

Health Self-Care as a Complex, Lifelong Career: Implications for Patients, Providers, and Policy Makers

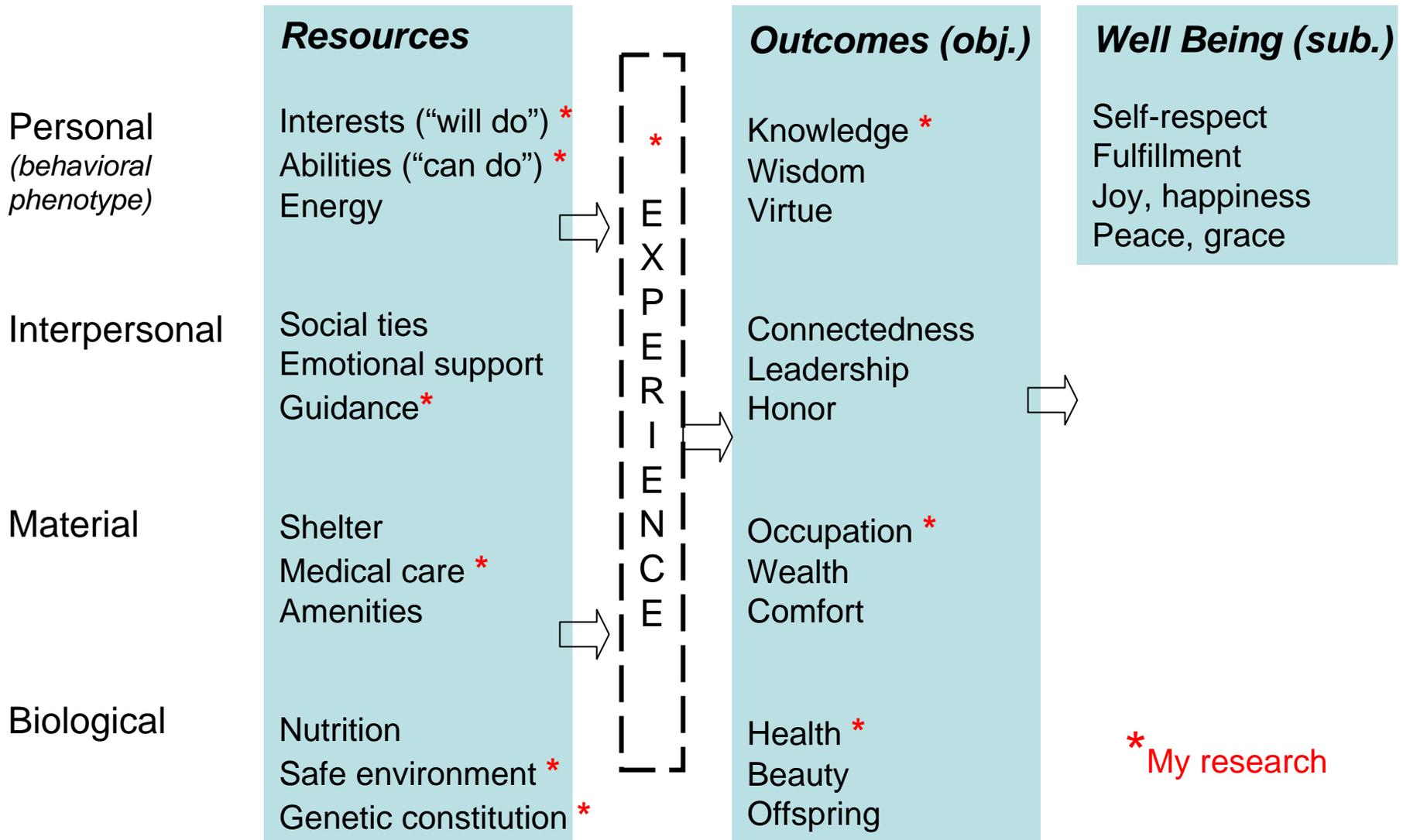
Linda S. Gottfredson
University of Delaware
July 5, 2006

