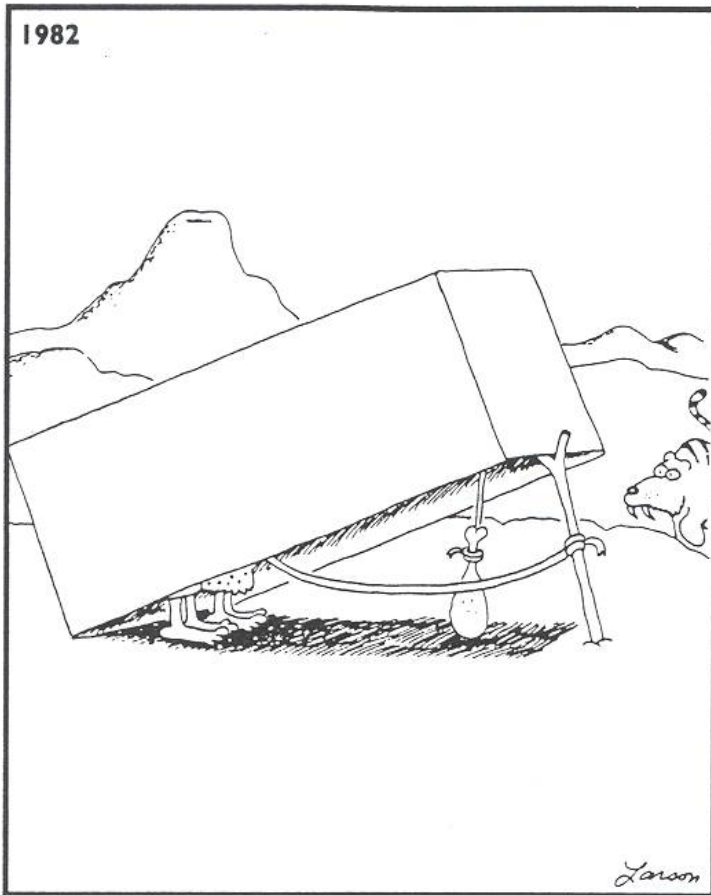
g is general ability to:

- Learn
- Reason
- Solve problems

Literacy?

- Learn
- Reason
- Solve problems

IQ/g is:

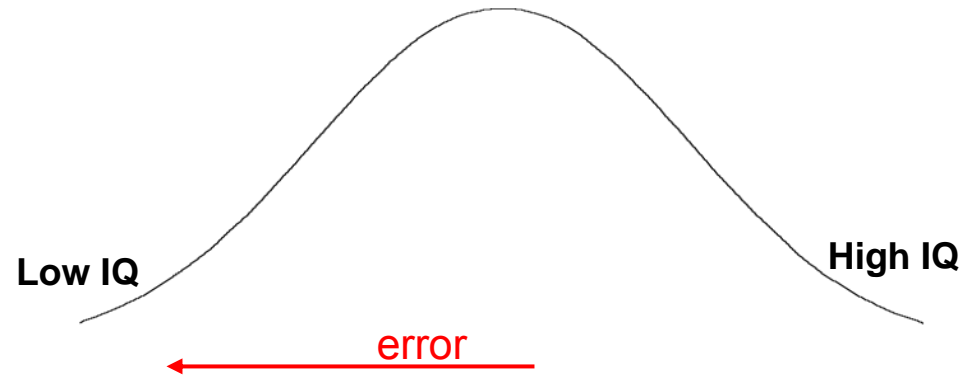


“Shhhh, Zog! ... Here come one now!”

- Ability to avoid cognitive error
- Not content specific

Epidemiology of Patient Error

1. Patients differ in cognitive ability (IQ/ g)

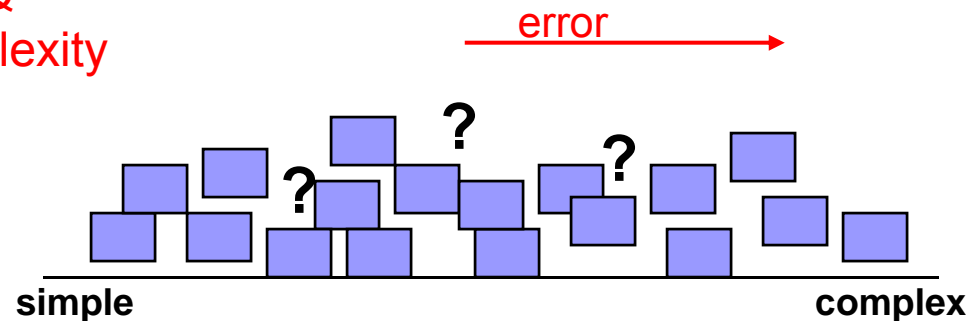


3. Error rates

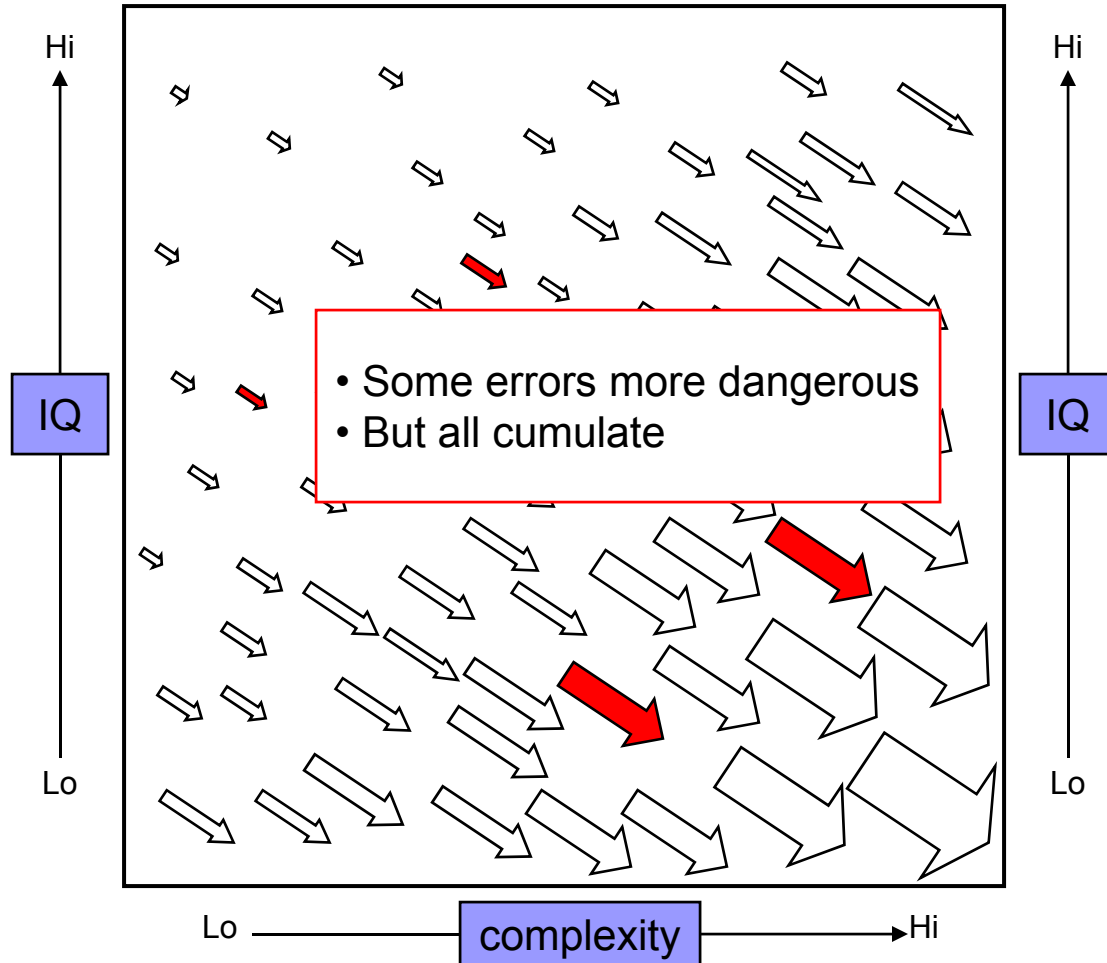
(non-adherence)

- rise at lower IQ
- rise with complexity

2. Health tasks differ in complexity (g loading)



Matrix of Cognitive Risk (error rates)



Can predict error
if we know:

Distribution of g in
groups of patients:

- race
- age
- locale

Assess

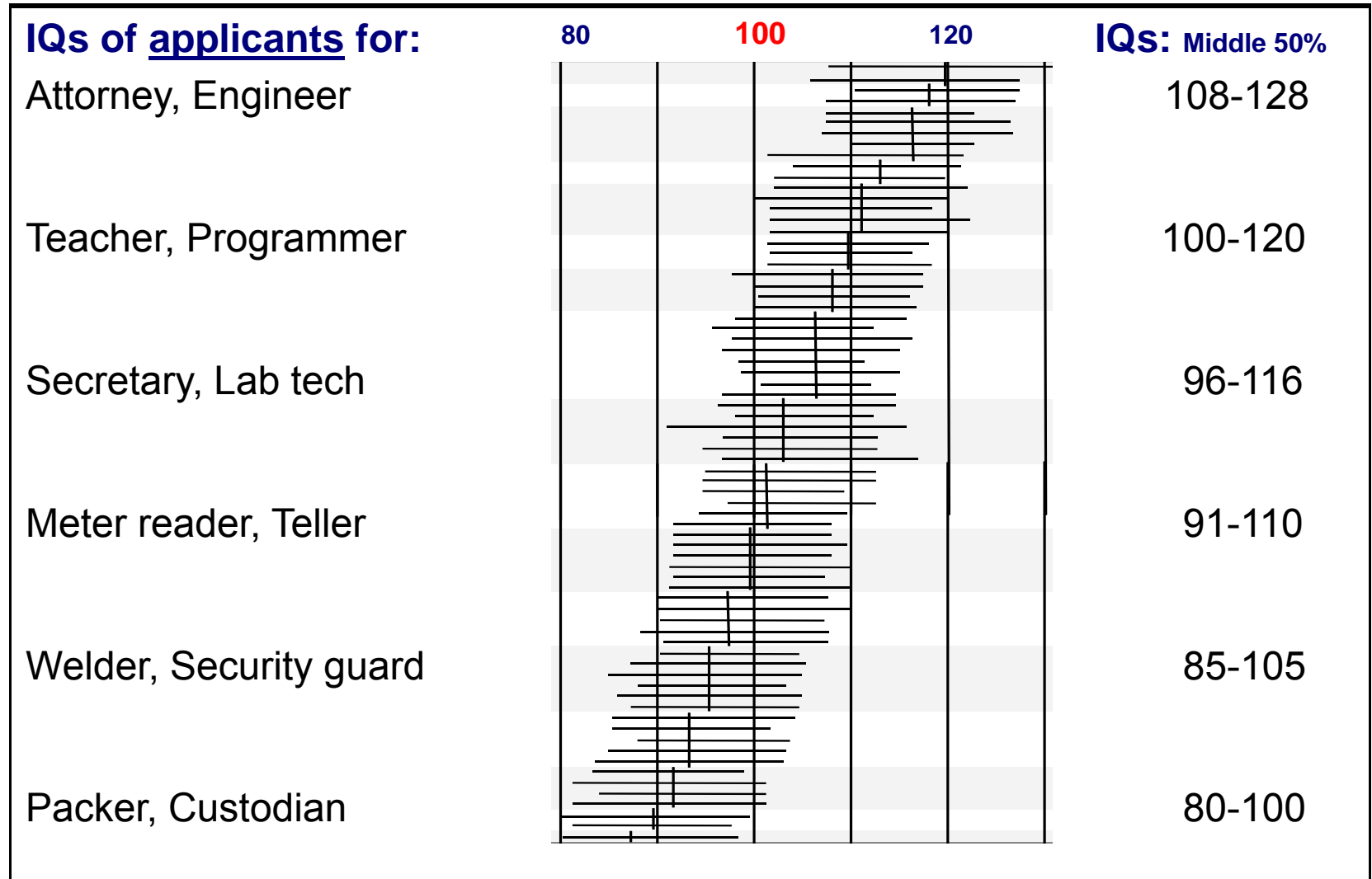
Distribution
of g loadings in
sets of tasks:

