Critical Issues for Developing and Maintaining Item Banks and CATs – Bringing the Concept into Reality: The Idea of A National Item Bank

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Reflections on Tensions between Scientific Canons and Proprietary Interests in Item Banking and Computerized Adaptive Testing (CAT)

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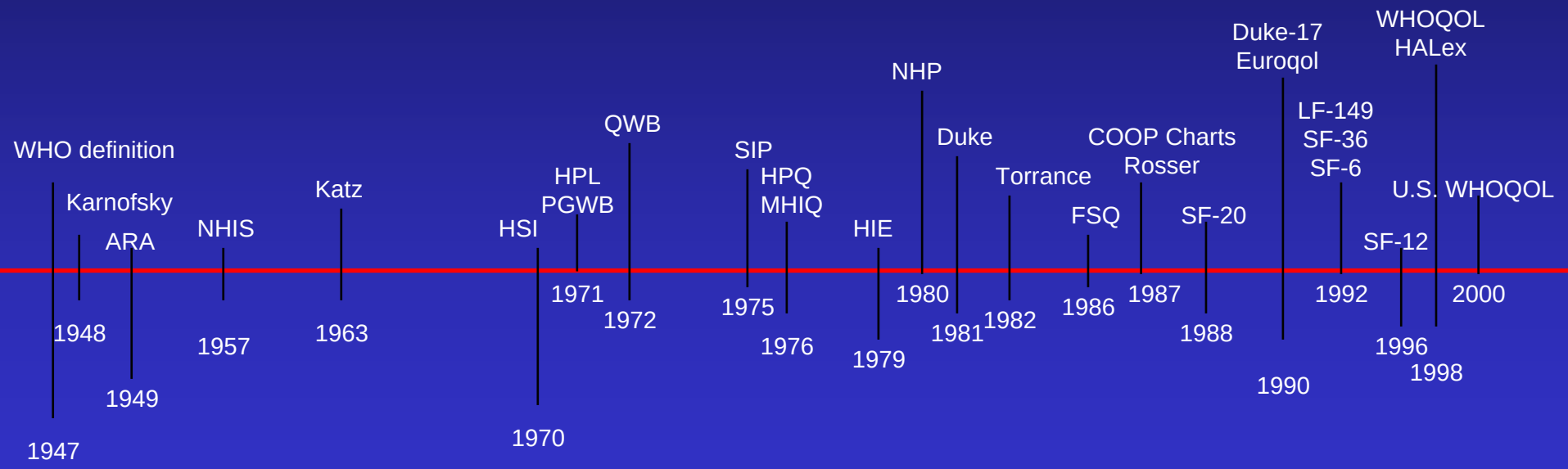
Co-Editor-in-Chief, *Medical Care*