Medici Conference, Center for Positive Psychology
University of Pennsylvania

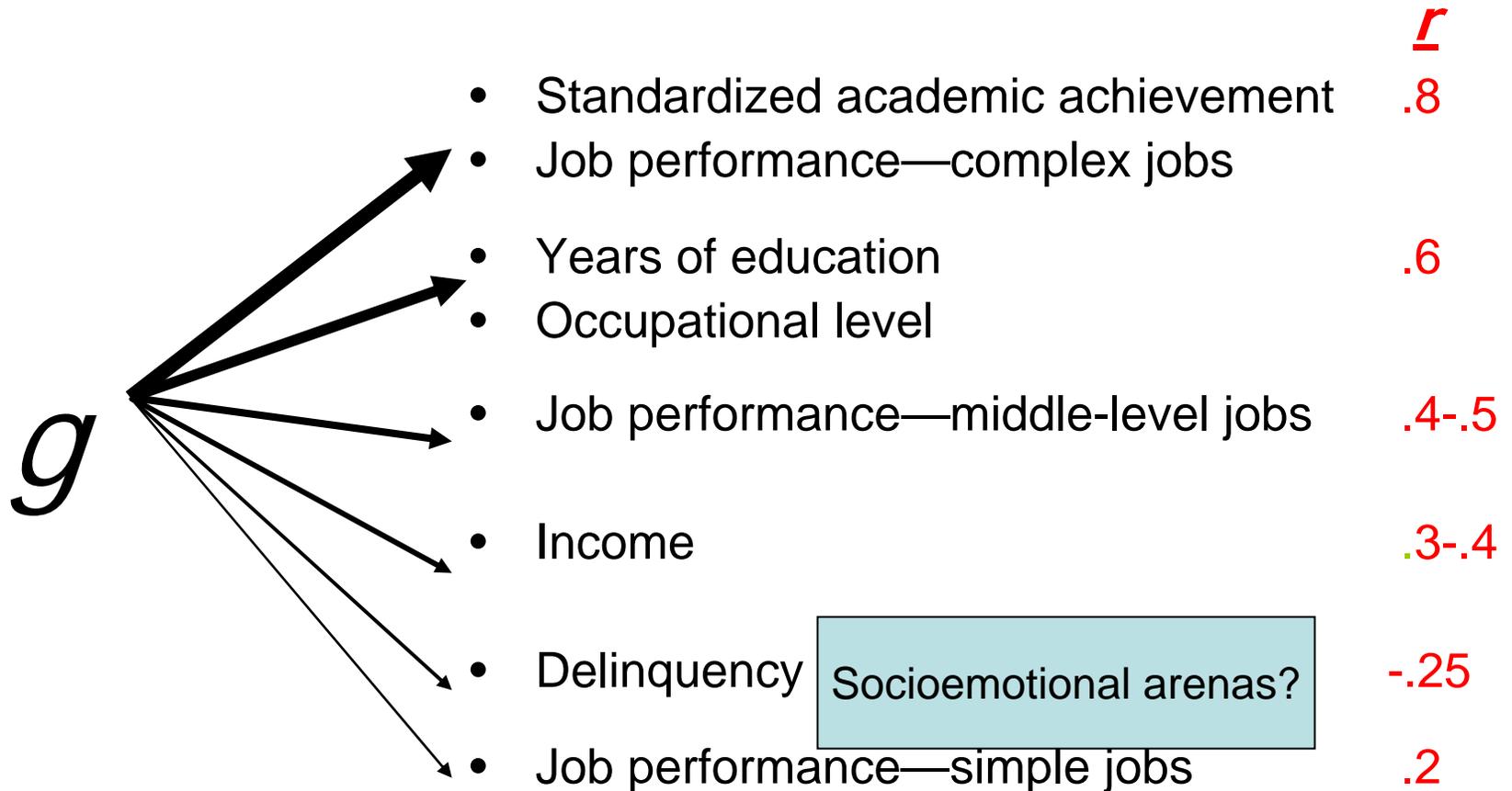
Questions

- Why is health self-care a job?
- What's IQ got to do with health?
- What's physical health (or IQ) got to do with subjective well-being?
- If we can't change IQ, isn't it a dead-end—a pessimistic stance—to study the impact of IQ on health?

Individual Differences in Development

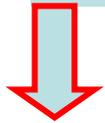


IQ Predicts Performance in Many Life Arenas, But Not Equally Well



g = The general mental ability factor; a general facility at learning & reasoning