- preventive care
- chronic disease

Audit

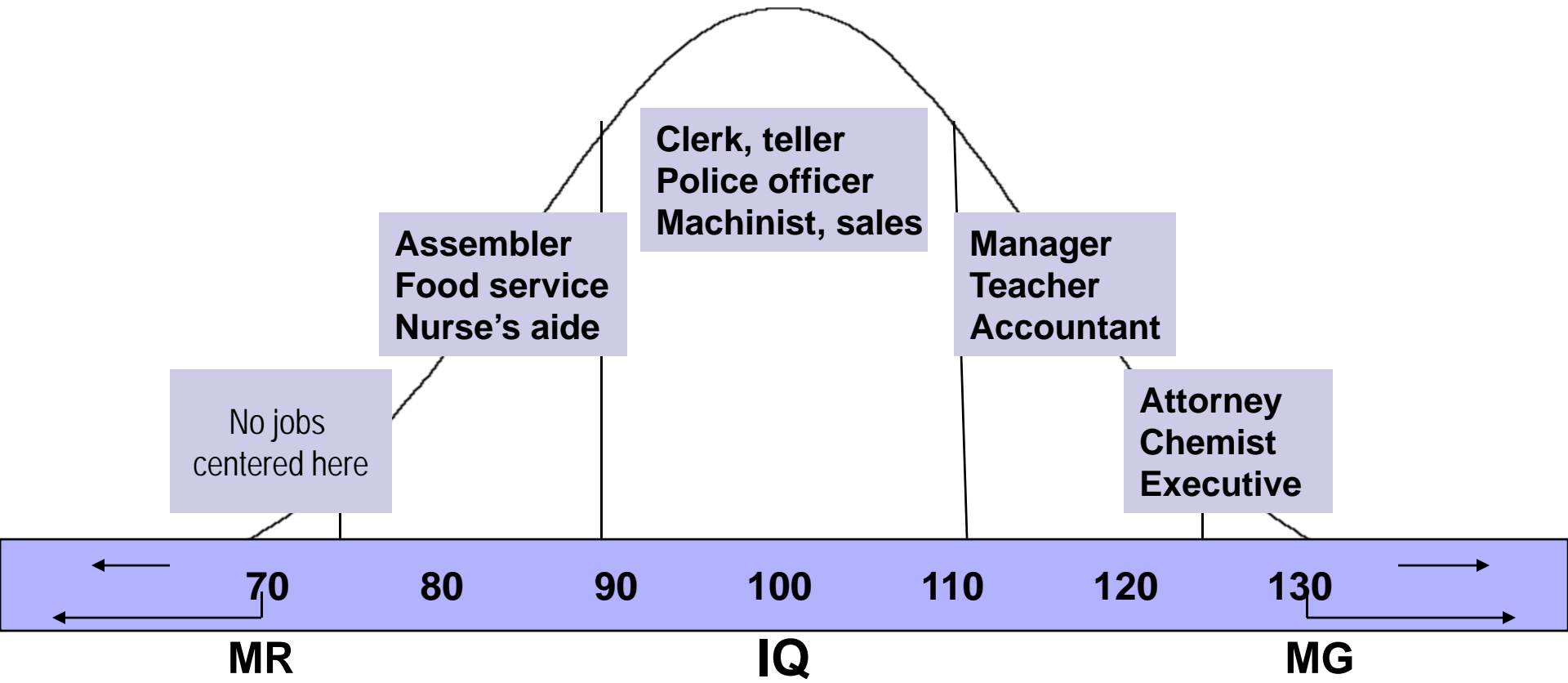
But Are IQ Differences Meaningful?

In criterion-related sense?

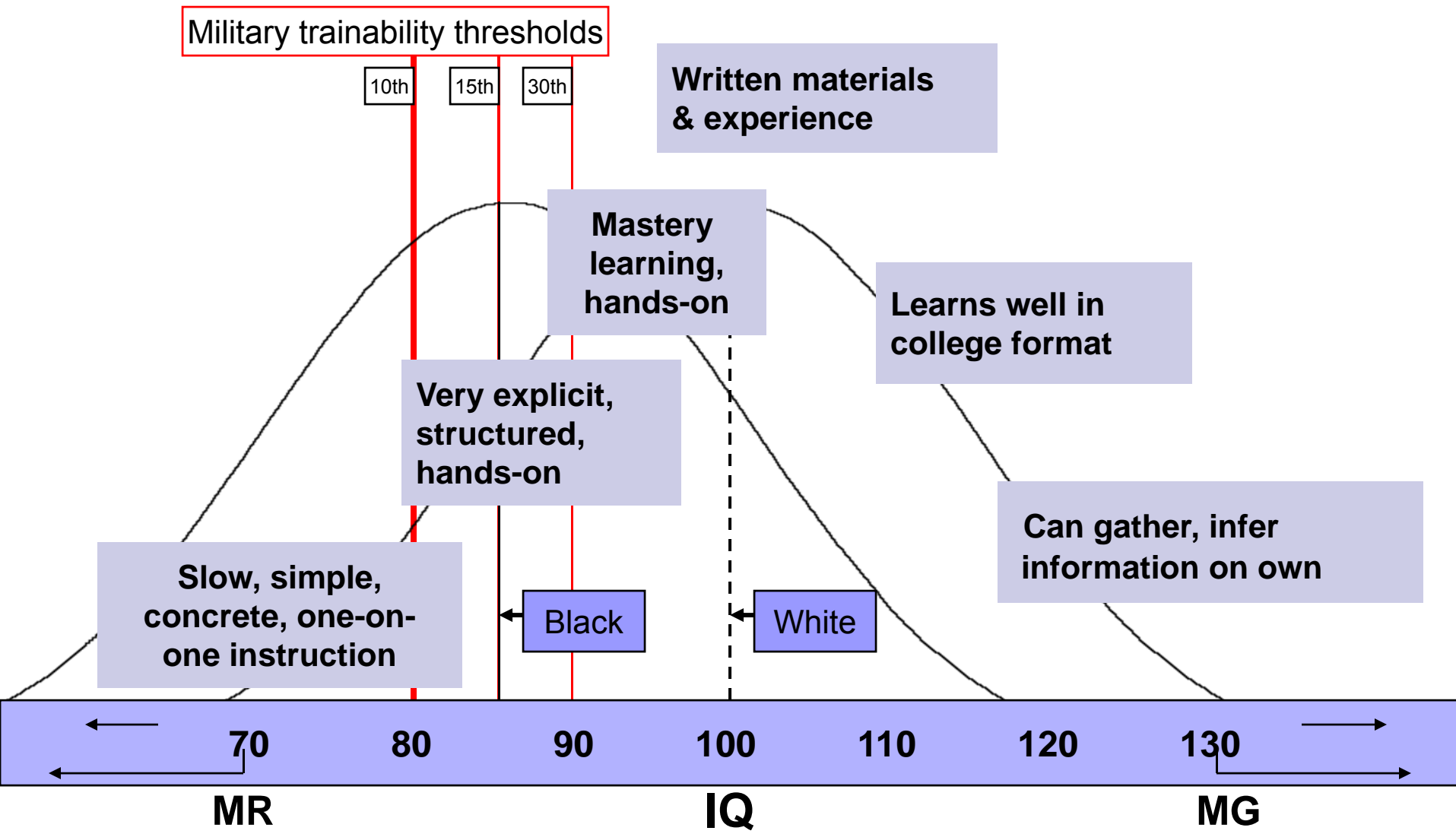


Typical IQs in Occupations

Typical IQ range of workers



Typical Learning Needs by IQ Level



Does IQ Predict Longevity?

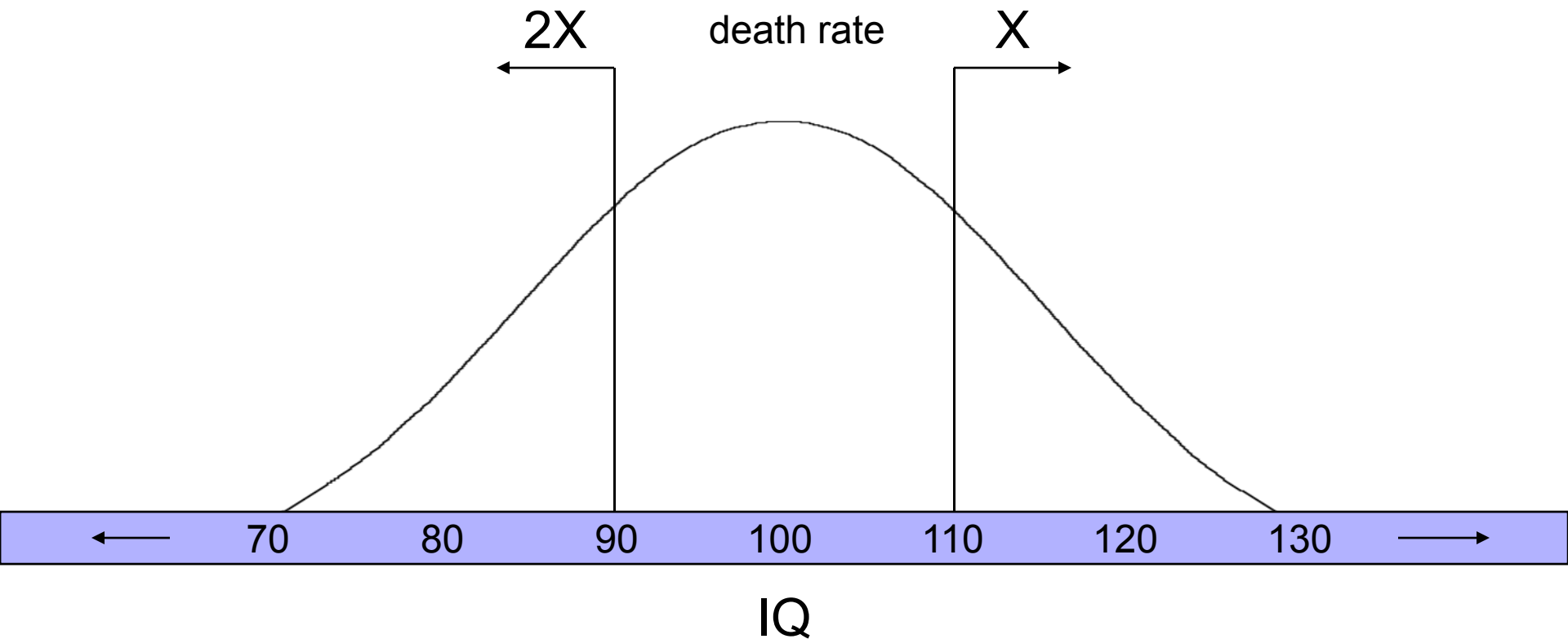
8 big cohort studies (Batty, Deary, & Gottfredson, 2007)

<i>(Whites)</i>	Birth yr	IQ age	Followed to	(N)
Australia	1947-53	18	29-35	1786
Britain	1947	8	54	2057
Denmark	1953	12	48	7319
Scotland	1946-52	11	50-56	11,859
Scotland	1936	11	65	908
Scotland	1921	11	80	922
Scotland	1921	11	76	2217
Sweden	1936	10	43	831

Childhood IQ Predicts Adult Mortality

8 large studies
(Batty, Deary, & Gottfredson, 2007)