Major advances in science are preceded by breakthroughs in measurement methods

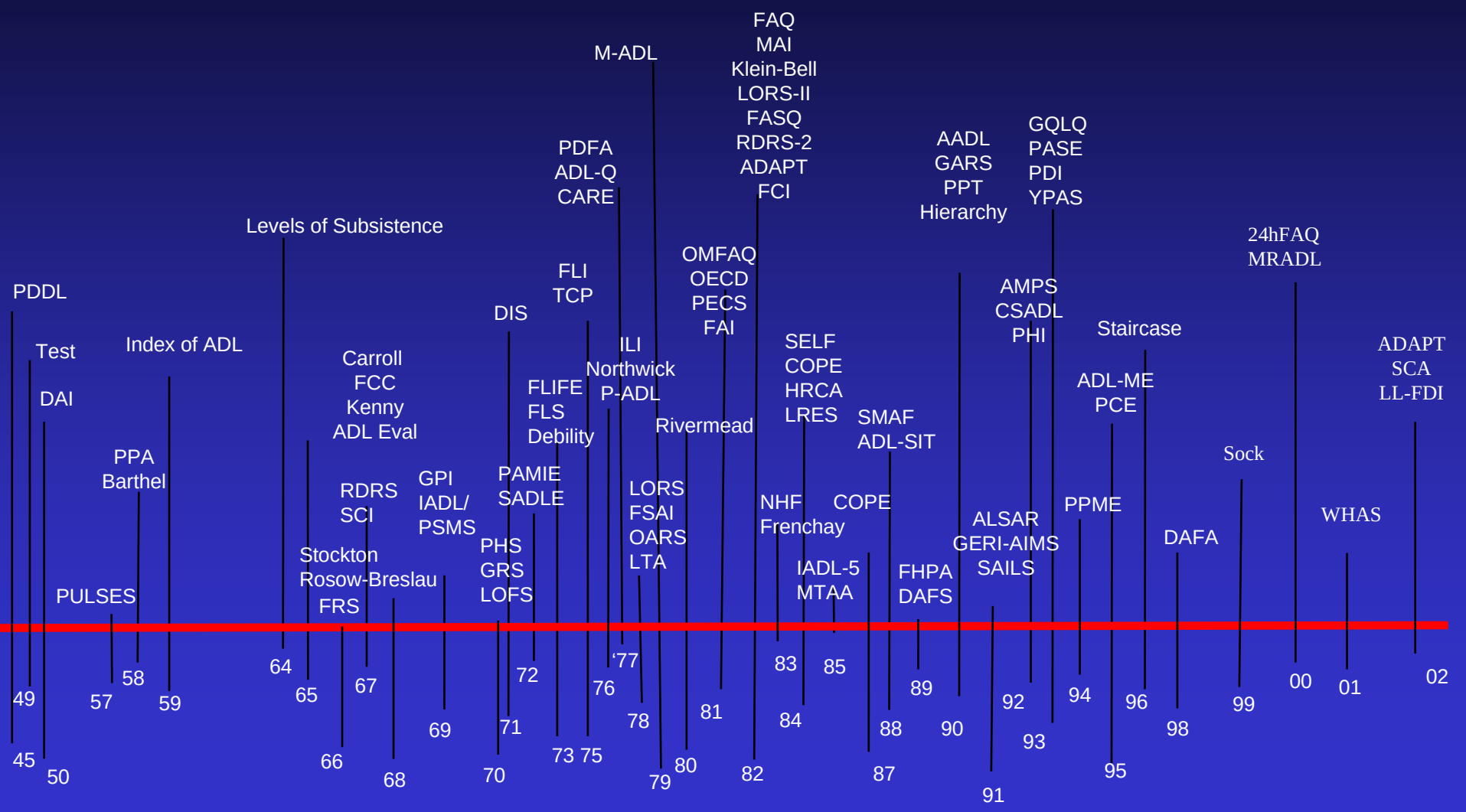
Nunnally, 1978

Adult Health Measurement Timeline: Generic Measures