IQ Predicts Performance Best in Most Complex Jobs



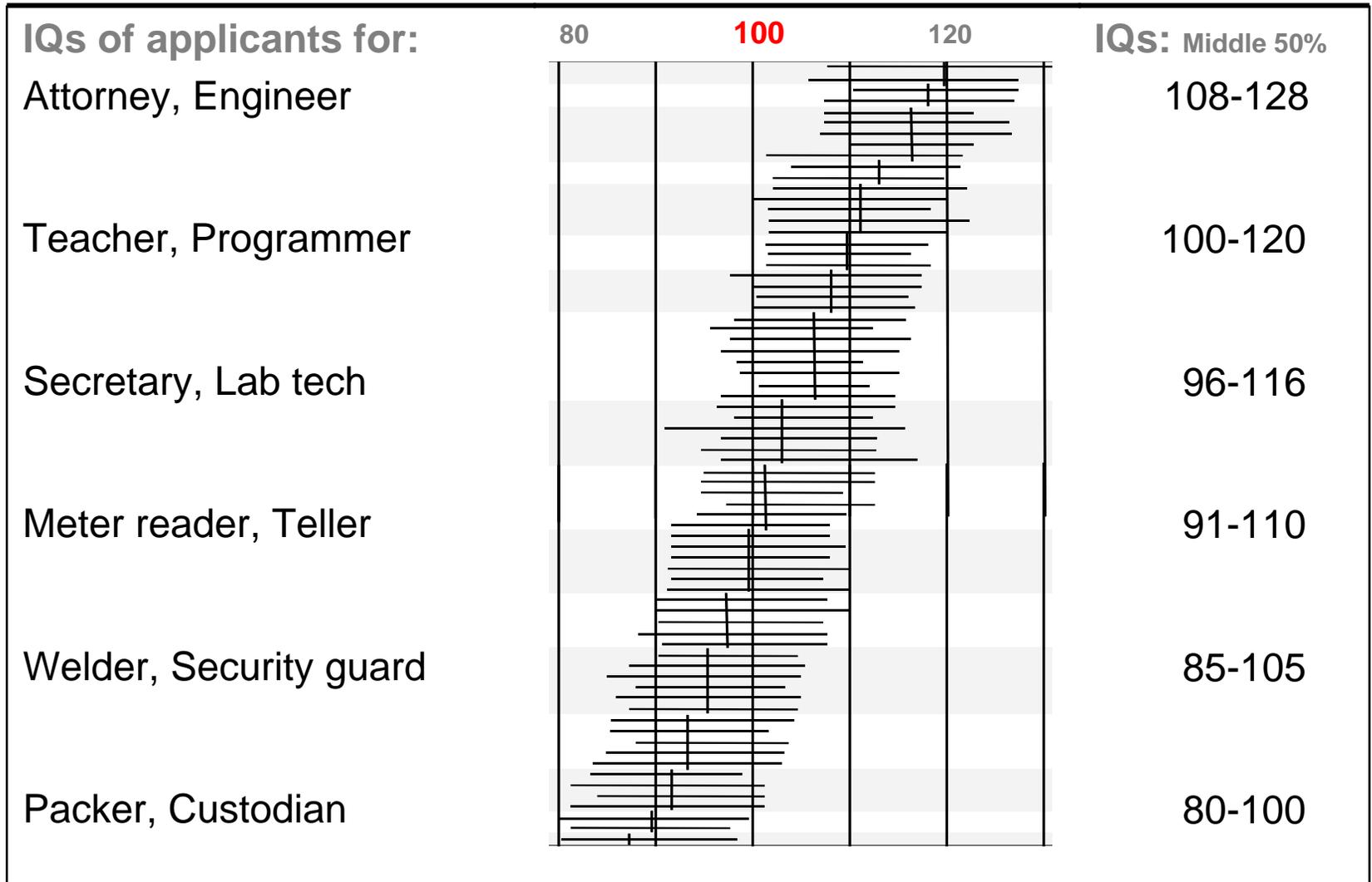
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