Managing One's Diabetes: Lifelong Career with Relentless Reasoning Demands

Linda S. Gottfredson, PhD

***Allied Health Symposium: Inform, Perform, Transform
Diabetes Association of Greater Cleveland
March 2, 2006***

School of Education, www.udel.edu/educ

Diabetes in the News

Diabetes and Its Awful Toll Quietly Emerge as a Crisis

As Cases Surge in New York, So Do Fears Of an Overburdened Medical System

By N. R. KLEINFIELD

Begin on the sixth floor, third room from the end, swathed in fluorescence: a 60-year-old woman was having two toes sawed off. One floor up, corner room: a middle-aged man sprawled, recuperating from a kidney transplant. Next door: nerve damage. Eighth floor, first room to the left: stroke. Two doors down: more toes being removed. Next room: a flawed heart.

As always, the beds at Montefiore Medical Center in the Bronx were filled with a universe of afflictions. In truth, these assorted burdens were all the work of a single illness: diabetes. Room after room, floor after floor, diabetes. On any given day, hospital officials say, nearly half the patients are there for some trouble precipitated by the disease.

An estimated 800,000 adult New Yorkers — more than one in every eight — now have diabetes, and city health officials describe the problem as a bona fide epidemic. Diabetes is

The prospect is frightening, but it has gone largely unnoticed outside public health circles. As epidemics go, diabetes has been a quiet one, provoking little of the fear or the prevention efforts inspired by AIDS or lung cancer.

In its most common form, diabetes, which allows excess sugar to build up in the blood and exact ferocious damage throughout the body, retains an outdated reputation as a relatively benign sickness of the old. Those who get it do not usually suffer any symptoms for years, and many have a hard time believing that they are truly ill.

Yet a close look at its surge in New York offers a disturbing glimpse of

BAD BLOOD

The Stealth Epidemic

First of Four Articles

Hints of its challenges to providers

The Vexing Compliance Problem

- Low rates of adherence
- Common to all chronic diseases
- Causes not clear
- Consequences costly in lives & dollars

A New Take on the Problem

1. Managing diabetes is like having a job—a lifelong career.

2. Intelligence (learning & reasoning ability) is best single predictor of job performance. It's more predictive in more complex jobs.

3. Diabetes self-management is complex, but some parts especially so.

4. Intelligence can't be changed, but task complexity can.

5. So we need to identify, and minimize, the biggest cognitive hurdles to effective self-management.

School of Education, www.udel.edu/educ

How is managing diabetes like having a job—a lifelong career?

DSME Content Areas (Standard 7 Goals for Patient Learning)

- Disease process
- Nutrition
- Physical activity
- Medications
- Monitoring
- Prevent/detect/treat
  - Acute complications
  - Chronic complications

- Goal setting/problem solving for daily living
- Psychosocial adjustment
- Preconception care/gestational management

Patients are not—cannot be—passive recipients of care.

Patient's Job

- **Learn about diabetes in general (At "entry')**
  - Physical 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

Diabetes Is Like a Career

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

UNIVERSITY OF DELAWARE

Good Performance=Adherence

- **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

Relentless demands for reasoning!

How well does intelligence predict job performance?

Influences Studied

External

- Resources
- Working conditions

- Task complexity

    A "Moderator"

Internal

- Personality
- Interests

    "Will Do"

- Knowledge
- Abilities

    "Can Do"

- Experience

    "Have Done"

1000's of studies in personnel selection psychology

Summary of Findings

Conscientiousness

Experience

Knowledge

Mental ability

Performance →

Rewards

UNIVERSITY OF DELAWARE.
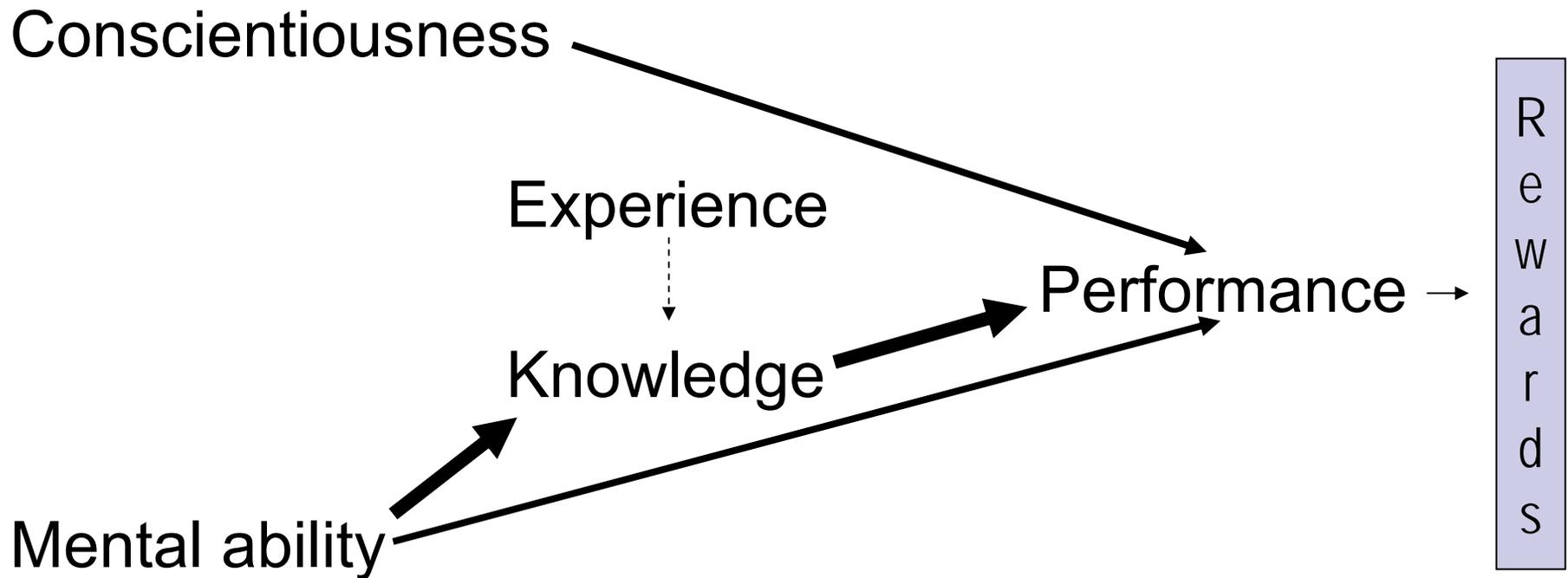
Results Differ by Type of Work

- <u>Not</u> by content of work
- But by <u>complexity</u> of work

Recall that regimen complexity is also
a consistent predictor of adherence rates.
Big clue!

IQ Predicts Performance Best in Most Complex Jobs

IQs of applicants for:	80	100	120	IQs: Middle 50%
Attorney, Engineer				108-128
Teacher, Programmer				100-120
Secretary, Lab tech				96-116
Meter reader, Teller				91-110
Welder, Security guard				85-105
Packer, Custodian				80-100

Diabetes??