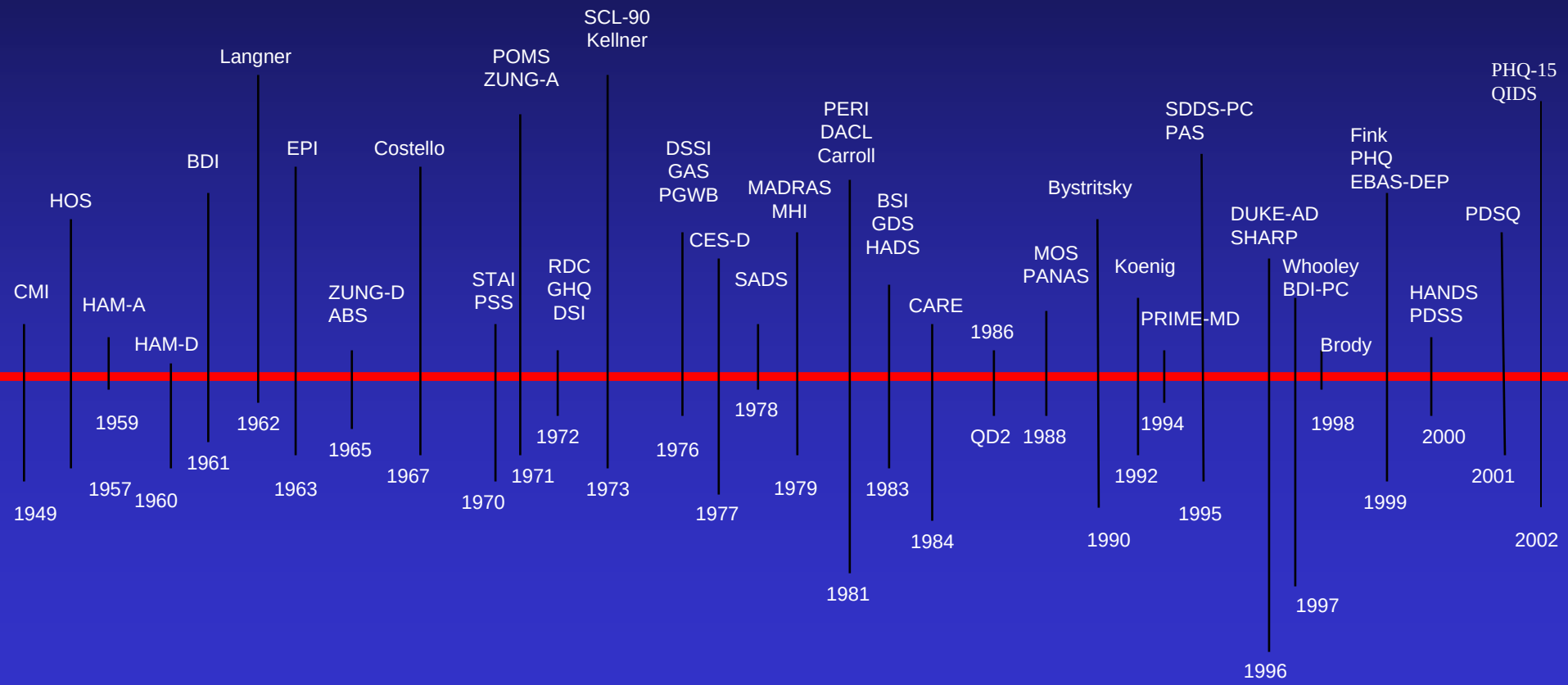


Source: McHorney, C.A., 1997

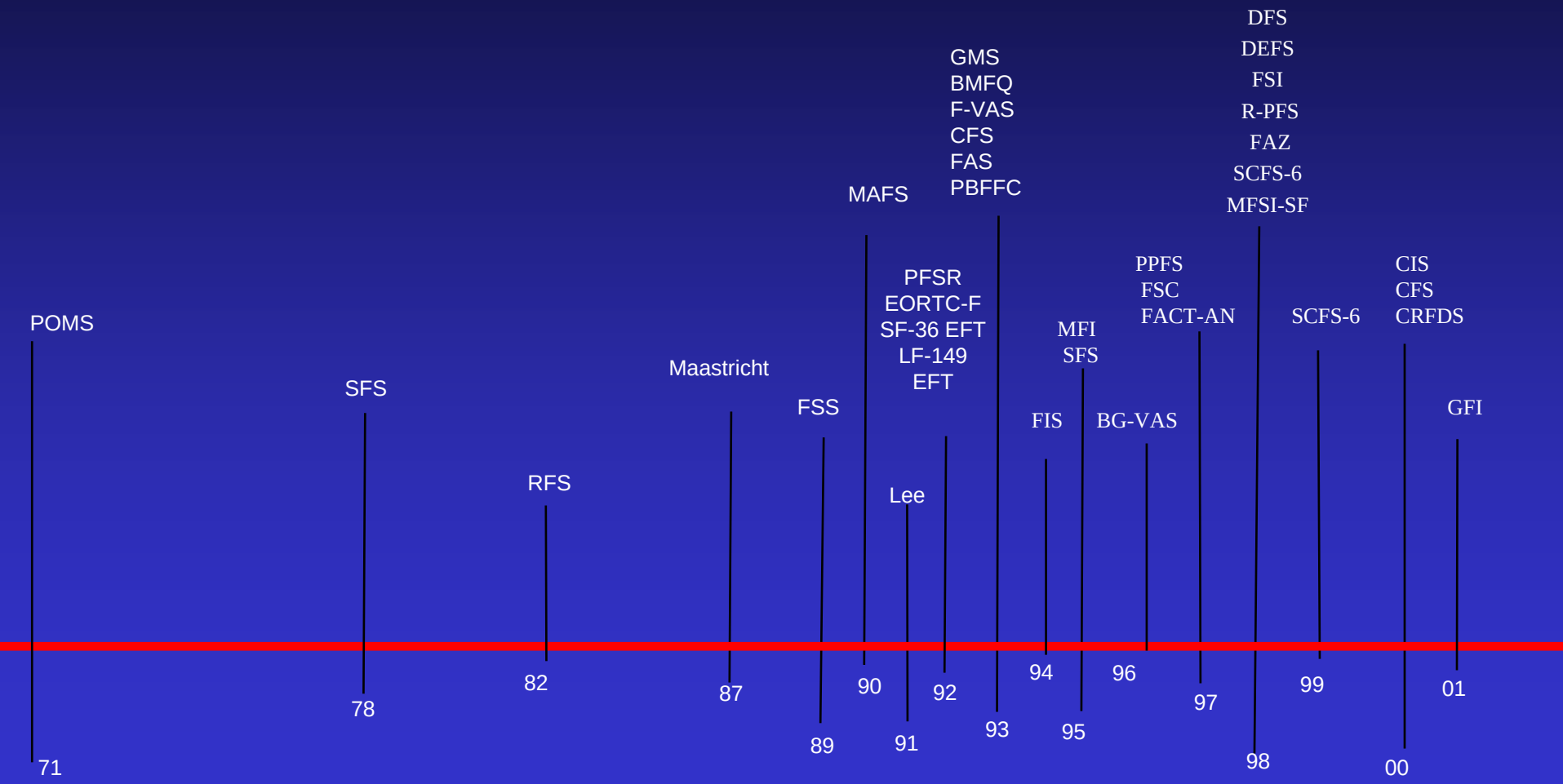
Health Measurement Timeline: ADL/IADL Measures