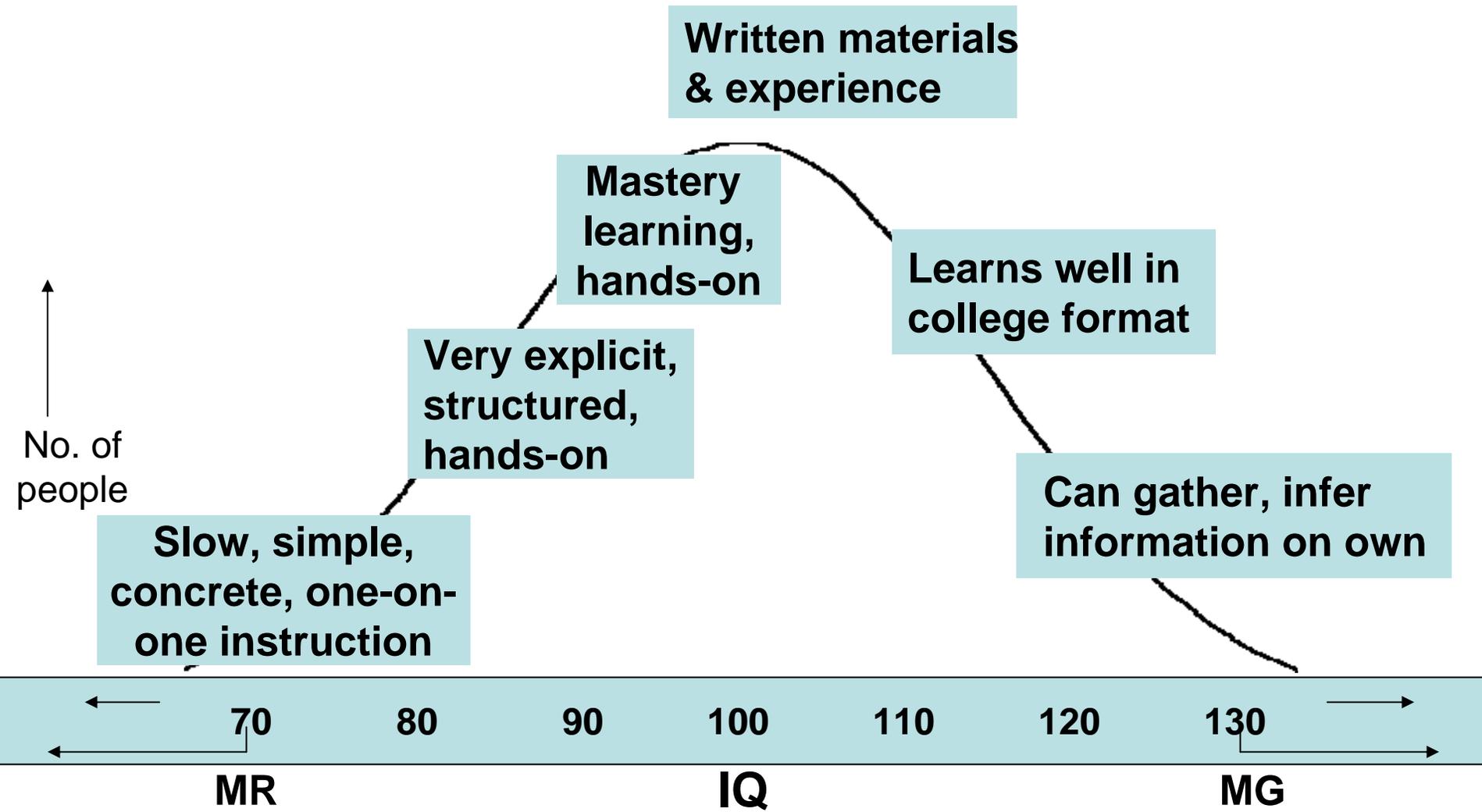
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.2