.8

.5

.2
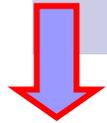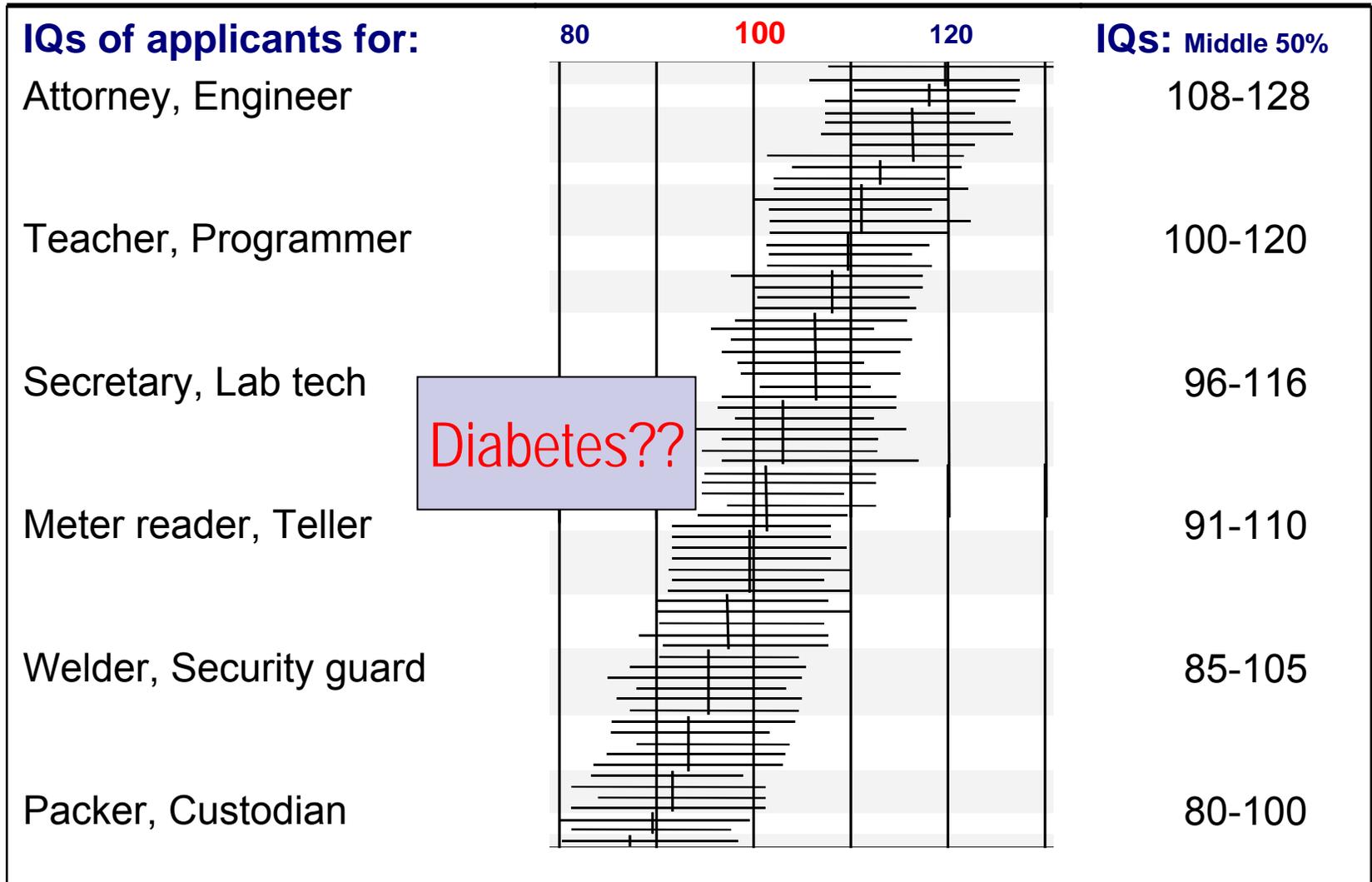
Findings for Low-Complexity Jobs

Conscientiousness

Experience

Knowledge

Mental ability

Performance

R
e
w
a
r
d
s

School of Education, www.udel.edu/educ
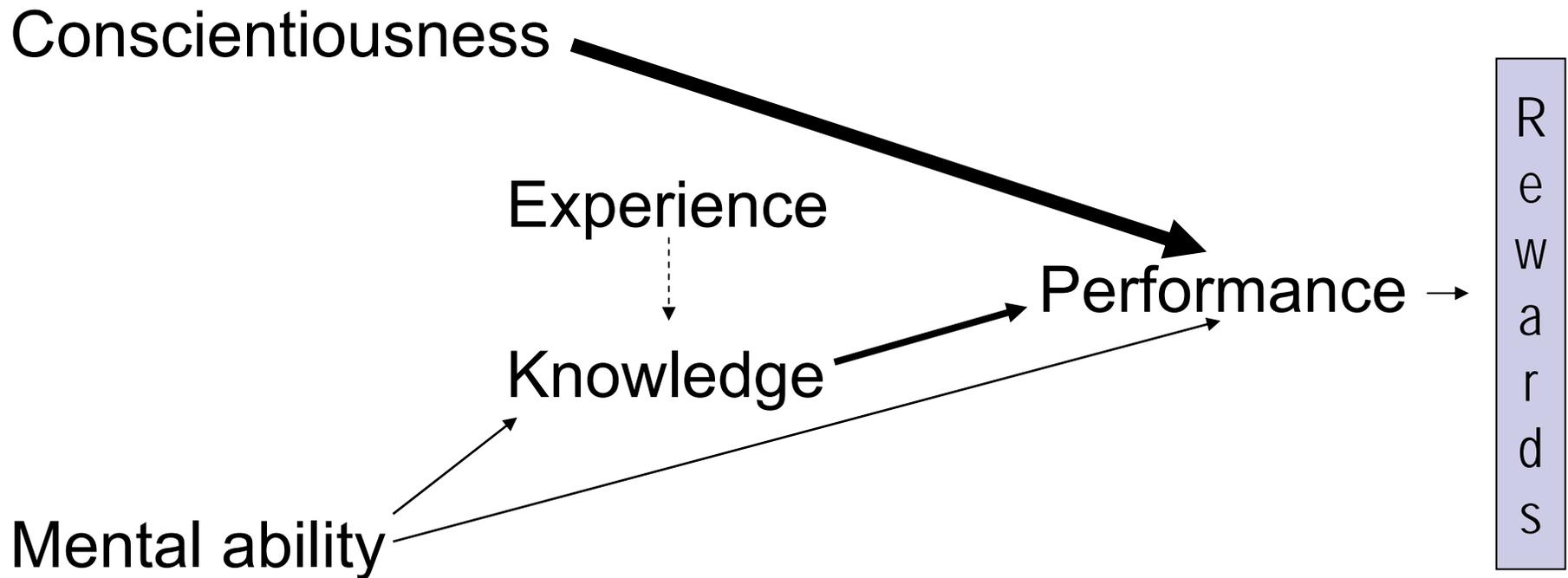
Findings for High-Complexity Jobs

Conscientiousness

Experience

Knowledge

Mental ability

Performance →

R e w a r d s
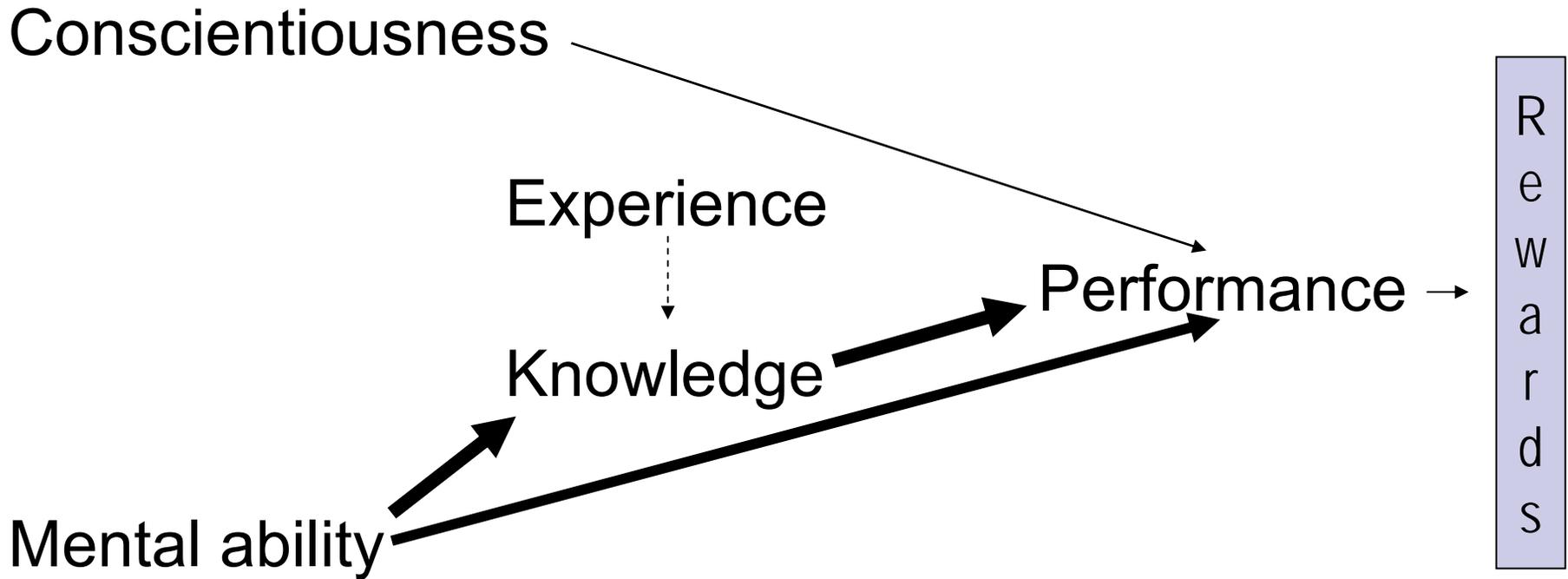
Higher intelligence is bigger advantage in more complex jobs

Oft-Suggested Determinants of Adherence[*]

- Depression
- Personality disorder
- Drug abuse
- Patient beliefs
- Older age

- Dosing frequency
- Cost of therapy
- Underinsurance
- Adverse family dynamics
- Poor relation with provider

"Can do" factors neglected!