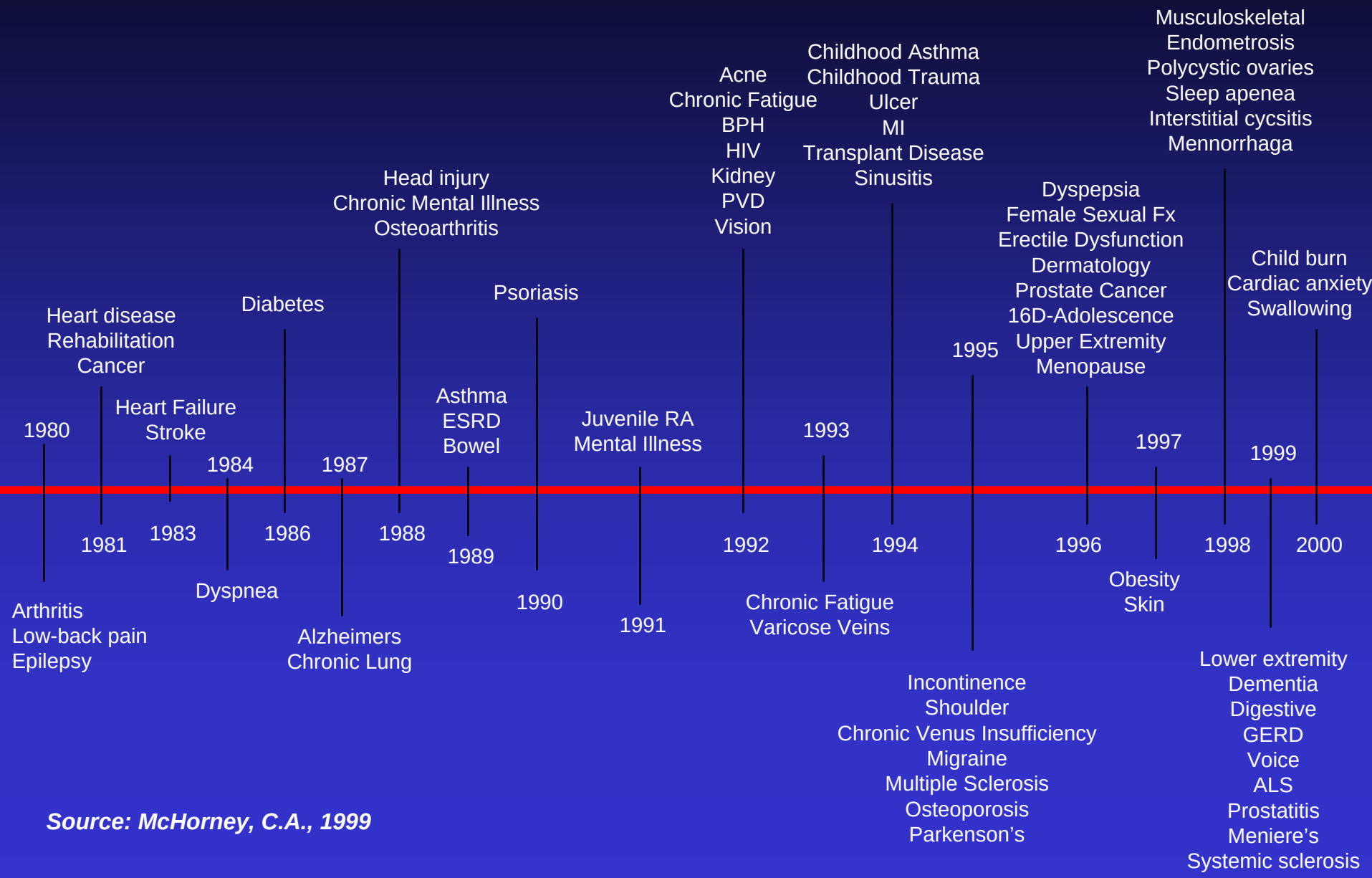
Health Measurement Timeline: Depression Measures