IQ/g Level Affects Trainability



IQ Predicts Mortality: Example

- 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
80- 85	146.7

2x

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

What is Good Health?

The physiological *system* is:

- Under control, functioning optimally
- Resists perturbation, recovers quickly
- Crucial parts intact, functional, & without premature wear or incubating problems
- Facilitates pursuit of owner's goals

Minding That System Is a Lifelong Job

- Constellation of tasks to perform, actions to avoid
- Training required
- Coordinate & communicate with others
- Exercise independent judgment
- Only occasional supervision
- Job changes as technology & conditions evolve
- Sometimes tiring, frustrating, affects family life
- Central to personal well-being
- **But no vacations, no retirement**

Major Forms of Death & Disease

- Chronic illnesses (heart disease, cancer, etc.)
 - Middle-age & older
- Unintentional (“accidental” injury)
 - Childhood & early adulthood

All are “preventable.”

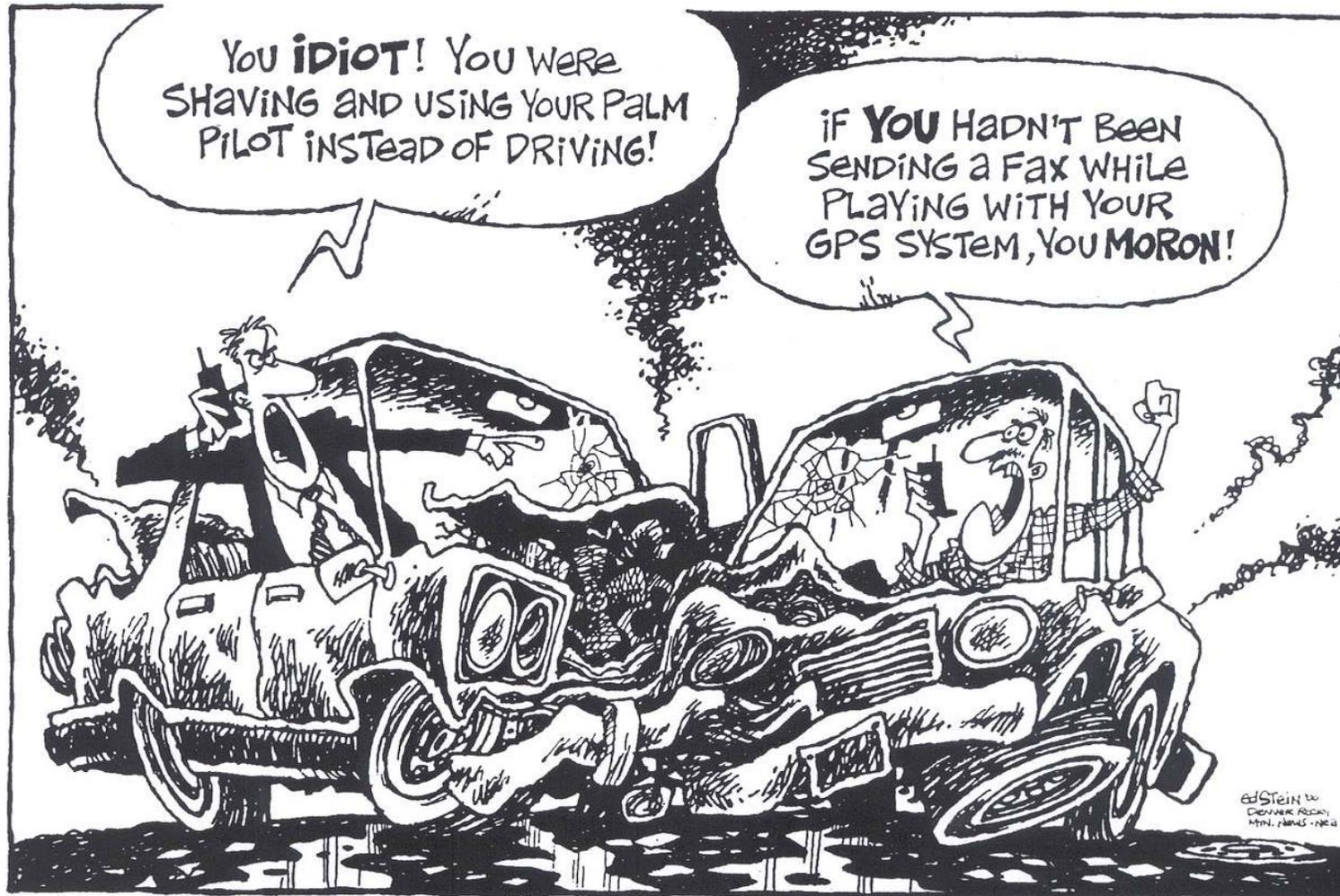
Avoiding Chronic Illness Requires Foresight & Prevention

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

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

Daily Life is Full of Hazards



Avoiding Accidents Requires “Defensive Driving”

- Recognize hazards
- Prevent incidents starting
- Halt progress of incidents
- Limit damage during incidents
- Recover and redesign

- Same process as with chronic illnesses
- Myriad low-probability, often-hidden hazards
- Damage usually small, but it cumulates

A 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

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

Very complex and demanding!

But what specifically makes a
job or task more
cognitively complex?
(i.e., tax lower- g individuals
more heavily)

Clues From Job Analyses: Behavioral Demands

Complex jobs require workers to:

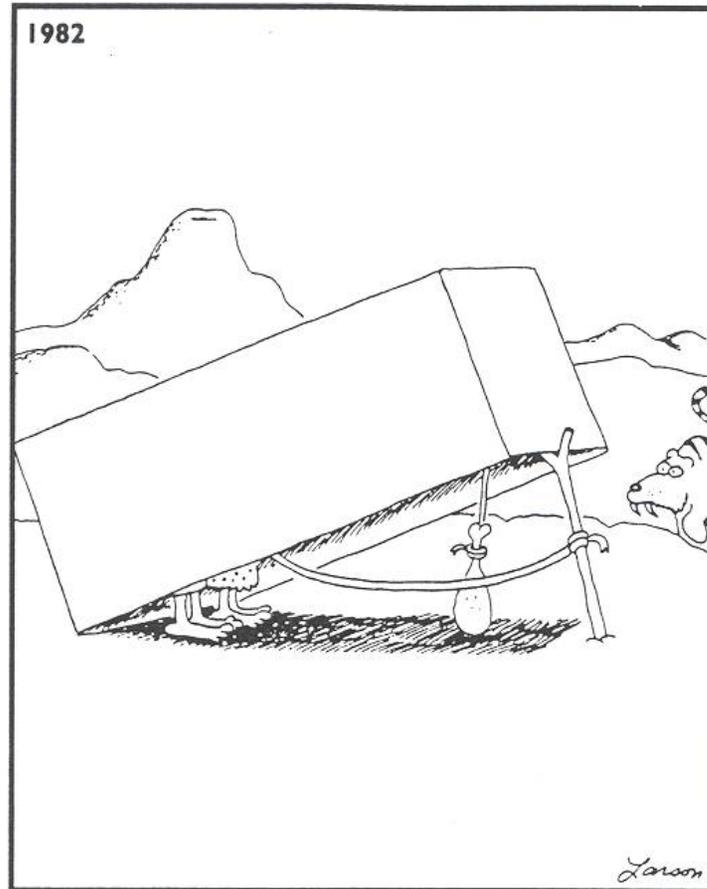
(Arvey, 1986)