Cognitive Aging: Another Clue

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

Average profile only

Basic cultural Knowledge (G_C)

g - Basic information processing (G_F)
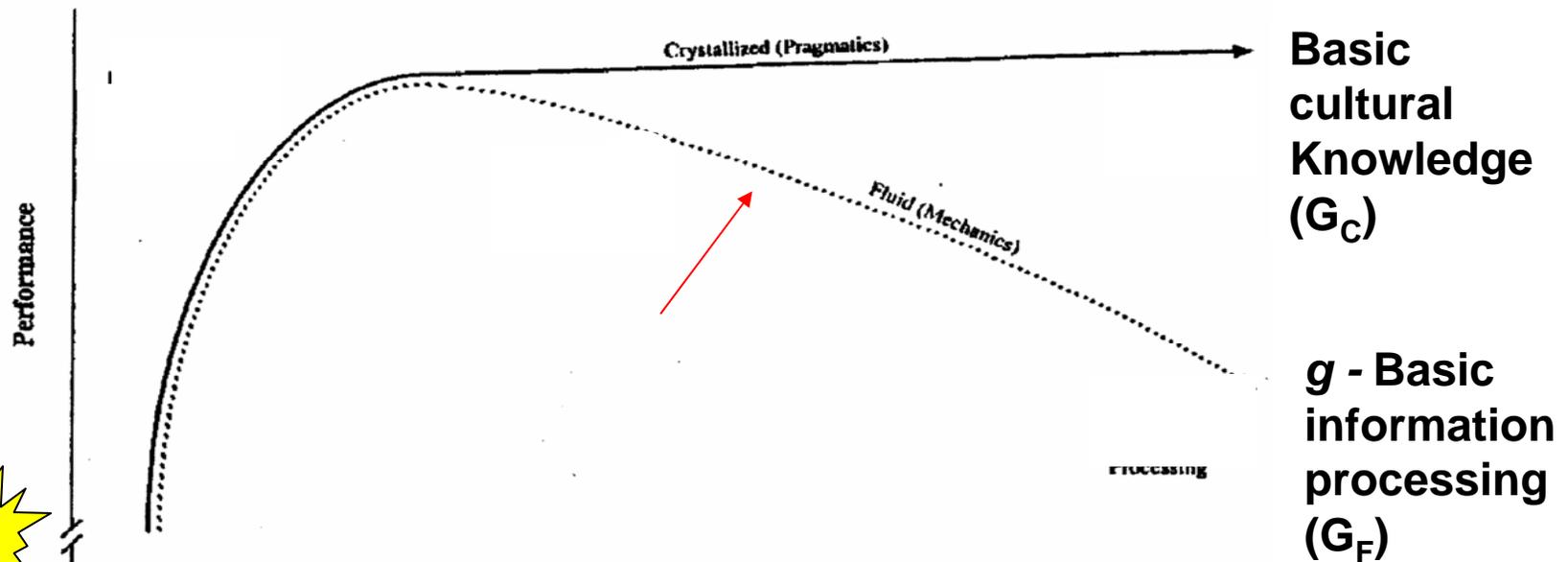
But score _relative to age mates_ ("IQ") is stable from adolescence on

Job Model of Adherence

"Will Do"

Resources

H
e
a
l
t
h

Experience

Adherence

Knowledge

"Can Do"

Conditions

UNIVERSITY OF DELAWARE
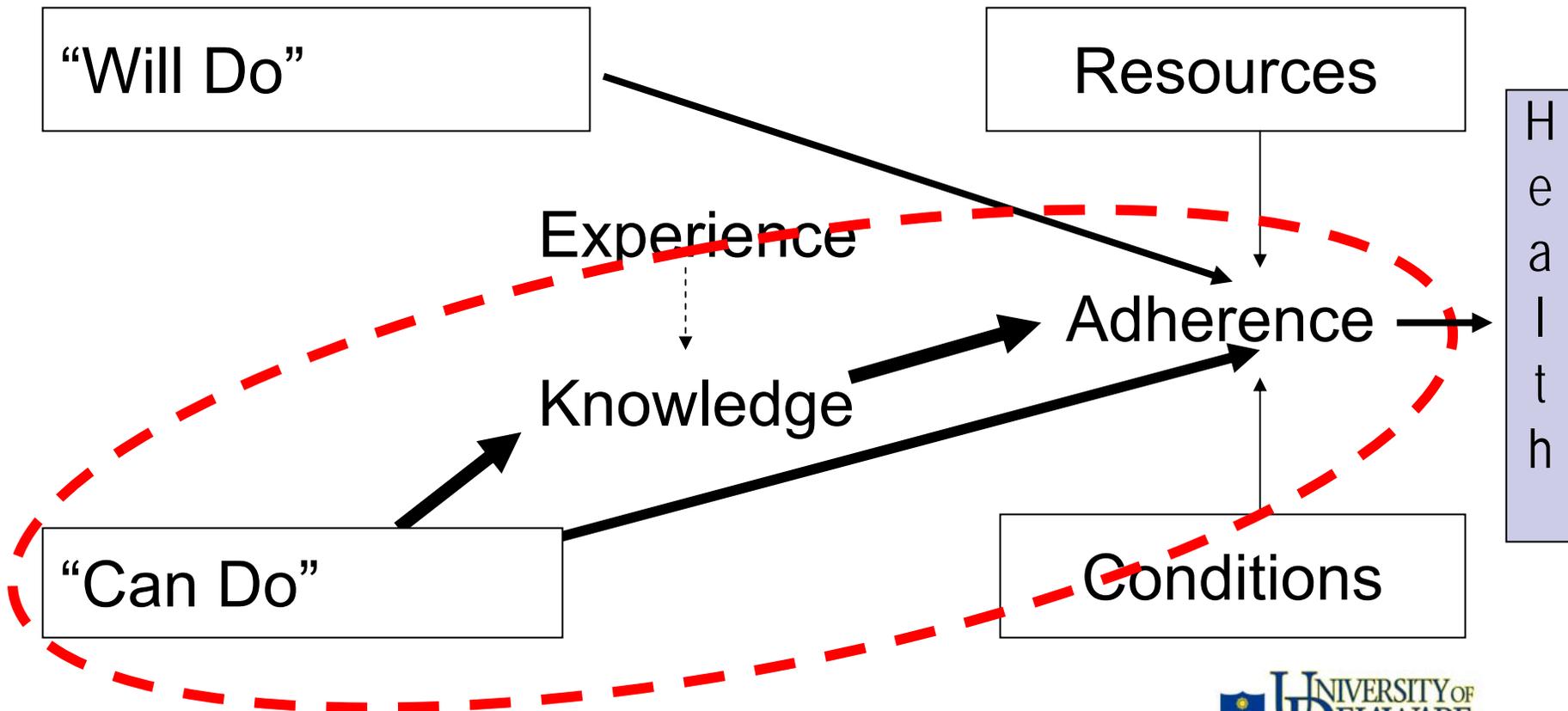
Equality Paradox: Ability Matters More When Resources Equalized

"Will Do"

Resources ✗

"Can Do"

Experience

Knowledge

Adherence

Conditions ✗
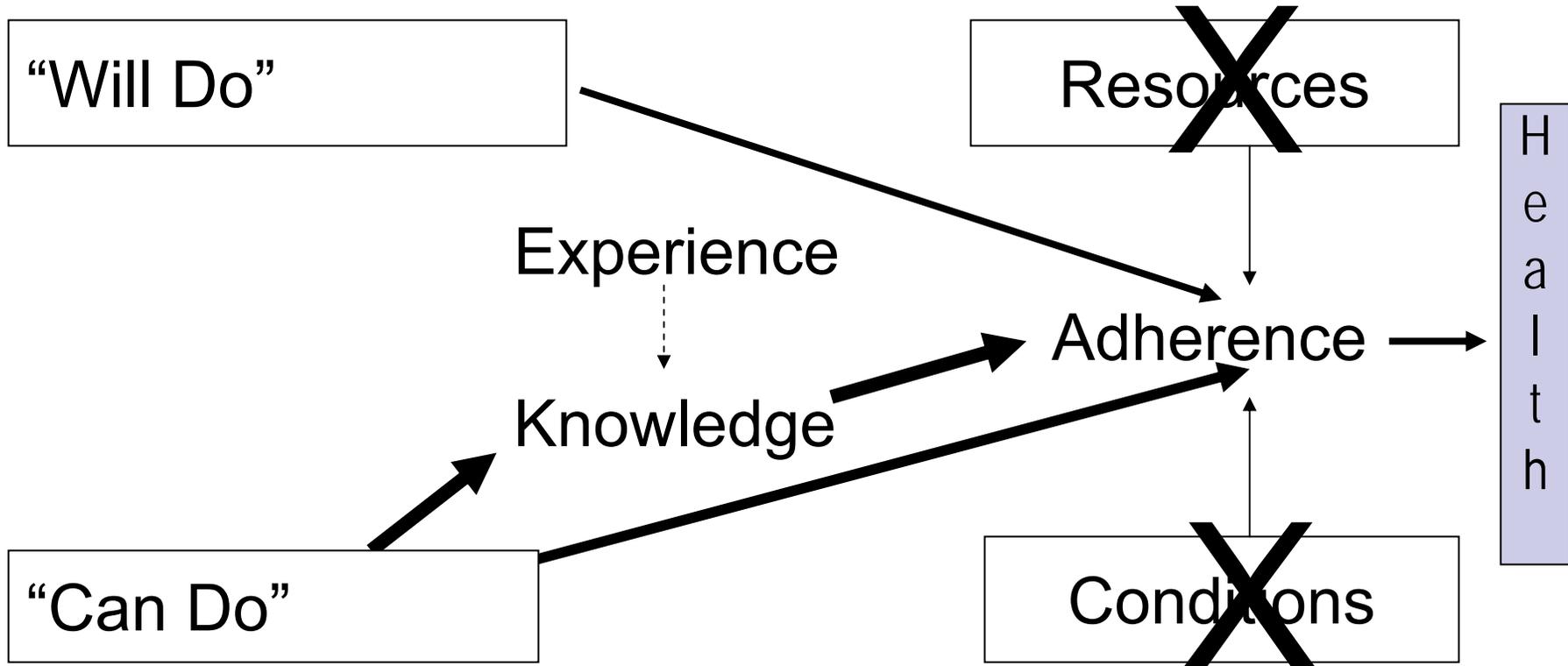
Health

Is there any evidence that intelligence really does affect health?