Health Measurement Timeline: Energy/Fatigue Measures

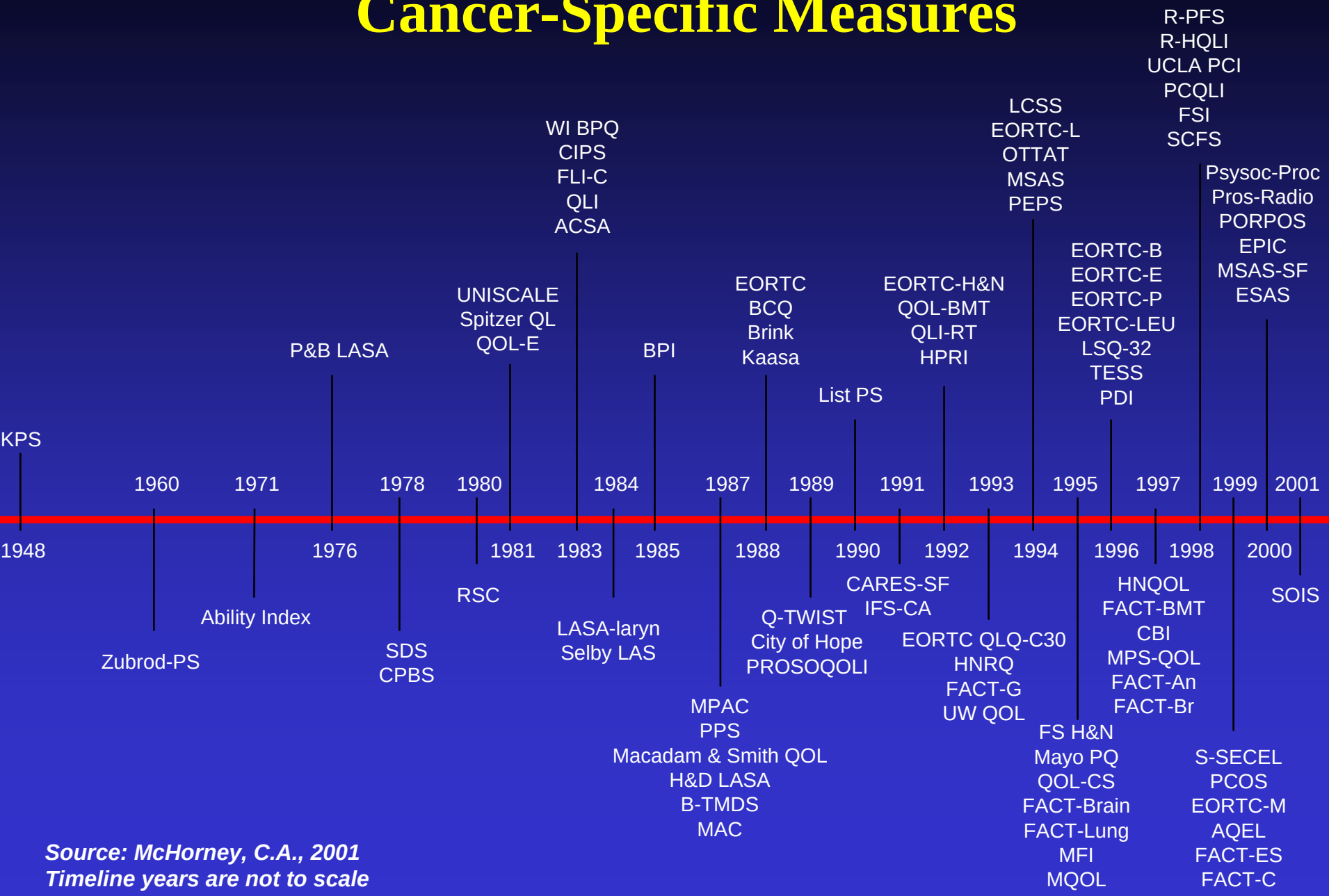


Health Measurement Timeline: Disease-Specific Measures



Source: McHorney, C.A., 1999

Health Measurement Timeline: Cancer-Specific Measures



Source: McHorney, C.A., 2001
Timeline years are not to scale

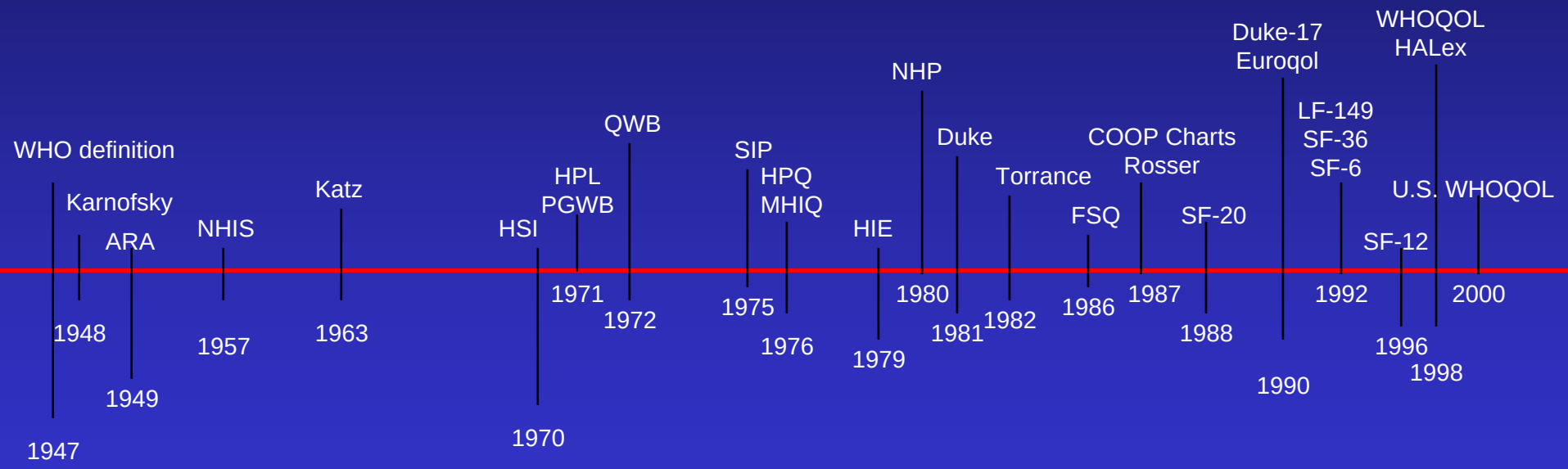
Our field can be characterized as a fusion of advances in science in psychology, sociology, health services research, social psychology, psychometrics, educational measurement, and medicine.

Can Time-Honored Scientific Canons Inform our Future Progress in Item Banking and CAT?

If I have seen further, it is by standing on the shoulders of giants.

Isaac Newton, 1675

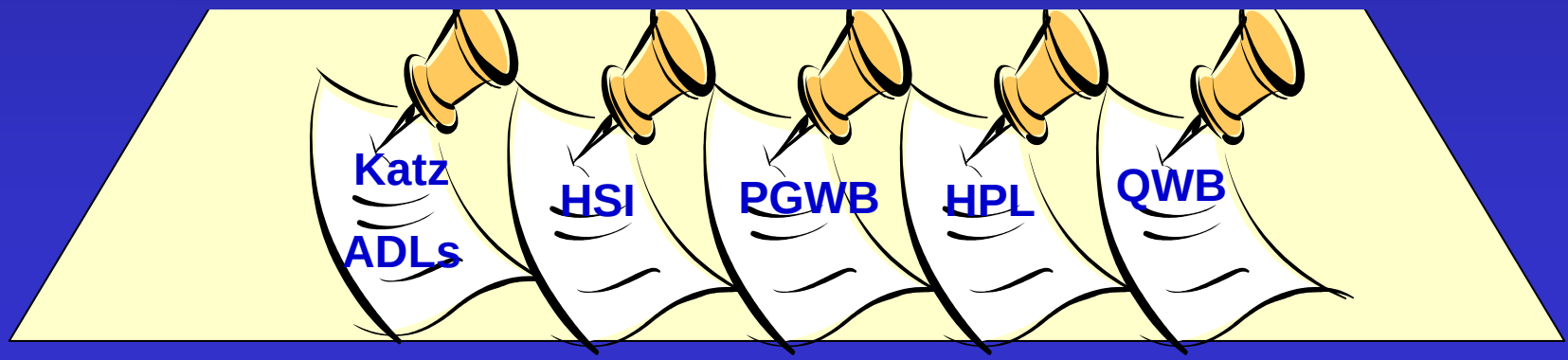
Adult Health Measurement Timeline: Generic Measures