Correlation with
overall job
complexity

(Applied to health)

- | | |
|--|------------|
| ▪ 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 |

Plan, Anticipate Problems



“Shhhh, Zog! ... Here come one now!”

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

Item Complexity & Error Rates in Health Literacy Surveys

- Items simulate everyday health tasks
- Analyses of what increases item difficulty (error rates)
- Increasingly difficult tasks can use the same info

Sample item from the HALS

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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

Pediatric Dosage Chart



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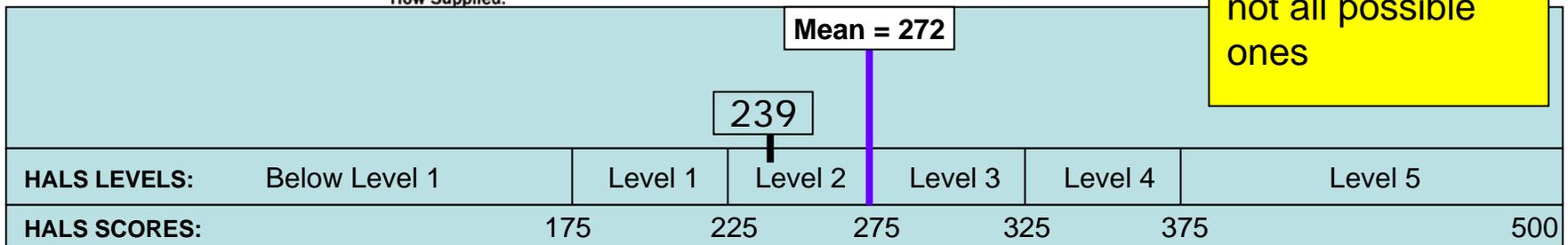
How Supplied:

- 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 possible ones



#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

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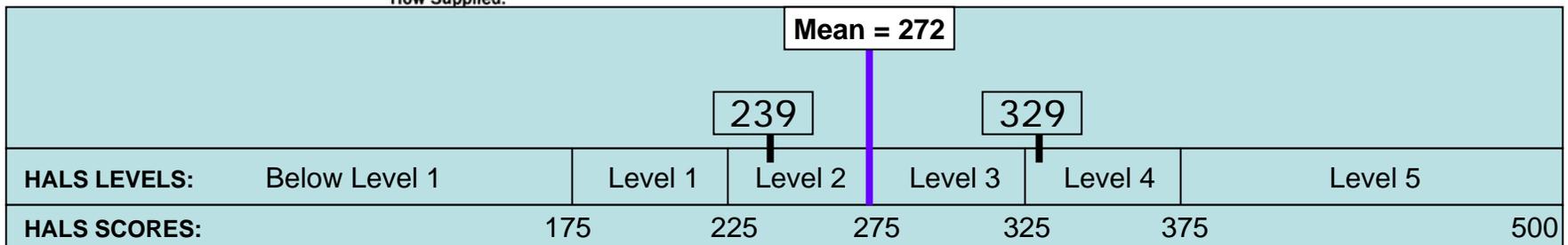
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 How Supplied:

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

% US adults routinely functioning below this level?

46%



#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

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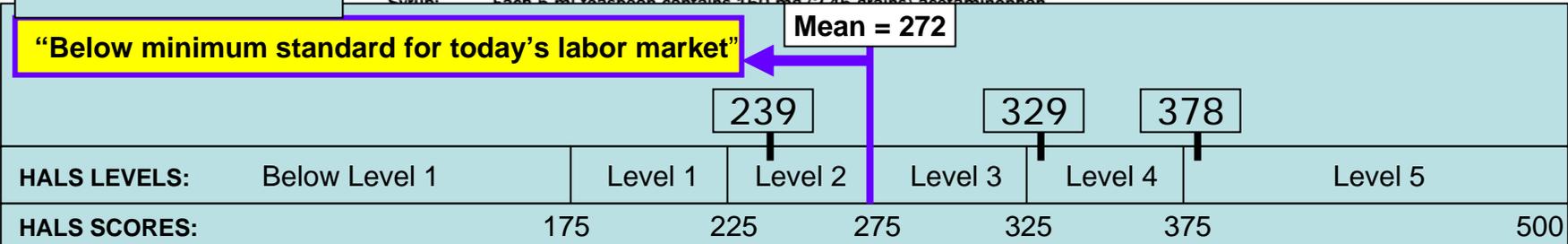