Yes, and Mounting

- Early IQ predicts later health outcomes
- Predicts at least as well as does socioeconomic status

Example: Longevity

- Childhood IQ predicts longevity

- 8 big cohort studies

(Whites)	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

Example: Motor Vehicle Deaths

■ IQ at Age 18

Australian veterans followed to age 40	Death rate per 10,000	
IQ: above 115	51.3	
100-115	51.5	
85-100	92.2	**2x**
80- 85	146.7	**3x**

"People with lower IQ may have a poorer ability to assess risks and, consequently, may take more risks in their driving."

1 more IQ point = 1% lower death rate

But *why* would intelligence be important in jobs and health?

First, We Need To Know

- What is it?

- How much do people differ?

- Which kinds of tasks call upon it most?

Many Abilities But One Intelligence—The *g* Factor

- All abilities correlated
- They differ in generality
- *g* is backbone of all others

General
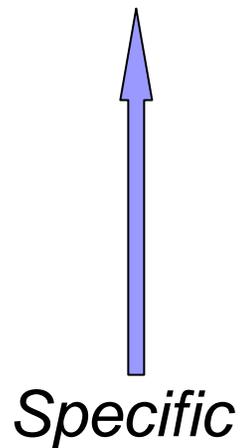
g =
- **Skill at processing complex information**
- **Any kind of content**

Specific

V   Q   S   M   others

UNIVERSITY OF DELAWARE
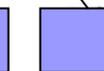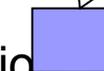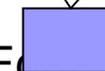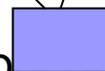
What Is The General Factor (*g*)?

Everyday meaning:

- Ability to reason, plan, spot and solve problems, think abstractly, comprehend complex ideas, learn quickly and from experience.

- Ability to "catch on," "make sense of things," and "figure out what to do."

Adept learning and reasoning

Most Fundamentally—

- *g* is ability to mentally manipulate information
- Concrete examples:
  - Digits Forward vs. Digits Backward
- Tests that measure *g* better are more "*g* loaded"
  - Reading comprehension vs. spelling
  - Math reasoning vs. arithmetic
 - The former two require more reasoning than the latter

School of Education, www.udel.edu/educ

How Much Do People Differ?

No. of people (whites)

5%   20%   50%   20%   5%

70   80   90   100   110   120   130

MR   IQ   MG
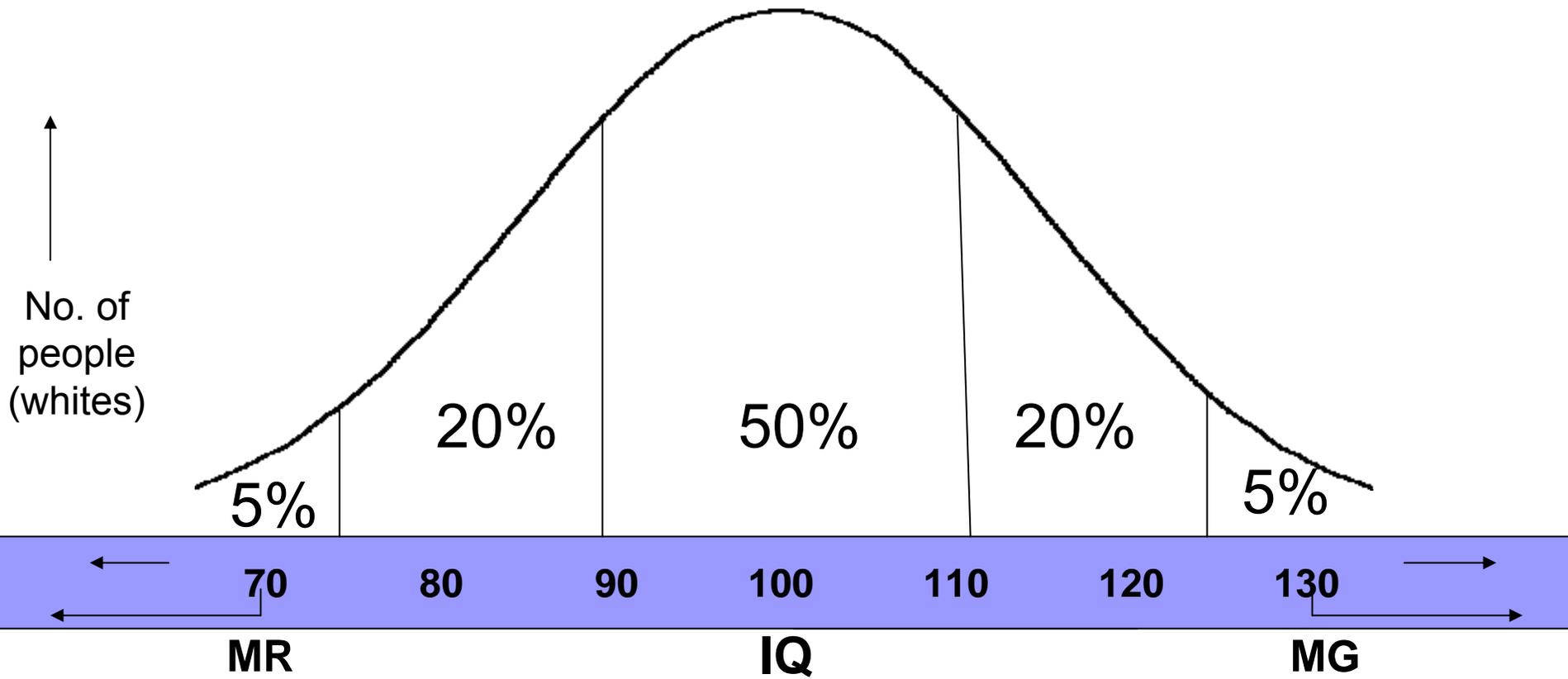
IQ/*g* Level Affects Life Chances