1 more IQ point = 1% lower death rate

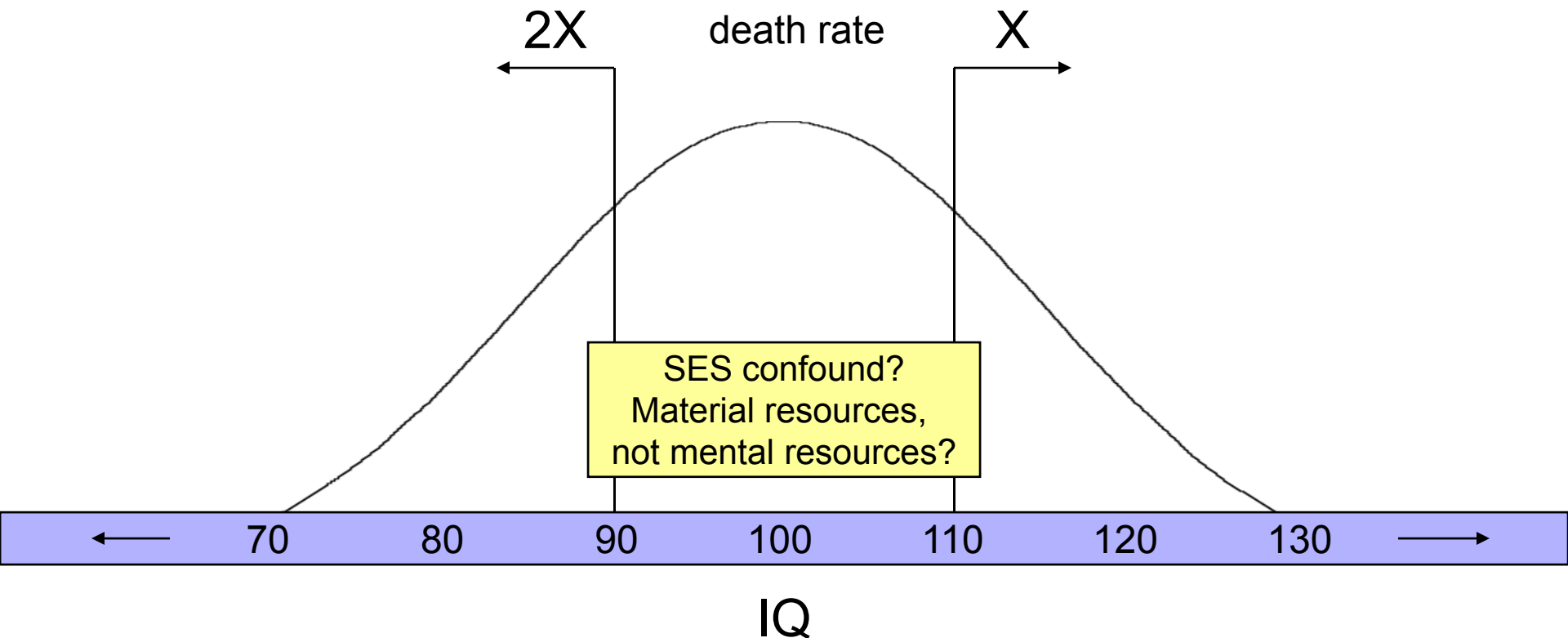


Childhood IQ Predicts Adult Mortality

8 large studies

(Batty, Deary, & Gottfredson, 2007)

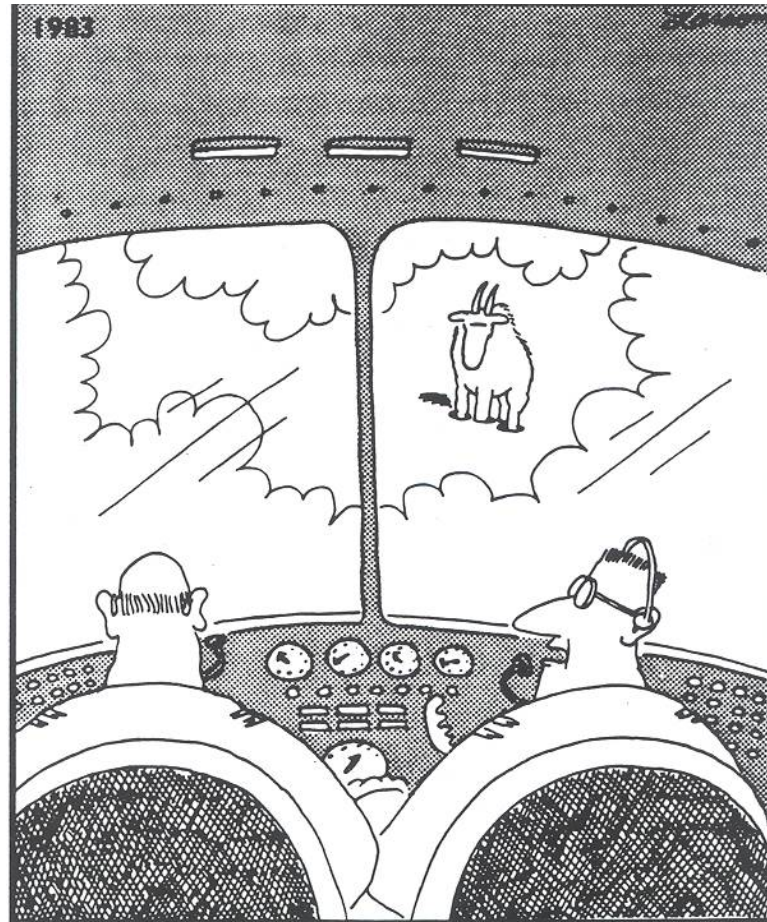
1 more IQ point = 1% lower death rate



Material resources not enough

- Equalizing resources increases health disparities
 - When Britain introduced **national health care**
 - When media made **health information** more widely available (signs and symptoms of cancer, diabetes, etc.)
- Old story—average rises, but variance too
 - Like in schools—some students more effectively exploit the same instruction
- Mental resources matter too—insufficiency means:
 - Inefficient use of available care
 - Inappropriate criticism of care

Does IQ Predict Health Behavior?

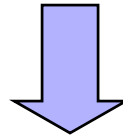


“Say ... what’s a mountain goat doing way up here in a cloud bank?”

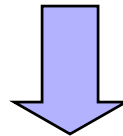
Literacy Example (TOFHLA)

(Controlling for personal resources, access, insurance, education, etc.)

Health literacy



More health knowledge
Better adherence



Better health
Less hospitalization
Lower health costs/year

Sample TOHFLA Items & Error Rates

Patients examine the actual vials or documents

% of urban hospital outpatients <i>not</i> knowing	Health literacy level		
	V-low	Low	OK
<p>Many professionals have no idea how difficult these “simple” things are for others</p>			
How to take meds 4 times per day	24	9	5
When next appointment is scheduled	40	13	5
How many pills of a prescription to take	70	34	13
What an informed consent form is saying	95	72	22

Sample TOHFLA Items & Error Rates

Patients examine the actual vials or documents

% of urban hospital outpatients <u>not</u> knowing:	Health literacy level		
	V-low	Low	OK
<div style="background-color: yellow; padding: 5px; display: inline-block;">But how representative?</div>			
How to take meds 4 times per day	24	9	5
When next appointment is scheduled	40	13	5
How many pills of a prescription to take	70	34	13
What an informed consent form is saying	95	72	22

Note: A red arrow points from the 'Low' column to the 'V-low' column, labeled 'error'. Another red arrow points from the 'V-low' column down to the 'What an informed consent form is saying' row.

Nationally-Representative Sample

(National Adult Literacy Survey, 1993)

NALS Level	% pop (white)	Reading grade level	Simulated Everyday Tasks Adults ages 16-65
1	14%	2.5	<ul style="list-style-type: none">▪ Total bank deposit entry▪ Locate expiration date on driver's license
2	25%	7.2	<ul style="list-style-type: none">▪ Determine difference in price between 2 show tickets▪ Locate intersection on street map
3	36%	12	<ul style="list-style-type: none">▪ Calculate miles per gallon from mileage record chart▪ Write brief letter explaining error on credit card bill
4	21%	16	<ul style="list-style-type: none">▪ Use eligibility pamphlet to calculate SSI benefits▪ Explain difference between 2 types of employee benefits
5	4%	16+	<ul style="list-style-type: none">▪ Use calculator to determine cost of carpet for a room▪ Use table of information to compare 2 credit cards

Nationally-Representative Sample

(National Adult Literacy Survey, 1993)

NALS Level	% pop (white)	Reading grade level	Simulated Everyday Tasks Adults ages 16-65	
1	14%	2.5	<ul style="list-style-type: none"> Total Local 	
2	25%	7.2	<ul style="list-style-type: none"> Dete Local 	show tickets
3	36%	12	<ul style="list-style-type: none"> Calcu Write 	record chart it card bill
4	21%	16	<ul style="list-style-type: none"> Use e Expla 	benefits employee benefits
5	4%	16+	<ul style="list-style-type: none"> Use calculator to determine cost of carpet for a room Use table of information to compare 2 credit cards 	

Item difficulty is from “process complexity”

- Level of inference
- Abstractness of info
- Distracting info

Health Adult Literacy Survey (HALS)

- Items simulate everyday health tasks
- Analyzed what increases item difficulty (error rates)
- 3 increasingly difficult questions for this item

Sample item

Recommend

ALCOHOL-FREE
ASPIRIN-FREE
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Ronald McDonald House is a program of
Ronald McDonald Children's Charities

Pediatric Dosage Chart Drops, Syrup, & Chewables

Age	Approximate Weight Range*	Dosage			
		Drops	Syrup	Chewables 80 mg	Chewables 160 mg
† Under 3 mo	Under 13 lb	½ dropper	¼ tsp	—	—
† 3 to 9 mo	13-20 lb	1 dropper	½ tsp	—	—
† 10 to 24 mo	21-26 lb	1½ droppers	¾ tsp	—	—
2 to 3 yr	27-35 lb	2 droppers	1 tsp	2 tablets	—
4 to 5 yr	36-43 lb	3 droppers	1½ tsp	3 tablets	1½ tablets
6 to 8 yr	44-62 lb	—	2 tsp	4 tablets	2 tablets
9 to 10 yr	63-79 lb	—	2½ tsp	5 tablets	2½ tablets
11 yr	80-89 lb	—	3 tsp	6 tablets	3 tablets
12 yr and older	90 lb & over	—	3-4 tsp	6-8 tablets	3-4 tablets

† Consult with physician before administering to children under the age of 2 years.
Dosage may be given every 4 hours as needed but not more than 5 times daily.

How Supplied:

Drops: Each 0.8 ml dropper contains 80 mg (1.23 grains) acetaminophen.

Syrup: Each 5 ml teaspoon contains 160 mg (2.46 grains) acetaminophen.

Chewables: Regular tablets contain 80 mg (1.23 grains) acetaminophen each. Double strength tablets contain 160 mg (2.46 grains) acetaminophen each.

* If child is significantly under- or overweight, dosage may need to be adjusted accordingly.

The weight categories in this chart are designed to approximate effective dose ranges of 10-15 milligrams per kilogram.
(Current Pediatric Diagnosis and Treatment, 8th ed. CH Kempe and HK Silver, ed. Lange Medical Publications: 1984, p. 1079)
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#1—Underline sentence saying how often to administer medication

Recommend



Pediatric Dosage Chart Drops, Syrup, & Chewables

Age	Approximate Weight Range*	Dosage			
		Drops	Syrup	Chewables 80 mg	Chewables 160 mg
† Under 3 mo	Under 13 lb	½ dropper	¼ tsp	—	—
† 3 to 9 mo	13-20 lb	1 dropper	½ tsp	—	—
† 10 to 24 mo	21-26 lb	1 ½ droppers	¾ tsp	—	—
2 to 3 yr	27-35 lb	2 droppers	1 tsp	2 tablets	—
4 to 5 yr	36-43 lb	3 droppers	1 ½ tsp	3 tablets	1 ½ tablets
6 to 8 yr	44-62 lb	—	2 tsp	4 tablets	2 tablets
9 to 10 yr	63-79 lb	—	2 ½ tsp	5 tablets	2 ½ tablets
11 yr	80-89 lb	—	3 tsp	6 tablets	3 tablets
12 yr and older	90 lb & over	—	3-4 tsp	6-8 tablets	3-4 tablets

† Consult with physician before administering to children under the age of 2 years.
 Dosage may be given every 4 hours as needed but not more than 5 times daily.
 How Supplied:

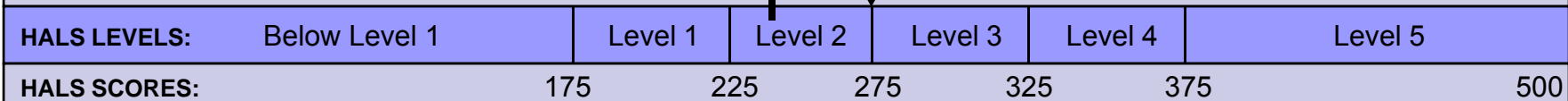
- One piece of info
- Simple match
- But lots of irrelevant info

% US adults routinely functioning below this level?
20%

Caution!
 Could train them do this item, but not all like it

Mean=272

239



#2—How much syrup for 10-year-old who weighs 50 pounds?