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% US adults routinely functioning below this level?
99%



Patient Performance on Other Health Literacy (TOHFLA) Items

Patients examine the actual vials or documents

% of urban hospital outpatients <i>not</i> 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

Error Rates Among 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

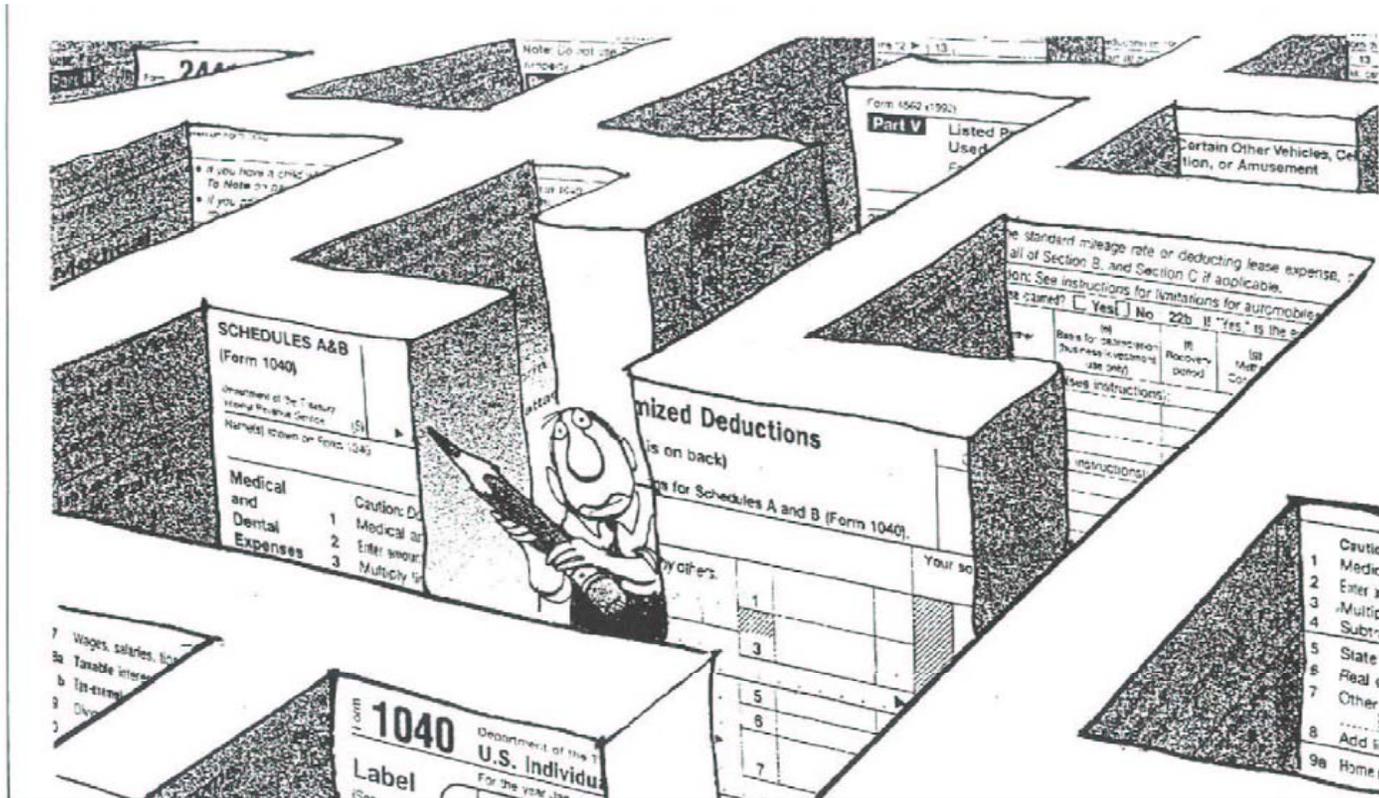
Cognitive Barriers Rise

- As treatments become more complex
- As individuals age (more illness, less cognitive ability)



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

Some Complexity Is Needless!