Typical IQ range of workers
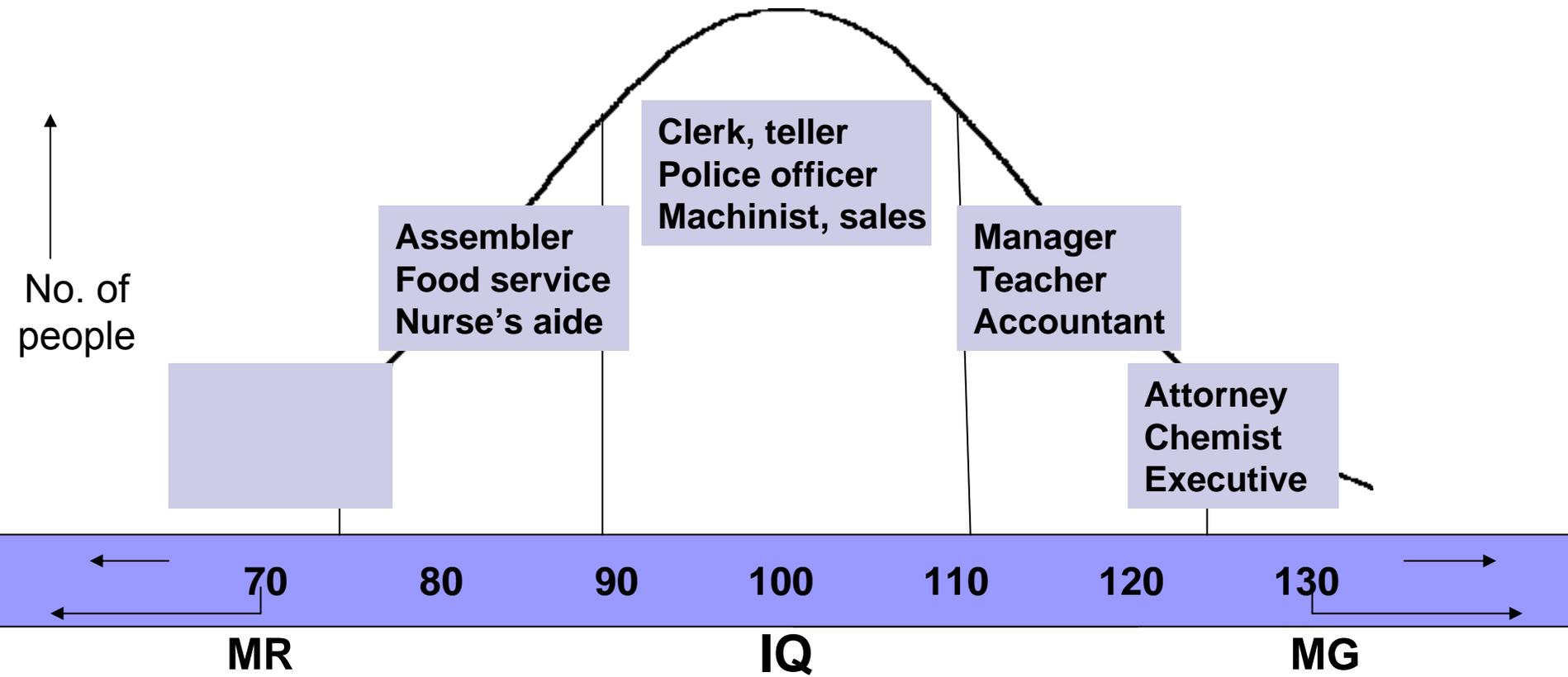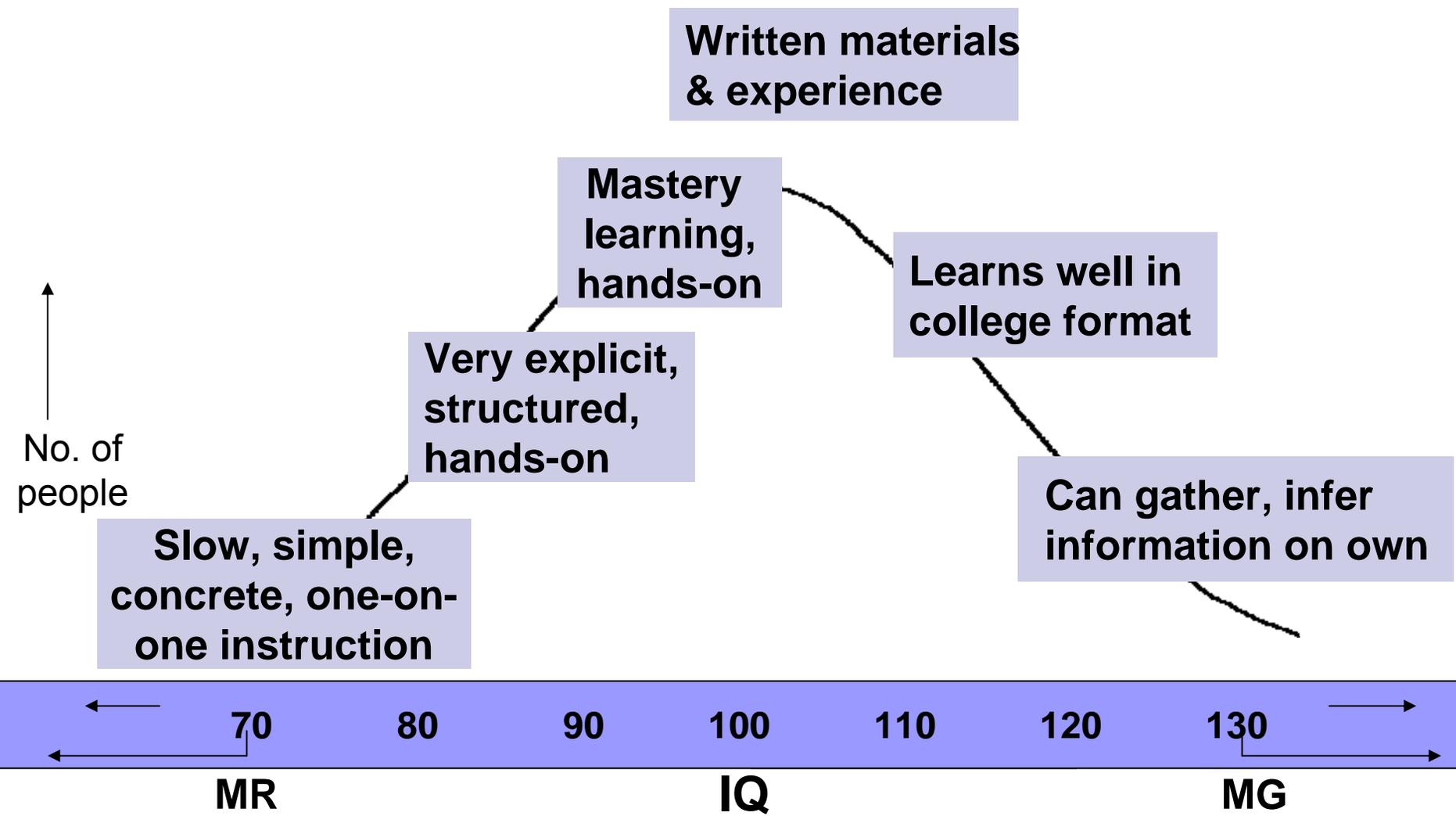
No. of people

Assembler
Food service
Nurse's aide

Clerk, teller
Police officer
Machinist, sales

Manager
Teacher
Accountant

Attorney
Chemist
Executive

70   80   90   100   110   120   130

MR   **IQ**   **MG**
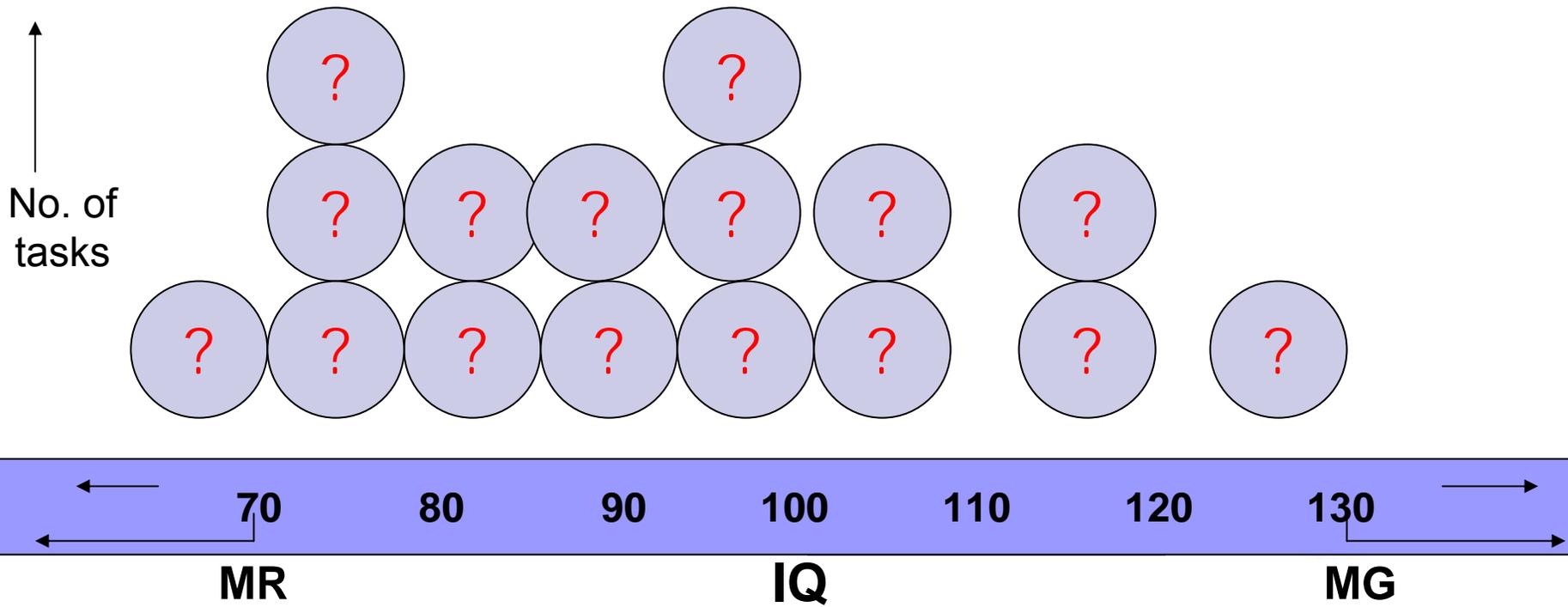
Why do some tasks require more reasoning?