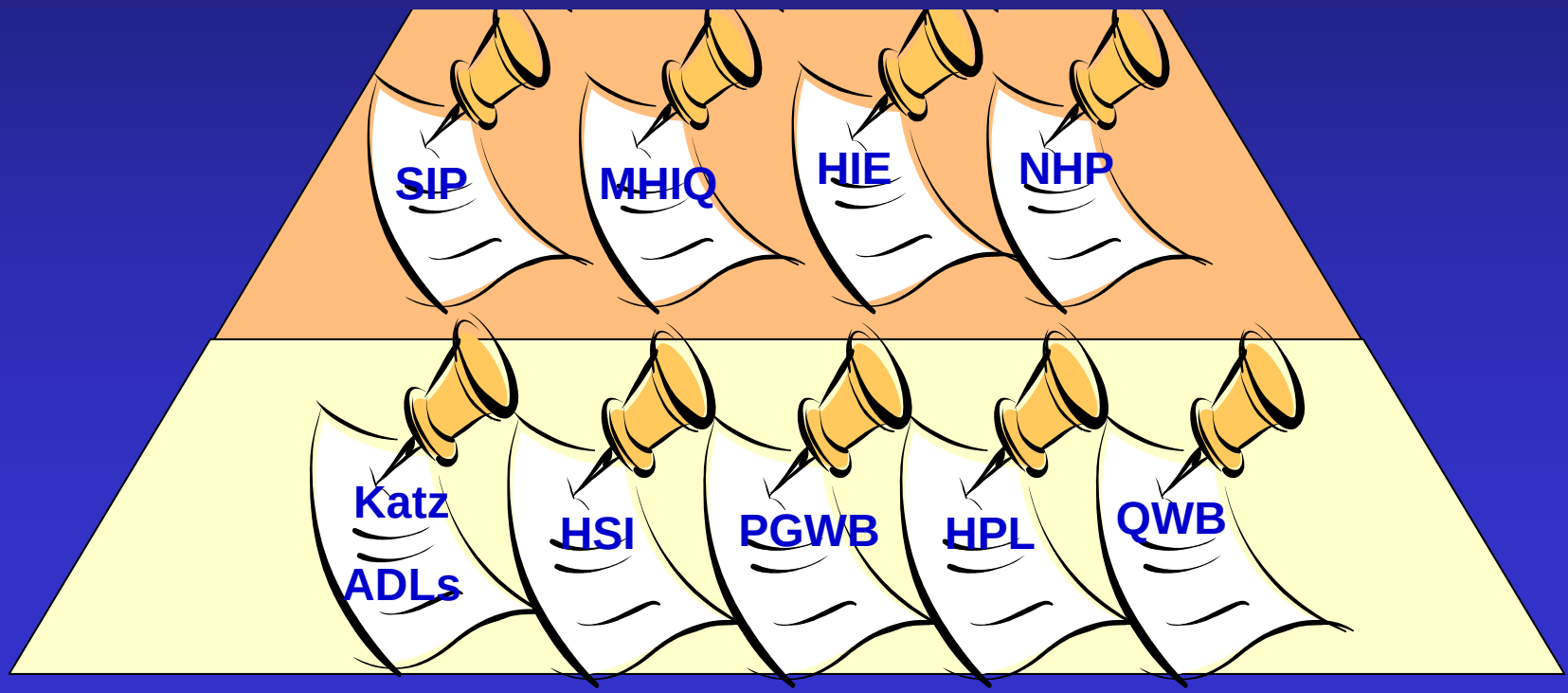


Source: McHorney, C.A., 1997

Science is a capital or fund perpetually reinvested; it accumulates, rolls up, is carried forward by every new man.