- Spot & reconcile conflicting info
- Inference from ambiguous info
- Multiple features to match

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 Ronald McDonald House is a program of
 Ronald McDonald Children's Charities^{*}

Pediatric Dosage Chart Drops, Syrup, & Chewables

Age	Approximate Weight Range*	Drops	Dosage		
			Syrup	Chewables 80 mg	Chewables 160 mg
† Under 3 mo	Under 13 lb	½ dropper	½ tsp	—	—
† 3 to 9 mo	13-20 lb	1 dropper	½ tsp	—	—
† 10 to 24 mo	21-26 lb	1 ½ droppers	¾ tsp	—	—
2 to 3 yr	27-35 lb	2 droppers	1 tsp	2 tablets	—
4 to 5 yr	36-42 lb	3 droppers	1 ½ tsp	3 tablets	1 ½ tablets
6 to 8 yr	44-62 lb	—	2 tsp	4 tablets	2 tablets
9 to 10 yr	63-79 lb	—	2 ½ tsp	5 tablets	2 ½ tablets
11 yr	80-89 lb	—	3 tsp	6 tablets	3 tablets
12 yr and older	90 lb & over	—	3-4 tsp	6-8 tablets	3-4 tablets

† Consult with physician before administering to children under the age of 2 years.
 Dosage may be given every 4 hours as needed but not more than 5 times daily.

??

% US adults routinely functioning below this level?
54%

??

239

329

HALS LEVELS:	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
HALS SCORES:	175	225	275	325	375	500

#3—Your child is 11 years old and weighs 85 pounds. How many 80 mg tablets can you give in 24-hr period?

Recommend



Pediatric Dosage Chart Drops, Syrup, & Chewables

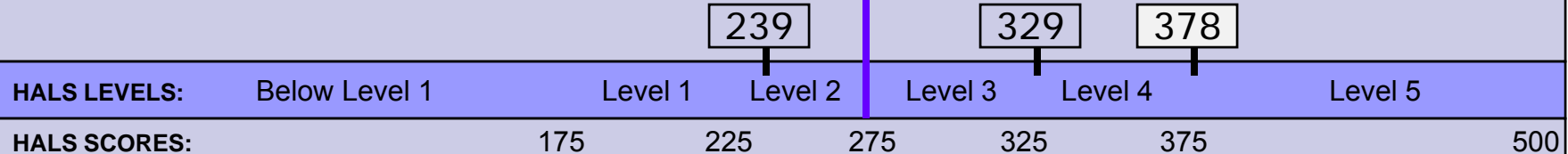
Age	Approximate Weight Range*	Drops	Syrup	Dosage	
				Chewables 80 mg	Chewables 160 mg
† Under 3 mo	Under 13 lb	½ dropper	¼ tsp	—	—
† 3 to 9 mo	13-20 lb	1 dropper	½ tsp	—	—
† 10 to 24 mo	21-26 lb	1 ½ droppers	¾ tsp	—	—
2 to 3 yr	27-35 lb	2 droppers	1 tsp	2 tablets	—
4 to 5 yr	36-43 lb	3 droppers	1 ½ tsp	3 tablets	1 ½ tablets
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11 yr	80-89 lb	—	3 tsp	6 tablets	3 tablets
12 yr and older	90 lb & over	—	3-4 tsp	6-8 tablets	3-4 tablets

† Consult with physician before administering to children under the age of 2 years.
 Dosage may be given every 4 hours as needed but not more than 5 times daily.
 How Supplied:

- Multiple features to match
- Two-step task
- Infer proper math operation
- Select proper numbers to use
- Ignore the most obvious but incorrect number
- Calculate the result

% US adults routinely functioning below this level?
99%

“Below minimum standard for today’s labor market”





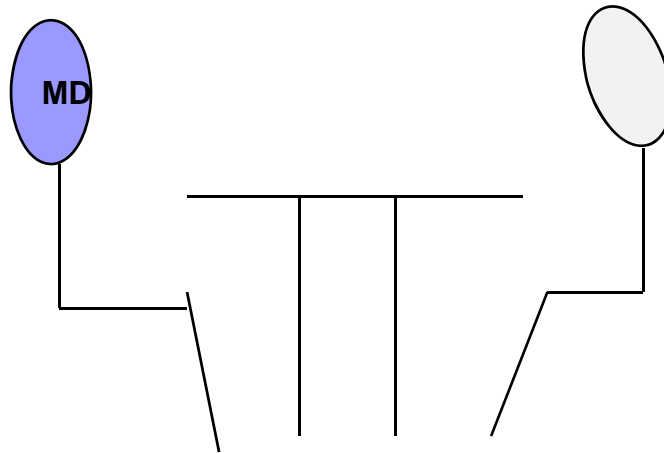
Psychometrics of Patient Error

Must reconceptualize the:

1. Provider-patient encounter
2. Provider's job
3. Patient's job

Reveals sources of error & touch-points for reduction

MDs Tested on “Standardized Patients”

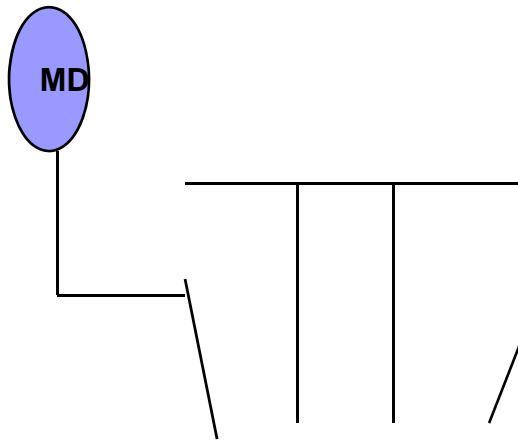


Items in test of patient care

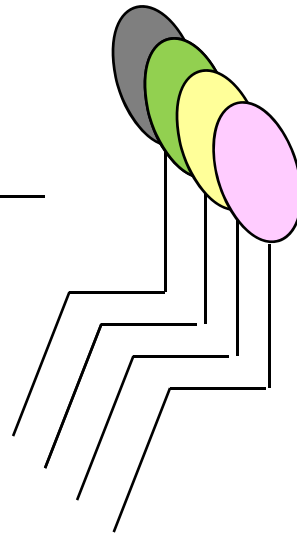
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

Daily MD Performance = “Adherence”

MD's test items in everyday life:



Many patients



Many days

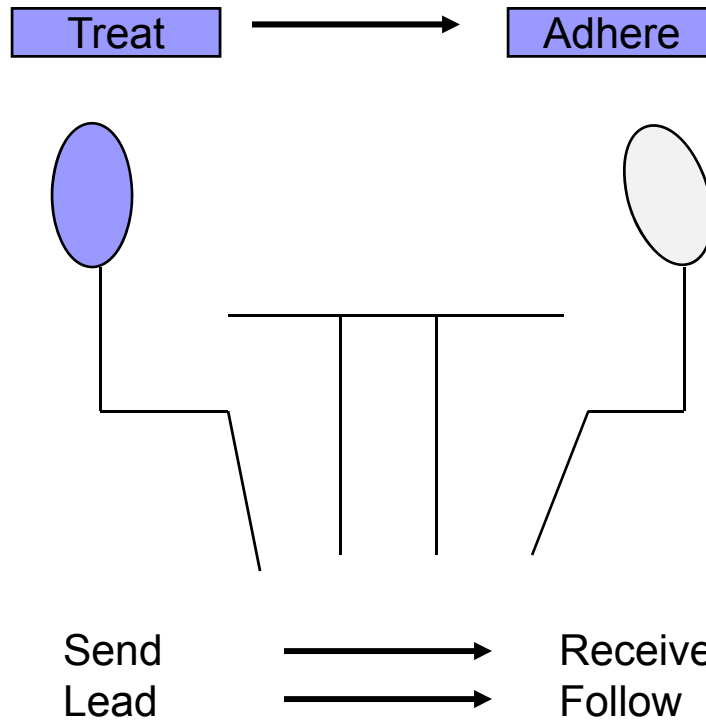
S	M	T	W	T	F	S

This “test”:

- Is unstandardized
- Results are cumulative (like GPA)
- MDs differ in performance

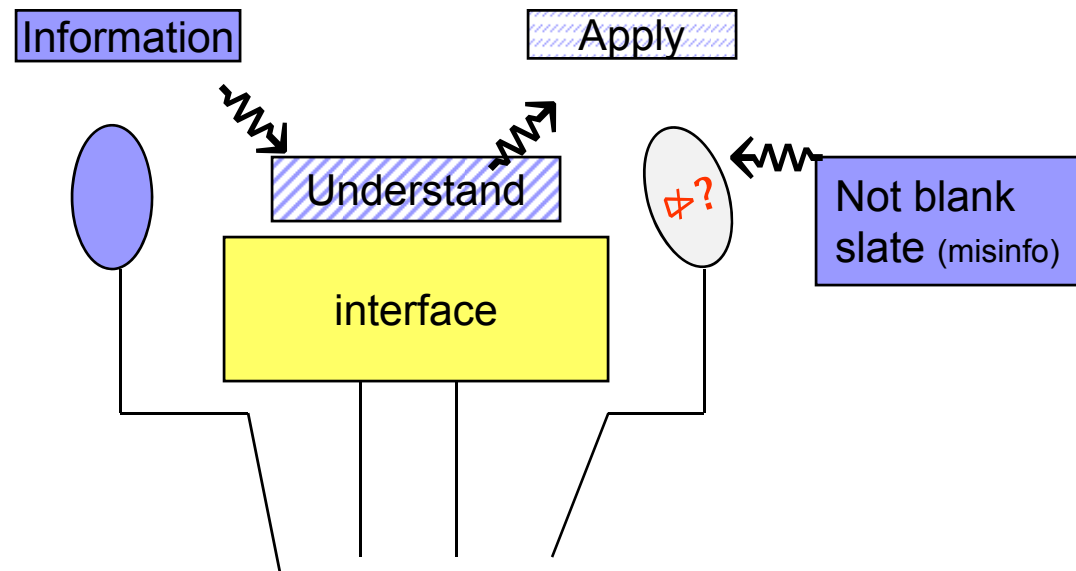
Passive-Patient Model

False!