Tasks Require More Reasoning When They Are More Complex

- But what—*specifically*—makes tasks more complex?
- Clues from
  - ☐ Job analyses
  - ☐ IQ test items
  - ☐ Functional literacy tests

Clues From Job Analyses

Complex jobs require workers to:	Correlation with
(Arvey, 1986)	overall job
(Applied to health)	complexity

- Learn and recall <u>relevant</u> information (symptoms) — **.75**
- Reason and make judgments (timely preventive care) — **.71**
- Deal with <u>unexpected</u> situations (meal delayed) — **.69**
- <u>Identify problem situations quickly</u> (hazards) — **.69**
- React <u>swiftly</u> when <u>unexpected</u>
  problems occur (injuries, asthma attack) — **.67**
- Apply common sense to solve problems — **.66**
- Learn new procedures <u>quickly</u> (treatment regimens) — **.66**
- Be alert & <u>quick</u> to understand things (feverish child) — **.55**

Clues From IQ Items

|	Easy item	Harder item
State one similarity	**Dog—Lion**	**Fly—Tree** The similarity is more abstract
Give the next two numbers	**3, 5, 7, 9, _, _**	**10, 9, 8, 9, 8, 7, _, _** Rule to be inferred has more parts
Complete the pattern		 More items & progressions in the pattern
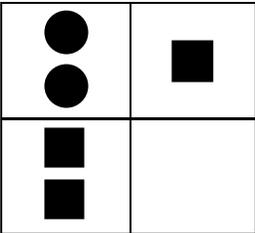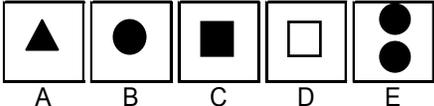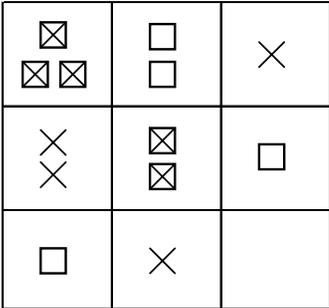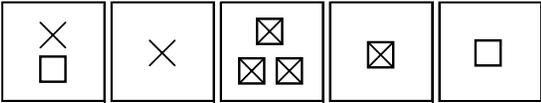
Complexity is the active ingredient

Functional Literacy in Daily Life

NALS Level	% pop (white)	Reading grade level	Simulated Everyday Tasks (National Adult Literacy Survey, 1993)
1	14%	**2.5**	▪ Total bank deposit entry ▪ Locate expiration date on driver's license
2	25%	**7.2**	▪ Determine difference in price between 2 show tickets ▪ Locate intersection on street map
3	36%	**12**	▪ Calculate miles per gallon from mileage record chart ▪ Write brief letter explaining error on credit card bill
4	21%	**16**	▪ Use eligibility pamphlet to calculate SSI benefits ▪ Explain difference between 2 types of employee benefits
5	4%	**16+**	▪ Use calculator to determine cost of carpet for a room ▪ Use table of information to compare 2 credit cards

Health ed says use Grade 5

Functional Literacy in Daily Life

NALS Level	% pop (white)	Reading grade level	Just a sample of the many tasks adults expected to learn on own
1	14%	2.5	**NOT READING *PER SE,* BUT:** • "complex information processing skills" • "verbal comprehension & reasoning" • "ability to understand, analyze, evaluate" *g*
2	25%	7.2	
3	36%	12	
4	21%	16	
5	4%	16+	**Predicts life outcomes in same pattern as does IQ**

Item Analyses Reveal Same Active Ingredient

| NALS Level	% pop (white)	Reading grade level	Simulated Everyday Tasks Adults ages 16-65
1	14%	2.5	▪Total ▪ Loca...
2	25%	7.2	▪ Dete... show tickets ▪ Loca...
3	36%	12	▪ Calcu... record chart ▪ Write... dit card bill
4	21%	16	▪ Use ... benefits ▪ Expla... mployee benefits
5	4%	16+	▪ 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

Example: Item at NALS Level 2

You are a marketing manager for a small manufacturing firm. This graph shows your company's sales over the last three years. Given the seasonal pattern shown on the graph, predict the sales for Spring 1985 (in thousands) by putting an "x" on the graph.

Simple inference

Little distracting information
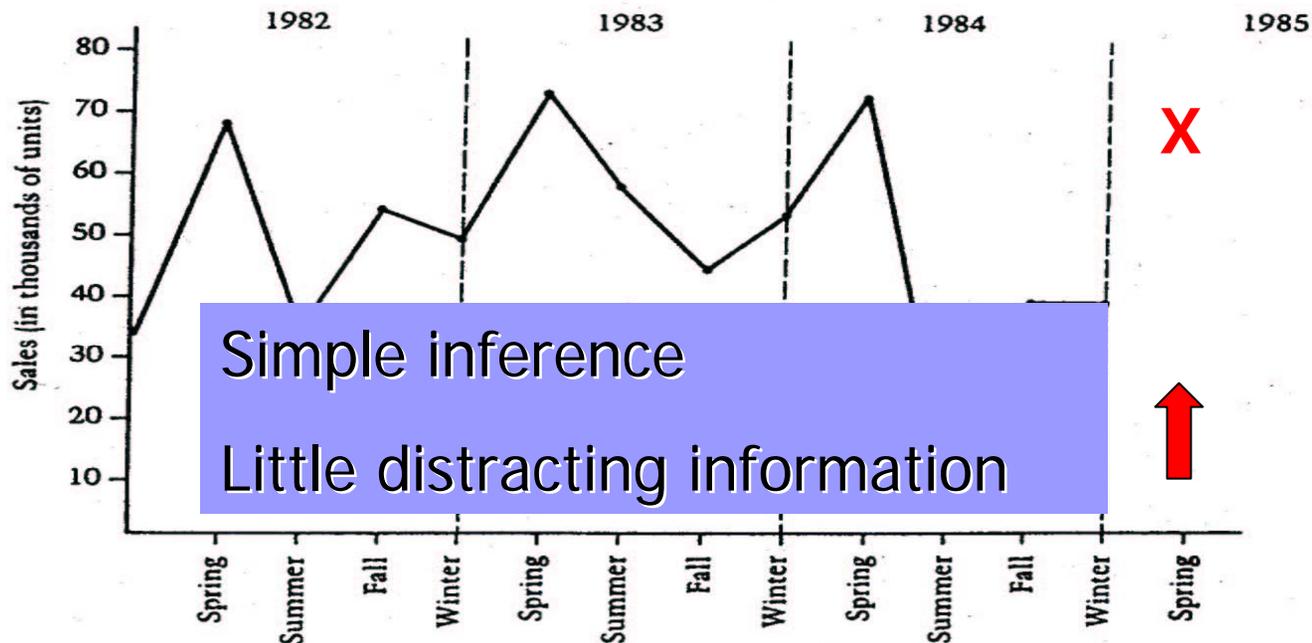
Item at NALS Level 4

On Saturday afternoon, if you miss the 2:35 bus leaving Hancock and Buena Ventura going to Flintridge and Academy, how long will you have to wait for the next bus?

More elements to match

More inferences

More distracting information

What do studies of
health literacy find?

School of Education, www.udel.edu/educ

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

Tempra® ASPIRIN-FREE ACETAMINOPHEN

Ronald McDonald House
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	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	1½ 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	—	2½ 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:
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)
LA-1451-2-88 © 1988, Bristol-Myers U.S. Pharmaceutical and Nutritional Group · Evansville, Indiana 47721 U.S.A.

© 1988, Bristol-Myers Pharmaceutical and Nutritional Group.

Reprinted with permission.

UNIVERSITY OF DELAWARE

#1—Underline sentence saying how often to administer medication

Pediatric Dosage Chart

Recommend

ALCOHOL-FREE
ASPIRIN-FREE
Tempra®
ACETAMINOPHEN

A Caring Sponsor of
Ronald McDonald House.
Ronald McDonald House is a program of
Ronald McDonald Children's Charities'

Pediatric Dosage Chart — Drops, Syrup, & Chewables

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

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:

% US adults routinely functioning <u>below</u> this level?

20%

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

Mean = 272

239

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?

- 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

ALCOHOL-FREE
ASPIRIN-FREE
Tempra®
ACETAMINOPHEN

A Caring Sponsor of
Ronald McDonald House®
Ronald McDonald House is a program of
Ronald McDonald Children's Charities'

Pediatric Dosage Chart   Drops, Syrup, & Chewables

Age	Approximate Weight Range*	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	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.

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

- 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

ALCOHOL-FREE
ASPIRIN-FREE

Tempra®
ACETAMINOPHEN

A Caring Sponsor of

Ronald McDonald House.

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

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	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.

% US adults routinely functioning <u>below</u> this level?