Burroughs, 1913


Katz
ADLs
HSI
PGWB
HPL
QWB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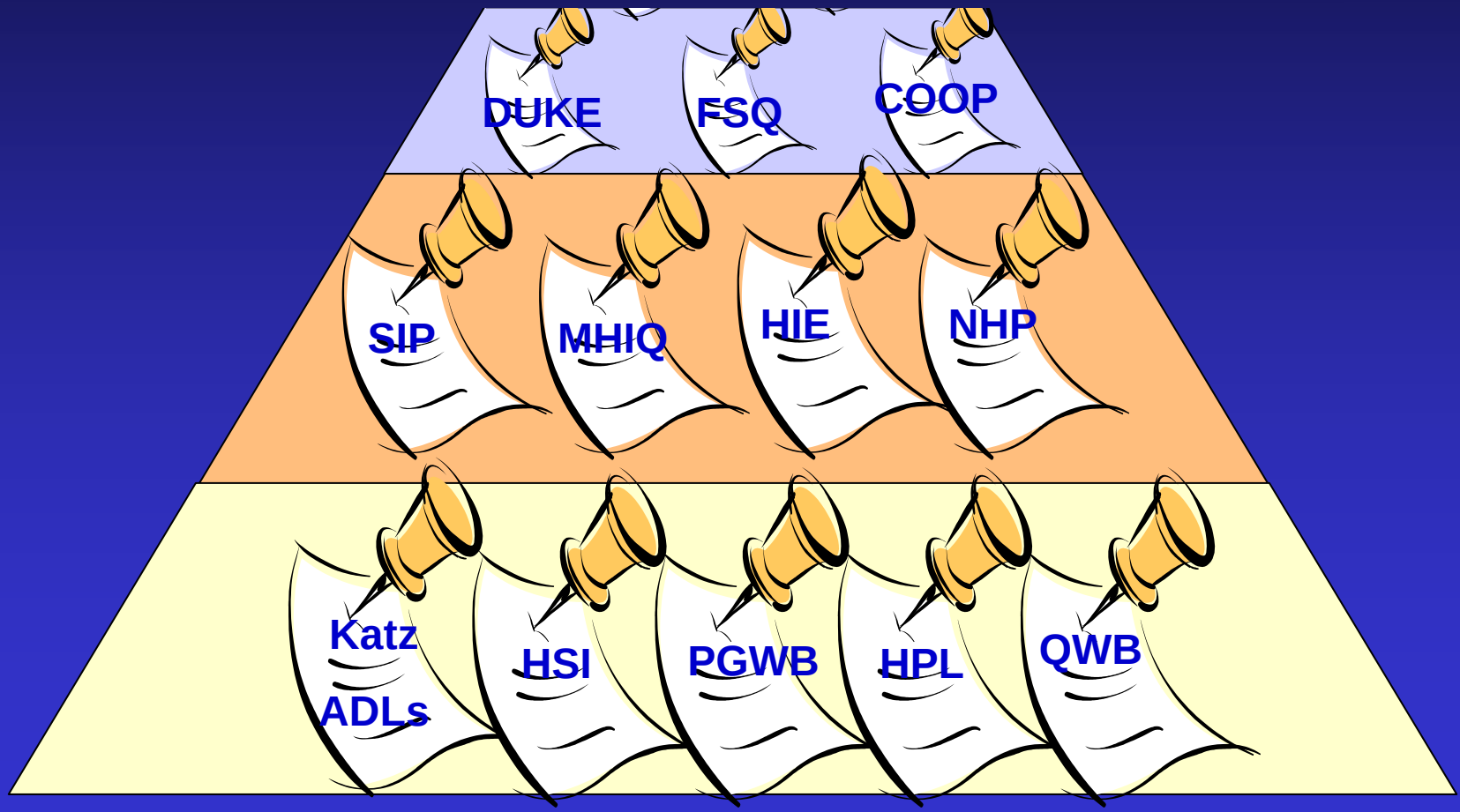
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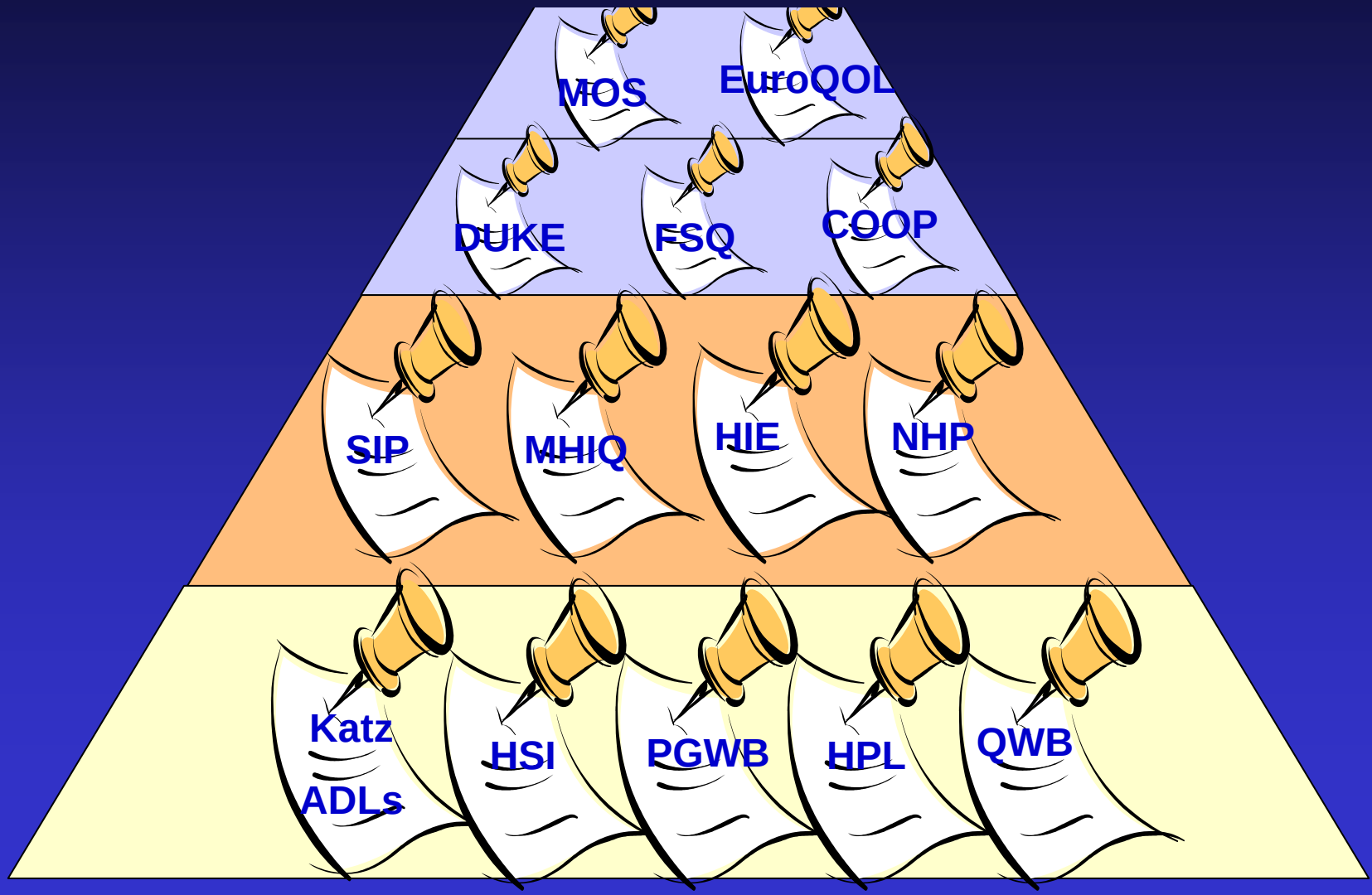