Resulting misconception: Non-adherence = lack of motivation

Reality 1: Faulty Receipt & Application



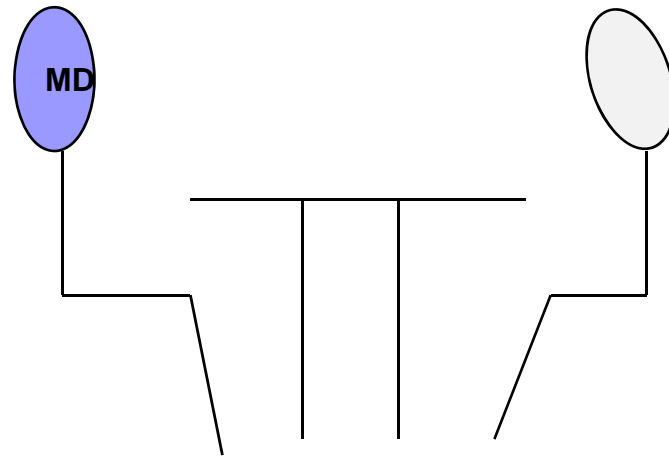
Conscientiousness is not enough
Errors rise with lower IQ/g

Physician is Test Item for Patient

(stimulus for behavior)

Items in test of self-care

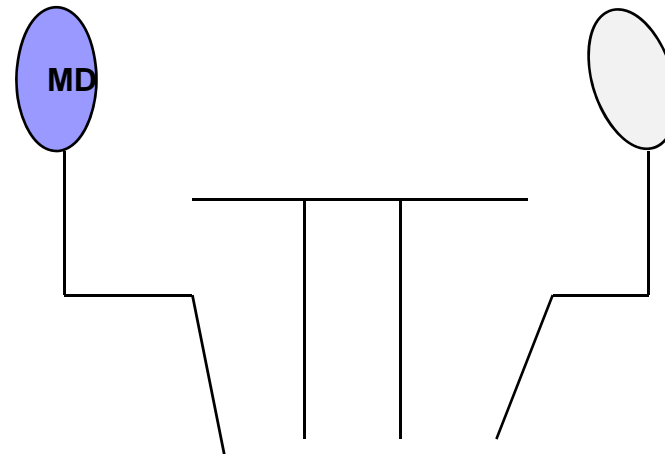
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0



Patient Adherence

Everyday test of self-care

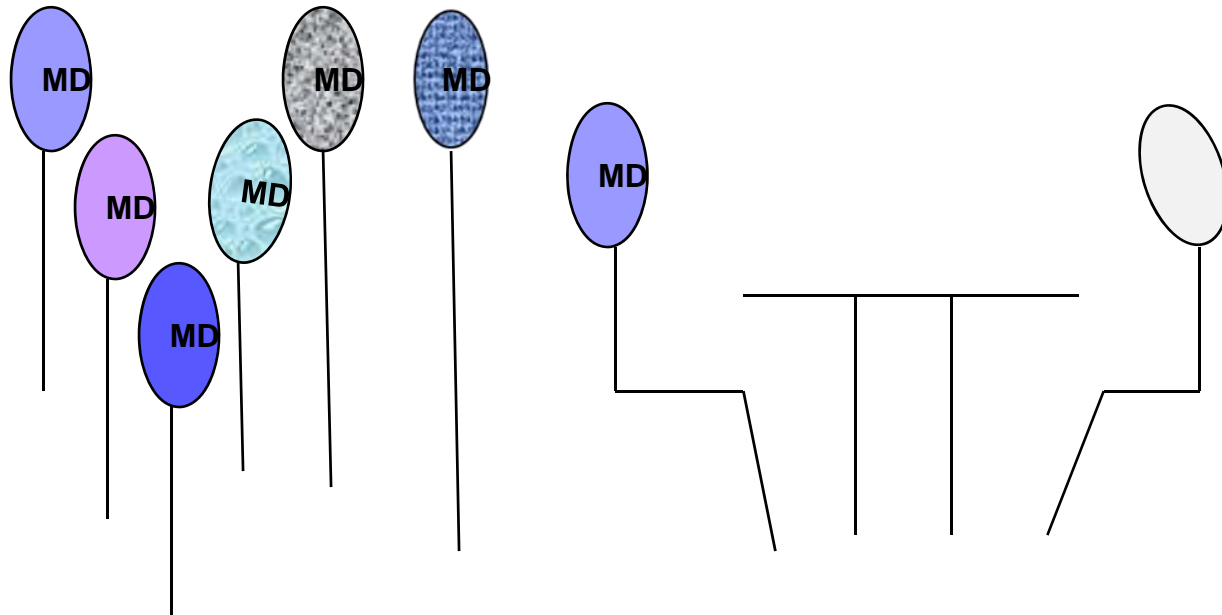
S	M	T	W	T	F	S



This “test”:

- Is unstandardized
- Results are cumulative (like GPA)
- Patients differ in performance

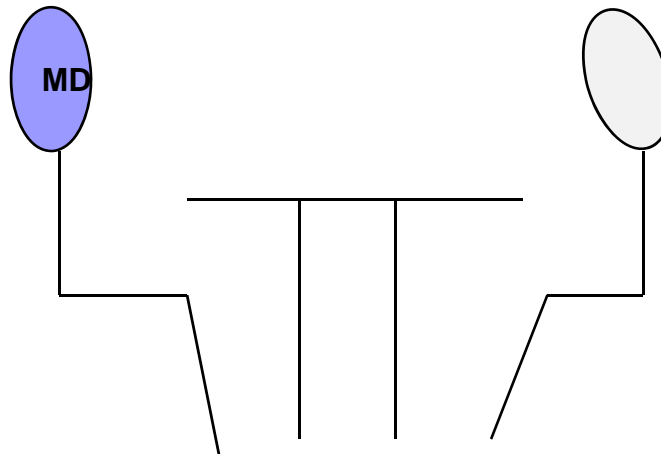
Reality 2: Physician Is Only One Among Others



Sometimes conflicting & often unintegrated care

Reality 3: Contact & Supervision Are Minimal—But Demands of Self-Care Are Constant

S	M	T	W	T	F	S
					*	



Occasional consultant

De facto primary care provider

S	M	T	W	T	F	S

Effective Self-Care Requires Minimizing Error Over the Long Haul

S M T W T F S

.1	.1	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1

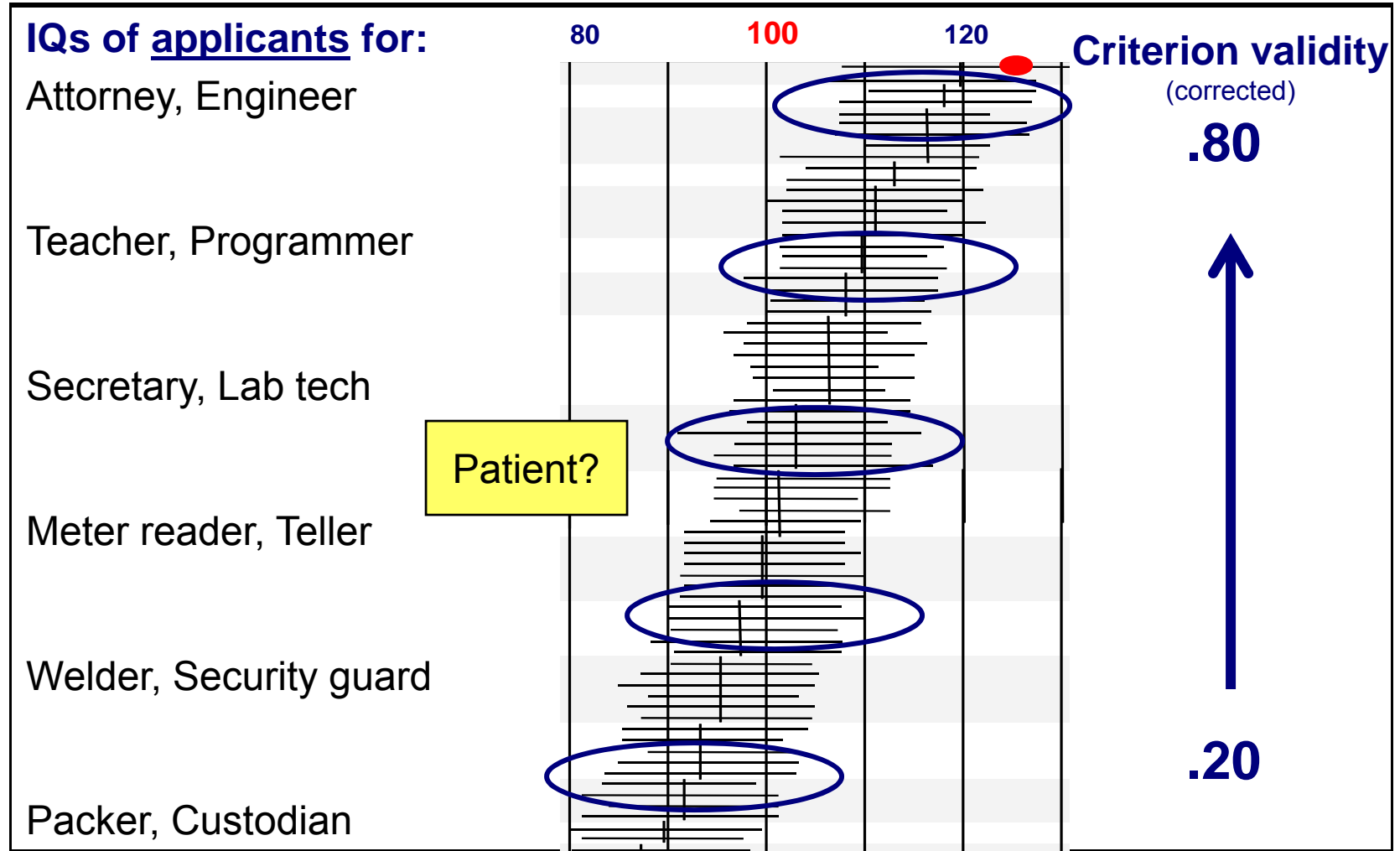
.1	.1	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1



Insights from Employment Literature


- Where and why IQ predicts job performance
- What makes jobs complex
- Highly regular, predictable patterns

IQ Predicts Best in Most Complex Jobs



Attributes of Complex Jobs

Job analysis 1 (Gottfredson, 1997)

Complex	r		
	.88	Self-direction	Combine information
	.86	Reason	Advise
	.85	Update knowledge	Write
	.83	Analyze	Plan
	.79	Lack of structure	Negotiate, Persuade
	.71	Criticality of position	Coordinate
			Instruct
Simple	-.73	Supervision	

Attorney (positioned between .86 and .88)

Teller (positioned between .51 and .36)

Custodian (positioned between -.49 and -.73)

Patient? (highlighted in a yellow box, positioned between .71 and .51)

Attributes of Complex Jobs

Job analysis 2 (Arvey, 1986)

Job requirements:

Correlation with factor

- | | |
|---|------------|
| ▪ <u>Learn</u> and recall relevant information | .75 |
| ▪ <u>Reason</u> and make judgments | .71 |
| ▪ Deal with unexpected situations | .69 |
| ▪ <u>Identify problem</u> situations quickly | .69 |
| ▪ React swiftly when unexpected
problems occur | .67 |
| ▪ Apply common sense to <u>solve problems</u> | .66 |
| ▪ <u>Learn</u> new procedures quickly | .66 |
| ▪ Be alert & <u>quick to understand</u> things | .55 |

Common Building Blocks of Job Complexity

■ Individual tasks

- Abstract, unseen processes; cause-effect relations
- Incomplete or conflicting information; much information to integrate; relevance unclear
- Inferences required; operations not specified
- Ambiguous, uncertain, unpredictable conditions
- Distracting information or events
- Problem not obvious, feedback ambiguous, standards change

■ Task constellation (Often neglected, even in job analyses)

- Multi-tasking, prioritizing
- Sequencing, timing, coordinating
- Evolving mix of tasks
- Little supervision; need for independent judgment

Chronic Diseases Are Like Jobs

- Set of duties to perform, actions to avoid
- Requires training
- Coordinate & communicate with others
- Exercise independent judgment
- Only occasional supervision or consultation
- Job changes as technology & conditions evolve
- Sometimes tiring, frustrating, affects family life
- Central to personal well-being
- Lifelong
- **But no vacations, no retirement**



Avoiding Chronic Illness Requires Foresight & Prevention

- Keep informed
- Live healthy lifestyle
- Get preventive checkups
- Detect signs and symptoms
- Seek timely, appropriate medical attention

State launches plan to stop rising rate of killer disease

About 15,000 in Del. don't know they're diabetic

By **SEAN O'SULLIVAN**
Staff reporter

Delaware health officials released a plan Tuesday they hope will help stop the rising rate of diabetes in the state by 2010, primarily through better education of adults and children, increased screening and by helping uninsured people treat the disease.

State officials estimate that 45,000 Delaware residents have diabetes, and that 15,000 of them do not know it because they have not been screened or diagnosed. Delaware has the fourth highest

diabetes death rate in the nation.

Diabetes is a disease that occurs when the body is not able to use sugar properly. Diabetes can cause adult blindness, kidney failure, heart disease and stroke, and require lower limb amputation. The ailment occurs more often in

women than men, more often in blacks than whites and more often among people older than 65. Those with a family history of diabetes also are at a greater risk, according to health officials.

The state's plan outlines a variety of strategies to avoid preventable cases of diabetes and help those who have the disease better treat it. Central to the plan is increased awareness through education and outreach in communities, schools and businesses, and expanded screening programs.

The plan's authors also hope by 2010 to provide coverage for diagnosis and treatment for 75 percent of people who have insurance or not enough to cover adequate care. The 54-page document is a follow-up to the "Burden of Diabetes," a report issued by the state in March documenting the extent of the diabetes problem in Delaware.