99%

Mean = 272

"Below minimum standard for today's labor market"

239   329   378

HALS LEVELS:	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
HALS SCORES:		175 225	275	325	375	500
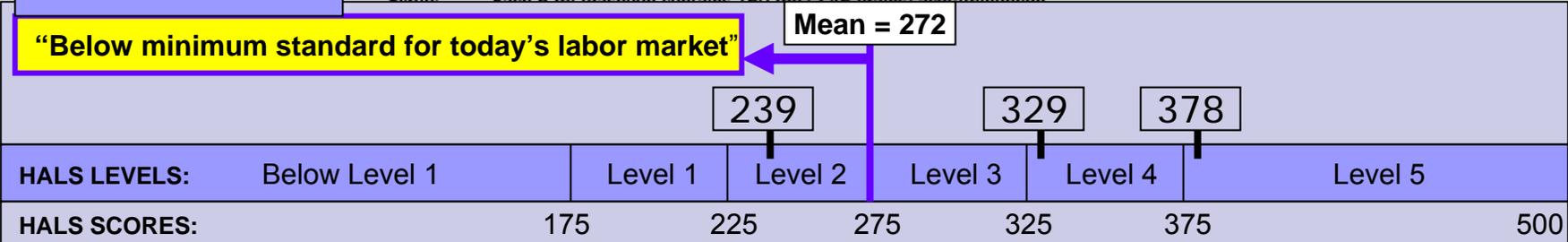
So, Exactly The Same Pattern

- **Health literacy is:**
  - □ "Problem-solving abilities"
  - □ "Ability to acquire new information and complete complex cognitive tasks"
- **Non-adherence often due to patients failing to "learn, reason, & problem-solve"**
- **Health literacy (TOFHLA score) predicts:**
  - □ More health knowledge
  - □ Better health
  - □ Less hospitalization
  - □ Lower health costs/year

School of Education, www.udel.edu/educ

Example: Common Patient Tasks

Patients examine the actual vials or documents

% of urban hospital outpatients _**not**_ knowing:	Health literacy level		
	V-low	Low	OK
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

Many professionals have no idea how difficult these "simple" things are for others

Example: Diabetes Self-Care

Urban hospital outpatients: % diabetics *__not__* 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

Rising Complexity: An Engine for Non-Adherence

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

UNIVERSITY OF DELAWARE

Aging Population: Another Engine for Non-Adherence

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

Average profile only

Basic cultural Knowledge (G_C)

g - **Basic information processing (G_F)**

Much Complexity Is Inherent—But Not All!

Confusing forms, handouts, labels; clinic layout, provider's vocabulary, etc.

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 ... NOT NOTICE ANY SIGNS OR ..., if you are pregnant or nursing ... health professional before using this product. Do not give this product to children under 12 years of ... ... ever for more than 3 d... ms do not improve wit... that lasts for more tha... ...edness or swelling is present, consult a doctor. **Do not exceed recommended** dos... ss occur, disc... ough may be ... more than 7 days, tends to recur or is accompanied by rash, persistent hea... than 3 days, or if new syn... not take this product for per... s occurs with smoking, asthma or emphysema, or a cough is 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 ... ...d. May cause marked dro... ...n- quilizers may increase ... ...ic beverages while taking ... 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®.

DISTRIBUTED BY
AMERICAN PROCUREMENT AND LOGISTICS COMPANY
P.O. BOX 27447, SALT LAKE CITY, UT 84127-0447 • 800-405-7787

Only 61% of adults

Cluttered

Poor chunking

Key points buried

Hard words

Well Known Ways to Simplify Written Materials

Such as simpler words

Drug Facts

Active ingredients (in each softgel)   **Purpose**
Guaifenesin, USP 200 mg...Expectorant
Pseudoephedrine HCl, USP 30 mg.......................Nasal decongestant

Uses
- temporarily relieves nasal congestion associated with
  - the common cold ■ hay fever ■ upper respiratory allergies
  - sinusitis
- helps loosen phlegm (mucus) and thin bronchial secretions to make coughs more productive

Warnings
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.

Ask a doctor before use if you have
- heart disease ■ high blood pressure ■ thyroid disease ■ diabetes
- trouble urinating due to an enlarged prostate gland
- cough that occurs with too much phlegm (mucus)
- cough that lasts or is chronic such as occurs with smoking, asthma, chronic bronchitis, or emphysema

Drug Facts (continued)

Stop use and ask a doctor if
- you get nervous, dizzy, or sleepless
- symptoms do not get better within 7 days or are accompanied by fever
- cough lasts more than 7 days, comes back, or is accompanied by fever, rash, or persistent headache. These could be signs of a serious condition.

If pregnant or breast-feeding, ask a health professional before use.
Keep out of reach of children. In case of overdose, get medical help or contact a Poison Control Center right away.

Directions
- do not use more than 4 doses in any 24-hour period

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

Other information ■ store at 20-25°C (68-77°F)

Inactive ingredients FD&C green no. 3, gelatin, glycerin, mannitol, pharmaceutical glaze, polyethylene glycol, povidone, propylene glycol, sorbitan, sorbitol, titanium dioxide, water

But written materials are only a small part of the problem

Returning to the DSME Content Areas…

- Disease process
- Nutrition
- Physical activity
- Medications
- Monitoring
- Prevent/detect/treat
  - ☐ Acute complications
  - ☐ Chronic complications

- Goal setting/problem solving for daily living
- Psychosocial adjustment
- Preconception care/gestational management

Compartmentalized for instruction, but miss key complexities confronting patients

So, what *are* the biggest cognitive hurdles in diabetes self-care?

Probably the usual suspects

Common Building Blocks of Task 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

Cognitive Hurdles in Diabetes: Examples

- **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")**

More Examples of Cognitive Hurdles

- ## Hypertension

  - ☐ No outward symptoms
  - ☐ So treatment is a nuisance without obvious benefits

- ## Asthma

  - ☐ Symptoms are obvious, but benefits of the superior drug are not
    - Brochodilators give immediate but only temporary relief
    - Inhaled steroids don't give fast relief but provide better long-term control

3 Ways to Minimize Cognitive Barriers

1. Mobilize person's abilities
2. Provide cognitive assistance
3. Reduce task complexity

www.udel.edu/edac
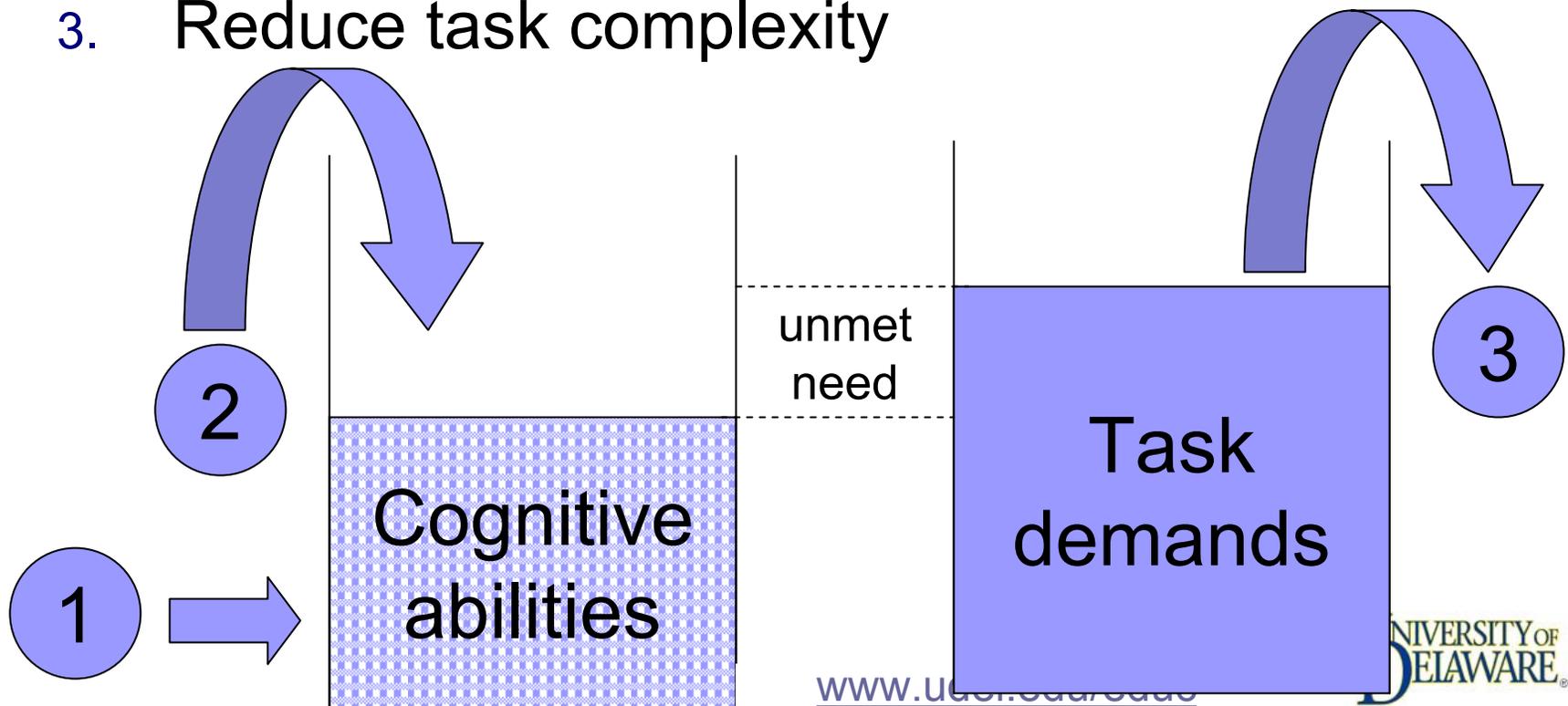
3 Options Require 3 Audits