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

Ways to Simplify

Such as simpler words

<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 <p>When using this product do not use more than directed</p>	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 Much Complexity Is Inherent: Examples from Diabetes

- **Known cognitive hurdles**

- 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**

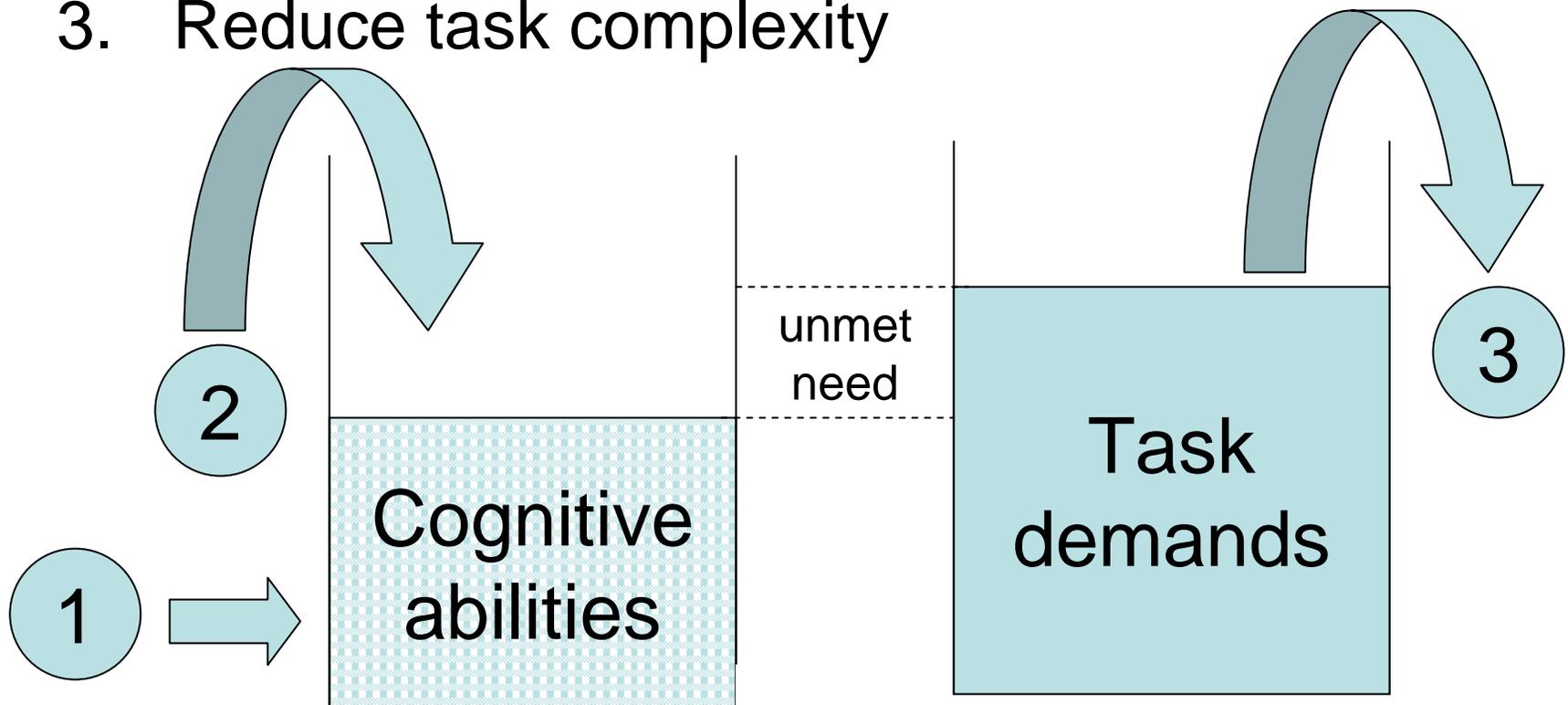
- Assuming that non-adherence which causes no obvious immediate harm isn’t dangerous (DKA from failing to take insulin for several days)
- False security from not grasping abstract concepts of risk, probability, & cumulative damage (“Not planning ahead/not testing myself hasn’t gotten me in trouble, 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
 - Bronchodilators 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



Old Lessons in New Settings

1. Small effects matter; over time, they add up
doing “the small things” right, day after day, minimizes unnecessary illness and injury
2. Individuals have more influence over their development than they realize or exercise
their health depends more on their own behavior than their doctors'; patients need not and should not be passive consumers of care
3. Different genotypes do not experience or utilize the “same” environments in the same way, nor benefit equally from them
patients differ in their ability to understand and adhere to the same treatments. One-size-fits-all information and treatment does not work.
4. Conversely, different genotypes require different environments to thrive
patients who learn slowly and reason poorly will not understand regimens and communications geared to the average patient (or physician!)
5. Environments—jobs—are malleable
cognitive barriers can sometimes be lowered by simplifying/reconfiguring regimens

Thank you.