Lt. Gov. John Carney said Tuesday that the action plan should help Delaware qualify for \$800,000 in federal grants to implement

See **DIABETES** — B2



Registered nurse Bonnie Cunningham of Beebe Medical Center demonstrates the effect of high blood sugar on a person's veins.

Diabetes facts

Definition

Diabetes is a chronic disease that has no cure. Type 1 diabetes, in which the body does not produce any insulin, is most common in children and young adults. In Type 2, the body does not make enough insulin or properly use it to convert food to energy. Type 2 accounts for 90 percent to 95 percent of all cases.

Diabetes is the leading cause of blindness, end-stage kidney disease and non-traumatic lower limb amputations — amputations not caused by accidents. Diabetics are as much as four times more likely to have heart disease and suffer strokes.

Symptoms

- Frequent urination
- Excessive thirst
- Extreme hunger
- Unusual weight loss
- Increased fatigue
- Irritability
- Blurry vision
- Frequent infections

If you have one or more symptoms, see your doctor.

Who is most at risk?

- People with high blood pressure — at or above 130/85.
- People in a family with a history of diabetes.
- Mothers who had diabetes during pregnancy or had a baby weighing more than 9 pounds at birth.
- People who are overweight or obese.
- People who do not exercise much.

What to do

- Everyone older than 45 should be tested every three years.
- Those who are younger, but at higher risk, should consult with their doctors about starting screenings sooner and more frequently.

For information/help

- Call (800) 342-2383
- Visit the American Diabetes Association Web site at www.diabetes.org.

Sources: American Diabetes Association and the Centers for Disease Control and Prevention

Chronic Illnesses Require Self-Regulation

- Follow treatment regimen
 - Use medications as prescribed
 - Diet, exercise, no smoking, etc.
 - Including for diseases without outward signs (e.g., hypertension)
- Monitor daily signs and symptoms
- Adjust medication and behavior in response to signs
- Have regular check-ups

Example: Diabetic's Job

- **Learn about diabetes in general (At “entry”)**
 - Physiological process
 - Interdependence of diet, exercise, meds
 - Symptoms & corrective action
 - Consequences of poor control
- **Apply knowledge to own case (Daily, Hourly)**
 - Implement appropriate regimen
 - Continuously monitor physical signs
 - Diagnose problems in timely manner
 - Adjust food, exercise, meds in timely and appropriate manner
- **Coordinate with relevant parties (Frequently)**
 - Negotiate changes in activities with family, friends, job
 - Enlist/capitalize on social support
 - Communicate status and needs to HCPs
- **Update knowledge & adjust regimen (Occasionally)**
 - When other chronic conditions or disabilities develop
 - When new treatments available
 - When life circumstances change

Specific Duties: Insulin-Dependent Diabetics

Urban hospital outpatients: % diabetics <u>not</u> knowing that:	Health literacy level		
	V-low	Low	OK
Signal: Thirsty/tired/weak usually means <u>blood sugar too high</u> →	40	31	25
Action: Exercise lowers blood sugar →	60	54	35
Signal: Suddenly sweaty/shaky/hungry usually means <u>blood sugar too low</u> →	50	15	6
Action: Eat some form of sugar →	62	46	27

Good Performance (Adherence) in Job of Diabetes

- **IT IS NOT** mechanically following a recipe
- **IT IS** keeping a complex system under control in often unpredictable circumstances
 - Coordinate a regimen having multiple interacting elements
 - Adjust parts as needed to maintain good control of system buffeted by many other factors
 - Anticipate lag time between (in)action and system response
 - Monitor advance “hidden” indicators (blood glucose) to prevent system veering badly out of control
 - Decide appropriate type and timing of corrective action if system veering off-track
 - Monitor/control other shocks to system (infection, emotional stress)
 - Coordinate regimen with other daily activities
 - Plan ahead (meals, meds, etc.)
 - For the expected
 - For the unexpected and unpredictable
 - Prioritize conflicting demands on time and behavior

Extremely Complex



Cognitive barriers for Many diabetics

Cognitive Barriers for Many Diabetics

■ Known

- Abstract concepts in meal planning: carbohydrates (“includes sugar, but not pasta”)
- Immediate costs and benefits are favored over future benefits and costs (cheating on one’s diet, failure to monitor blood glucose)

■ Underappreciated

- Assuming that non-adherence which causes no obvious immediate harm isn’t dangerous (DKA from failing to take insulin for several days)
- False security from not grasping abstract concepts of risk, probability, & cumulative damage (“Not planning ahead/not testing myself hasn’t gotten me in trouble, so there is no need for it.”)
- Not knowing when a deviation is big enough or frequent enough to cause concern (elevated glucose readings)
- Cognitive overload (“It’s too complicated—too much to bother with.”)
- Distrust created when patients don’t understand the limits of medical understanding and advice (“I’m not going to listen to her anymore because the medicine she gave me didn’t work.” Or, “He said he didn’t know if it would work.”)
- **NOTE: These are not arbitrary “beliefs” that can just be replaced; they are failures to comprehend (“cognitive errors”)**

Treatment regimens becoming more complex

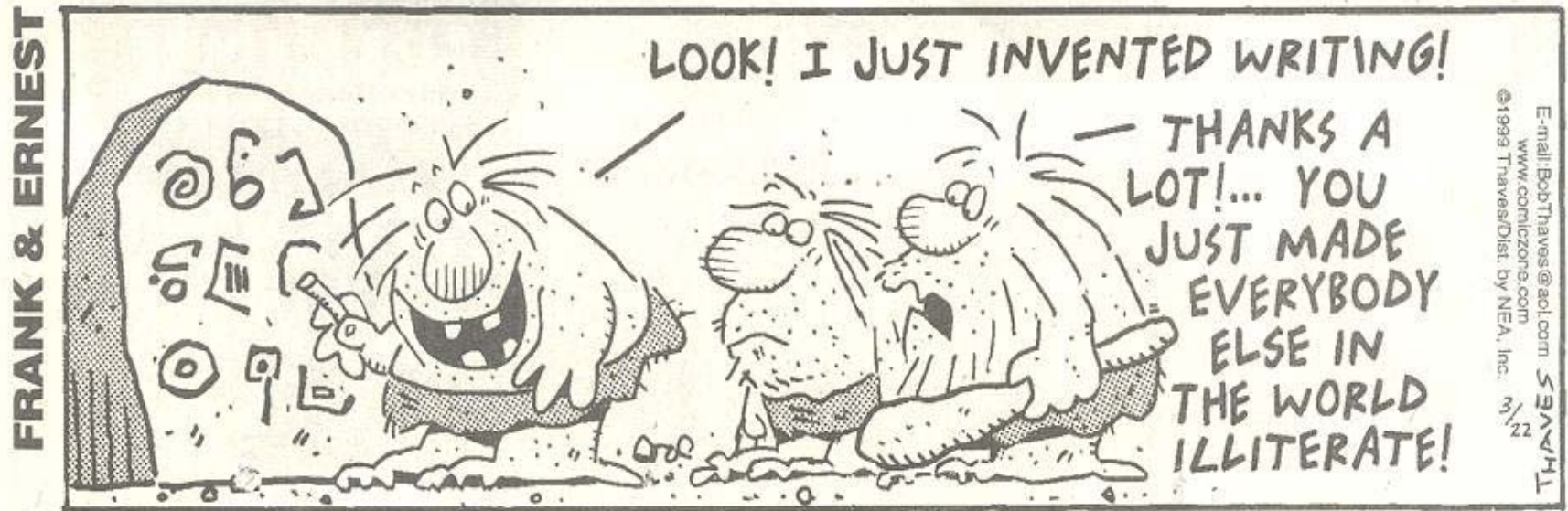
■ Heart attacks

□ 1960's—just “good luck”

□ Now often includes:

- regimen of aspirin, β -blocker, angiotensin-converting enzyme inhibitor
- low-salt and low-cholesterol diet
- Medicine to control hypertension, diabetes, & hypercholesterolemia