1. Mobilize person's abilities
2. Provide cognitive assistance
3. Reduce task complexity
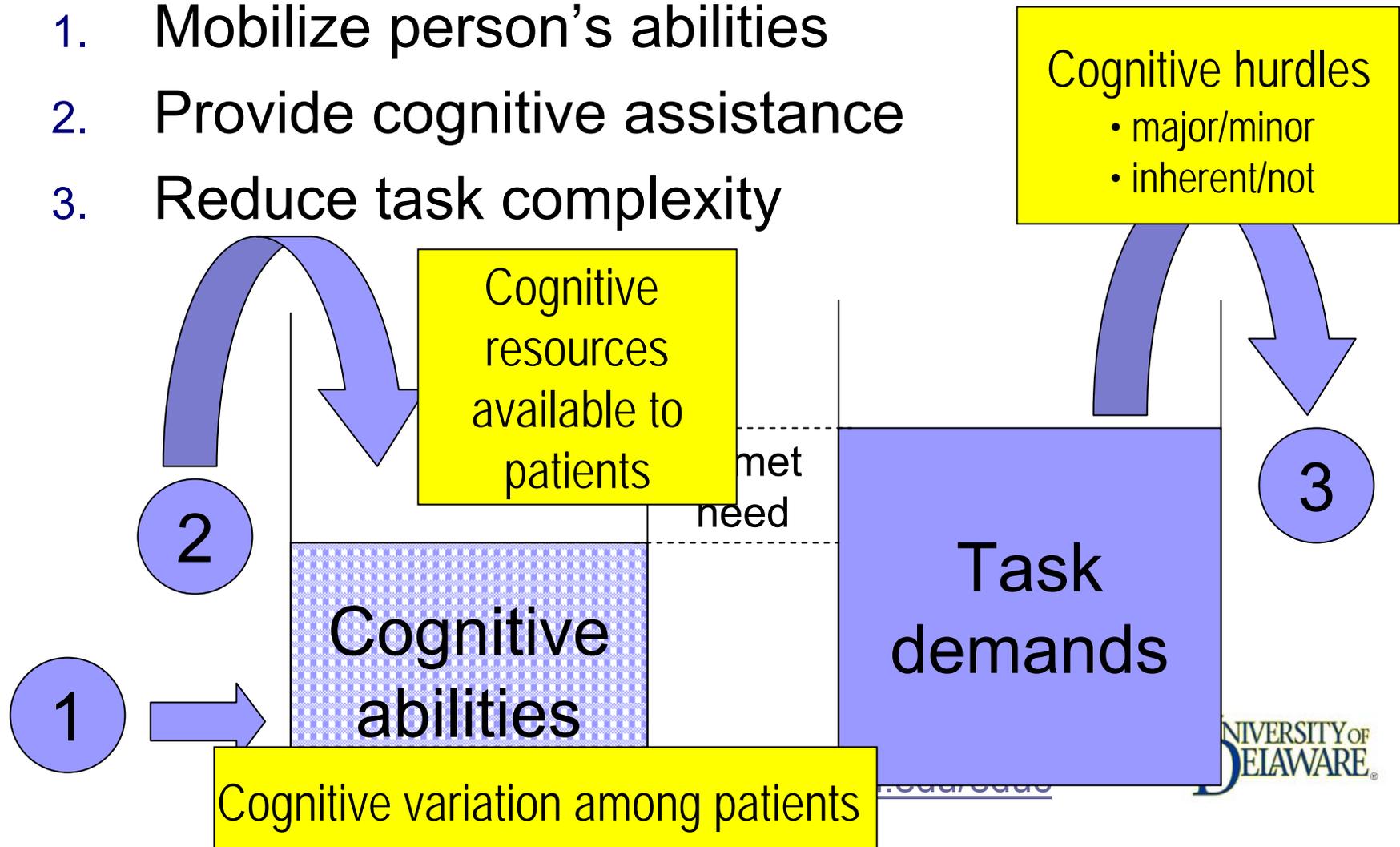
Thank you.

Contact Information

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

Phone: (302) 831-1650
Fax (302) 831-6058
Email: gottfred@udel.edu
Website: http://www.udel.edu/educ/gottfredson/

Bibliography

Brief overviews of major research findings on general intelligence for the general reader

- Deary, I. J. (2000). *Intelligence: A very short introduction.* Oxford: Oxford University Press.
- Gottfredson, L. S. (1998). The general intelligence factor. *Scientific American Presents, 9*, 24-29.

IQ, Functional Literacy, and Everyday Life

- Gottfredson, L. S. (1997). Why *g* matters: The complexity of everyday life. *Intelligence, 24*, 79-132.
- Kirsch, I. S., Jungeblut, A., Jenkins, L., & Kolstad, A. (1993). *Adult literacy in America: A first look at the results of the National Adult Literacy Survey.* Princeton, NJ: Educational Testing Service. *(Report of a large government study often cited in health literacy work.)*

IQ, Health, and Health Knowledge

- Gottfredson, L. S., & Deary, I. J. (2004). Intelligence predicts health and longevity, but why? *Current Directions in Psychological Science, 13*(1), 1-4. *(Short overview of possibly why IQ affects health.)*
- Gottfredson, L. S. (2004). Intelligence: Is it the Epidemiologists' Elusive "Fundamental Cause" of Social Class Inequalities in Health? *Journal of Personality and Social Psychology, 86*, 174-199. *(How differences in intelligence may create the consistent health disparities between social classes (a long argument describing many kinds of evidence on IQ, health, health literacy, accidental injury, social class)*
- Deary, I. J., Whiteman, M. C., & Starr, J. M. (2004). The impact of childhood intelligence in later life: Following up the Scottish Mental Surveys of 1932 and 1947. *Journal of Personality and Social Psychology, 86*, 130-147. *(Overview of big epidemiological studies linking people's childhood IQ to illness and death decades later.)*
- Beier, M. B., & Ackerman, P. L. (2004) Determinants of health knowledge: An investigation of age, gender, abilities, personality, and interests. *Journal of Personality and Social Psychology, 84,* 439-447.

Health literacy and patient outcomes

- Doak, C. C., Doak, L. G., & Root, J. H. (1996). *Teaching patients with low literacy skills (2nd Ed).* Philadelphia: J. B. Lippincott. *(A guide to making health communications less complex for less literate patients.)*
- Williams, M. V., Baker, D. W., Parker, R. M., & Nurss, J. R. (1998). Relationship of functional health literacy to patients' knowledge of their chronic disease. *Archives of internal Medicine, 158*, 166-172.
- Williams, M. V., Parker, R. M., Baker, D. W., Parikh, N. S., Pitkin, K., Coates, W. C., & Nurss, J. R. (1995). Inadequate functional health literacy among patients at two public hospitals. *Journal of the American Medical Association, 274*, 1677-1682.

School of Education, www.udel.edu/educ

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

Pediatric Dosage Chart

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

Recommend

ALCOHOL-FREE
ASPIRIN-FREE

Tempra®
ACETAMINOPHEN

A Caring Sponsor of

Ronald McDonald House.

Ronald McDonald House is a program of
Ronald McDonald Children's Charities'

Pediatric Dosage Chart   Drops, Syrup, & Chewables

Age	Approximate Weight Range*	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	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)
LA-1451-2-88 © 1988, Bristol-Myers U.S. Pharmaceutical and Nutritional Group · Evansville, Indiana 47721 U.S.A.
© 1988, Bristol-Myers Pharmaceutical and Nutritional Group.

Reprinted with permission.

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

Pediatric Dosage Chart

Recommend

ALCOHOL-FREE
ASPIRIN-FREE
Tempra®
ACETAMINOPHEN

A Caring Sponsor of
Ronald McDonald House
Ronald McDonald House is a program of
Ronald McDonald Children's Charities*

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

Pediatric Dosage Chart   Drops, Syrup, & Chewables

			Dosage		
Age	Approximate Weight Range*	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:

% US adults routinely functioning <u>below</u> this level?

46%

Mean = 272

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