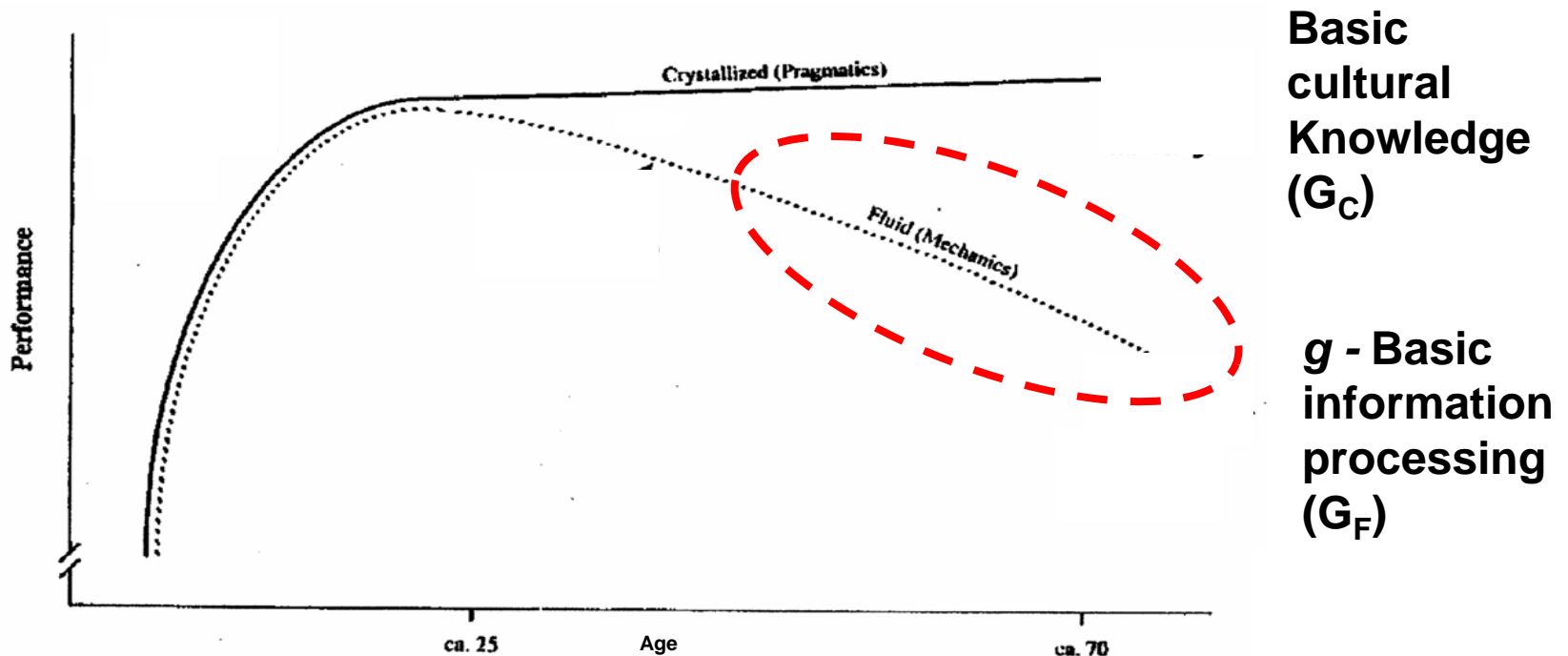
Complexity Favors Brighter Patients



Increasing Complexity Favors the Young

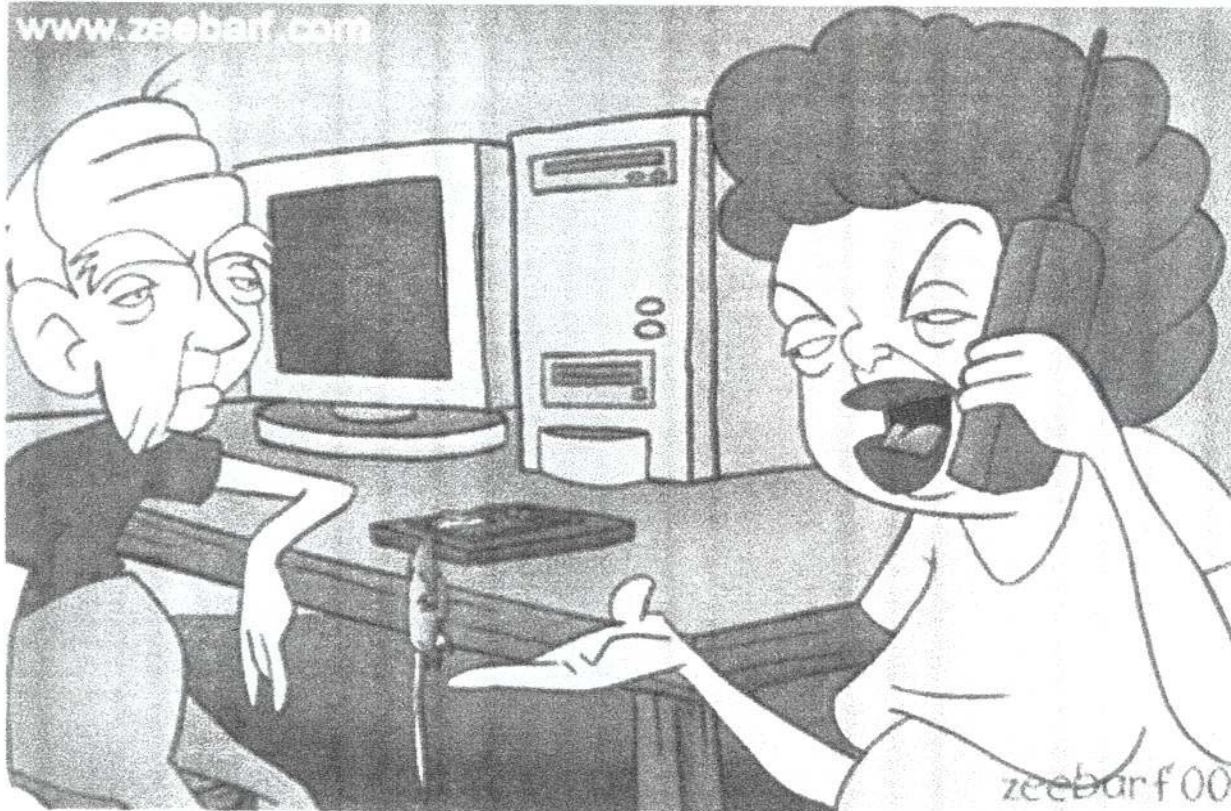
Raw mental horsepower (ability to learn and reason) rises into early adulthood, then falls[☀]

Average profile only



☀ Score relative to age mates ("IQ") is stable from adolescence on

Complexity & Aging



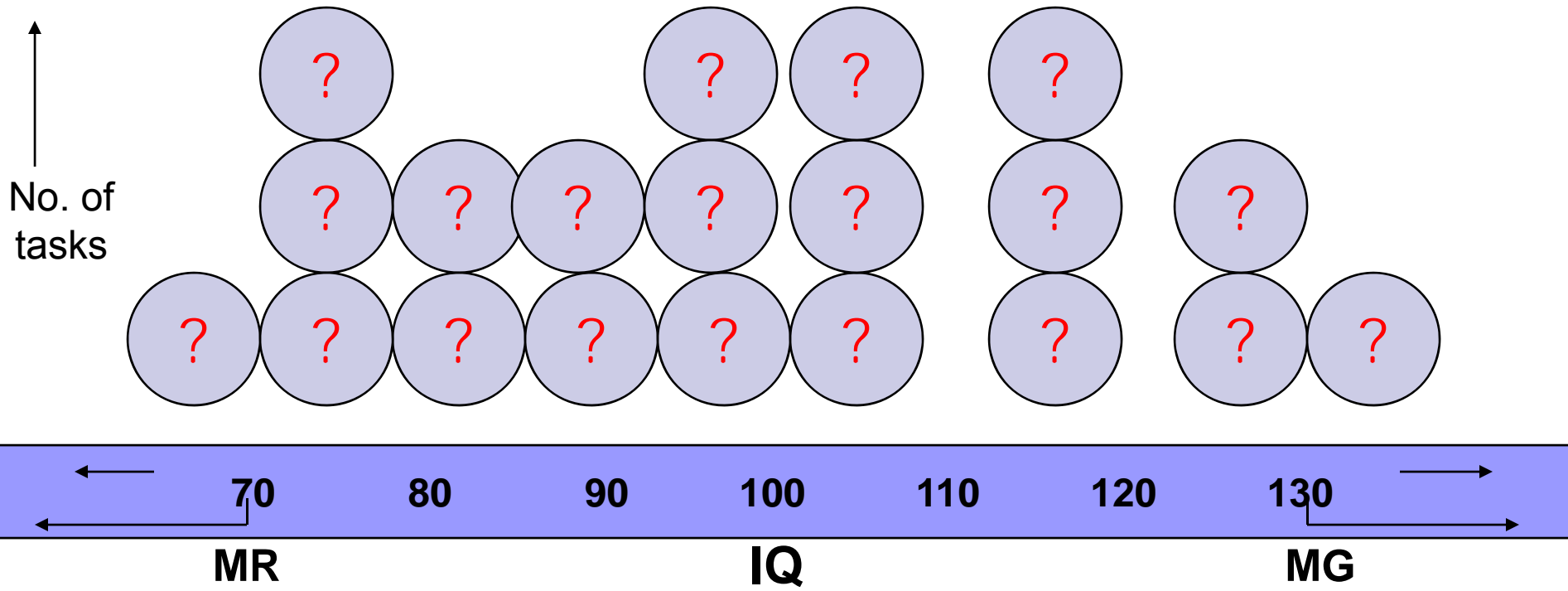
"Okay your father
managed to get a mouse.
Now how do we use it?"

Distribution of Cognitive Hurdles?

Medical advances increase complexity

Easy is

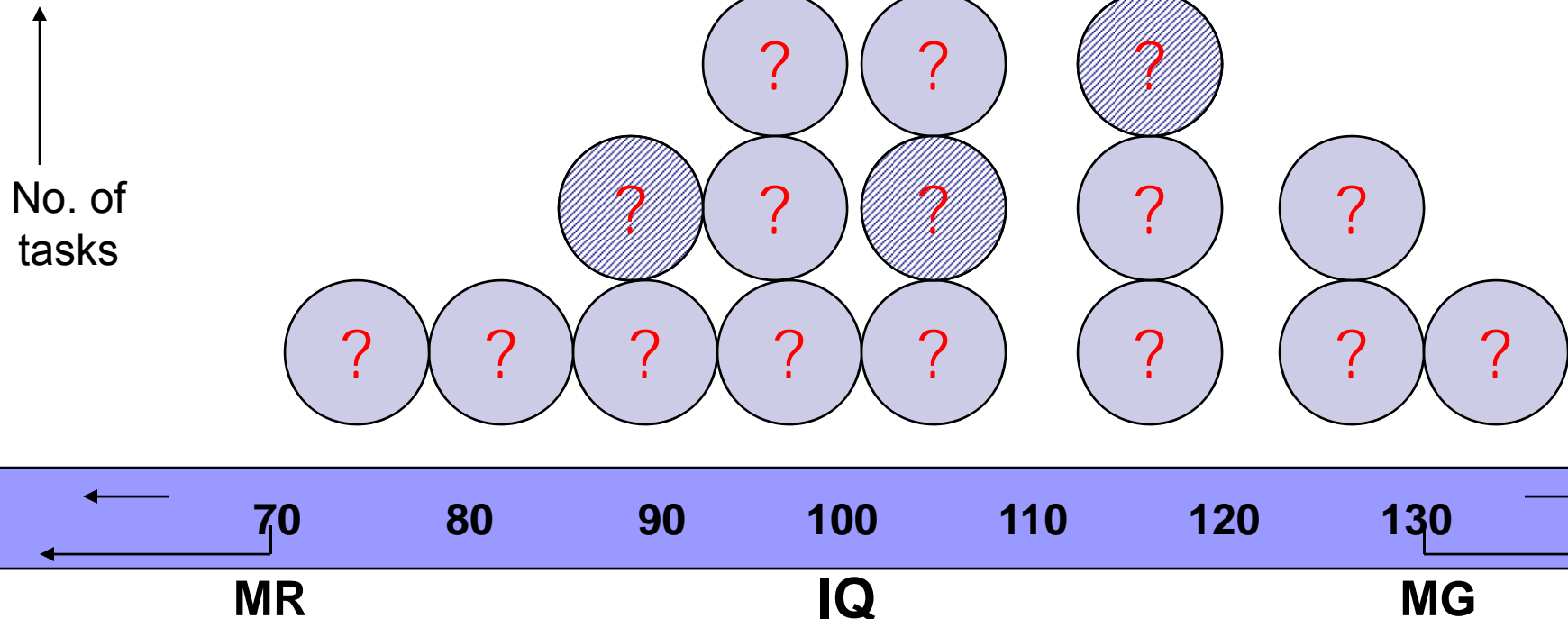
Broad range is more likely



Distribution of Cognitive Hurdles?

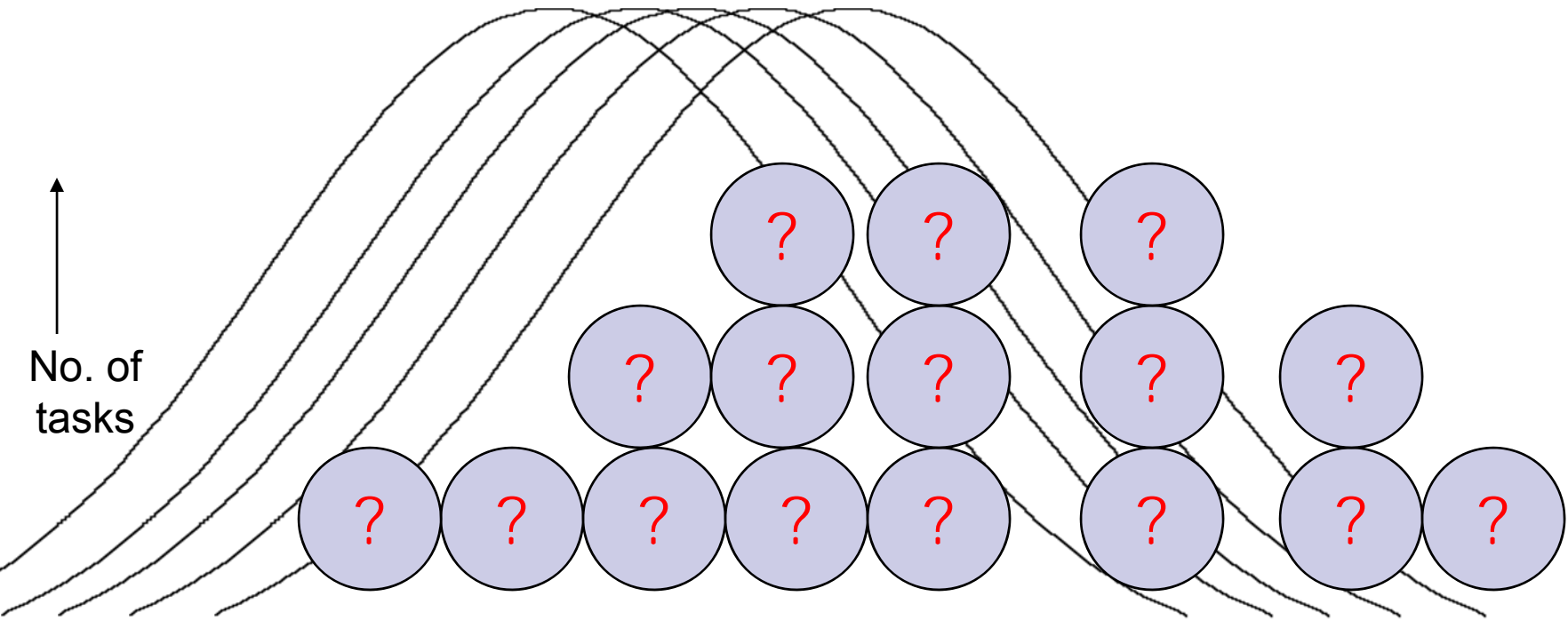
Medical advances increase complexity

Some complexity unnecessary, but much inherent



Distribution of Cognitive Hurdles?

Aging lowers our ability to deal with it



But *g* Theory Opens New Vistas

Strong evidence base, clockwork patterns

- What to do
 - How to audit task complexities in self-care
 - How to audit total job complexity (e.g., diabetes self-management)
 - How to audit patient populations' cognitive needs
 - How to quickly estimate individual patient's cognitive needs and supports
 - How to fashion instruction more sensitive to patient's cognitive needs

 - What to expect
 - Which self-care tasks will have highest error rates (non-adherence)
 - How changes in task complexity will change adherence rates
 - Size of age & race disparities to expect on different health tasks
 - How disparities will increase or decrease with as treatment complexity rises or falls
- New tools for providers—all providers
 - More feasible than eradicating social inequality
 - More humane than denying ability differences

Specific Opportunities—1

- Patient differences in g
 - Train providers
 - Size, nature, distribution, practical meaning of differences
 - Recognize/communicate across large IQ gaps
 - Create short unobtrusive measure of “literacy”
 - Target pockets of high error
 - Identify options for cognitive scaffolding
 - Tailored instruction, comprehension checks
 - Feedback, monitoring, retraining, reminders, hotlines
 - Auxiliary staff, family

Schools do it, military and employers do it

Specific Opportunities—2

- Task differences in complexity
 - Audit complexity in:
 - Information & instructions
 - Individual treatments, diseases
 - Clinic layout, patient interface
 - Target tasks with:
 - High expected error rates
 - Needless complexity
 - Write job descriptions for chronic diseases
 - Biggest cognitive barriers to adherence
 - Touch-points for intervention to surmount barriers
 - Set priorities for triage

Badly neglected, everywhere

Unnecessary Complexity

Back of a box of cold medicine

INDICATIONS: These **Maximum Strength** Tablets contain four effective ingredients for the temporary relief of these major cold and flu symptoms: A **Nasal Decongestant**—to relieve stuffy nose and sinus congestion. An **Antihistamine**—to dry up runny nose and relieve sneezing. A **Cough Suppressant**—to quiet cough. A **Non-aspirin Analgesic**—to relieve headache, fever, minor sore throat pain and body aches and pain.

DIRECTIONS: **Adults:** 2 tablets every 6 hours while symptoms persist, not to exceed 8 tablets in 24 hours, or as directed by a doctor. **Children under 12:** Consult a doctor.

WARNINGS: **KEEP THIS AND ALL OTHER MEDICATIONS OUT OF THE REACH OF CHILDREN. IN CASE OF ACCIDENTAL OVERDOSE, SEEK PROFESSIONAL ASSISTANCE OR CONTACT A POISON CONTROL CENTER IMMEDIATELY. PROMPT MEDICAL ATTENTION IS CRITICAL FOR ADULTS AS WELL AS FOR CHILDREN.** Do not take this product if you are pregnant or nursing a baby. Consult your health professional before using this product. Do not give this product to children under 12 years of age. If symptoms do not improve or last for more than 3 days, if new symptoms occur, or if redness or swelling is present, consult a doctor. Do not exceed recommended dosage. If rash occurs, discontinue use. If more than 7 days, tends to recur or is accompanied by rash, persistent headache, or if new symptoms occur, consult a doctor. Do not take this product if you are taking this product with or occurs with smoking, asthma or emphysema, or if you are accompanied by excessive phlegm (mucus/sputum) unless directed by a doctor. If sore throat is severe, persists for more than 2 days, is accompanied or followed by a fever, headache, rash, nausea or vomiting, consult a doctor promptly. Do not take this product, unless directed by a doctor, if you have a breathing problem such as

emphysema or chronic bronchitis, or if you have heart disease, high blood pressure, thyroid disease, diabetes, glaucoma or difficulty in urination due to prostate enlargement. May cause marked drowsiness. Sedatives or tranquilizers may increase drowsiness. Do not drink alcoholic beverages while taking this product. Do not take this product if you are taking sedatives or tranquilizers without first consulting your doctor. Use caution when driving a motor vehicle or operating machinery. May cause excitability, especially in children.

ALCOHOL WARNING: If you generally consume 3 or more alcohol-containing drinks per day, you should consult your physician for advice on when and how you should take this product and other pain relievers.

DRUG INTERACTION PRECAUTION: Do not use this product if you are now taking a prescription monoamine oxidase inhibitor (MAOI) (certain drugs for depression, psychiatric or emotional conditions, or Parkinson's disease), or for two weeks after stopping the MAOI drug. If you are uncertain whether your prescription drug contains an MAOI, consult a health professional before taking this product.

ACTIVE INGREDIENTS (PER TABLET): Acetaminophen 500mg; Dextromethorphan HBr 15mg; Chlorpheniramine Maleate 2mg; Pseudoephedrine HCl 30mg.

OTHER INGREDIENTS: Carnauba Wax, Croscarmellose Sodium, D&C Yellow No. 10 Aluminum Lake, FD&C Red No. 40 Aluminum Lake, Hydroxypropyl Methylcellulose, Magnesium Stearate, Microcrystalline Cellulose, Polydextrose, Polyethylene Glycol, Povidone, Sodium Starch Glycolate, Starch, Stearic Acid, Titanium Dioxide, Triacetin.

STORE AT ROOM TEMPERATURE.

*This product is not manufactured or distributed by Bristol-Myers Products, distributor of Comtrex®.

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Only 61% of adults

Cluttered

Poor chunking

Key points buried

Hard words

New Labeling Regulations

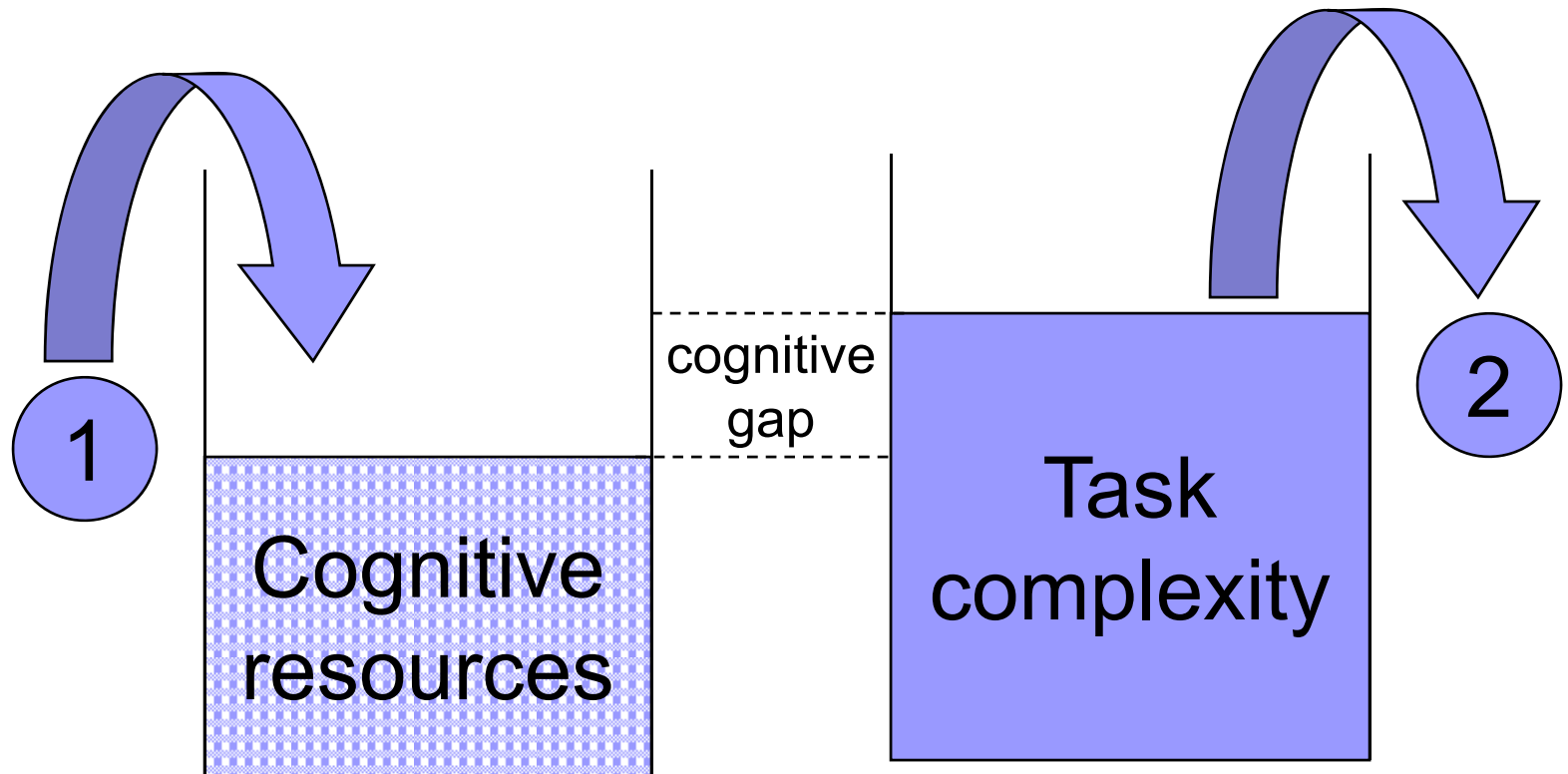
Simpler words, etc.

<h2>Drug Facts</h2> <p>Active ingredients (in each softgel)</p> <table><tr><td>Guaifenesin, USP 200 mg.....</td><td>Expectorant</td></tr><tr><td>Pseudoephedrine HCl, USP 30 mg.....</td><td>Nasal decongestant</td></tr></table> <p>Uses</p> <ul style="list-style-type: none">temporarily relieves nasal congestion associated with<ul style="list-style-type: none">the common coldhay feverupper respiratory allergiessinusitishelps loosen phlegm (mucus) and thin bronchial secretions to make coughs more productive <p>Warnings</p> <p>Do not use if you are now taking a prescription monoamine oxidase inhibitor (MAOI) (certain drugs for depression, psychiatric, or emotional conditions, or Parkinson's disease), or for 2 weeks after stopping the MAOI drug. If you do not know if your prescription drug contains an MAOI, ask a doctor or pharmacist before taking this product.</p> <p>Ask a doctor before use if you have</p> <ul style="list-style-type: none">heart diseasehigh blood pressurethyroid diseasediabetestrouble urinating due to an enlarged prostate glandcough that occurs with too much phlegm (mucus)cough that lasts or is chronic such as occurs with smoking, asthma, chronic bronchitis, or emphysema	Guaifenesin, USP 200 mg.....	Expectorant	Pseudoephedrine HCl, USP 30 mg.....	Nasal decongestant	<h2>Drug Facts (continued)</h2> <p>Stop use and ask a doctor if</p> <ul style="list-style-type: none">you get nervous, dizzy, or sleeplesssymptoms do not get better within 7 days or are accompanied by fevercough lasts more than 7 days, comes back, or is accompanied by fever, rash, or persistent headache. These could be signs of a serious condition. <p>If pregnant or breast-feeding, ask a health professional before use.</p> <p>Keep out of reach of children. In case of overdose, get medical help or contact a Poison Control Center right away.</p> <p>Directions</p> <ul style="list-style-type: none">do not use more than 4 doses in any 24-hour period <table border="1"><thead><tr><th>Age</th><th>Dose</th></tr></thead><tbody><tr><td>adults and children 12 years and over</td><td>2 softgels every 4 hours</td></tr><tr><td>children 6 to under 12 years</td><td>1 softgel every 4 hours</td></tr><tr><td>children under 6 years</td><td>ask a doctor</td></tr></tbody></table> <p>Other information ■ store at 20-25°C (68-77°F)</p> <p>Inactive ingredients FD&C green no. 3, gelatin, glycerin, mannitol, pharmaceutical glaze, polyethylene glycol, povidone, propylene glycol, sorbitan, sorbitol, titanium dioxide, water</p>	Age	Dose	adults and children 12 years and over	2 softgels every 4 hours	children 6 to under 12 years	1 softgel every 4 hours	children under 6 years	ask a doctor
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But written materials are only a small part of the problem

Can Reduce Risk of Error

1. Provide cognitive assistance
2. Reduce task complexity



Thank you.