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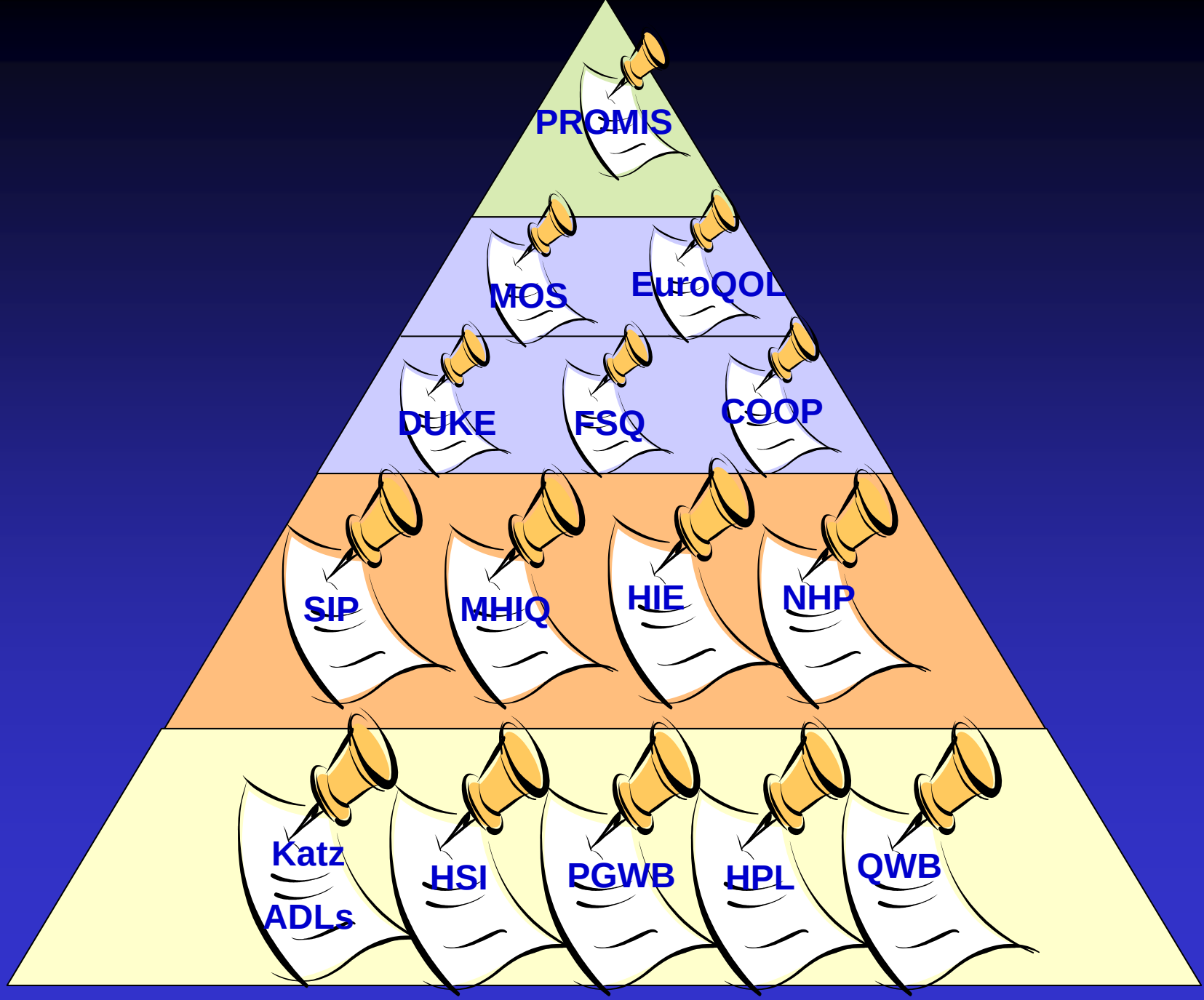
PROMIS
MOS
EuroQOL
DUKE
FSQ
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SIP
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HIE
NHP
Katz
ADLs
HSI
PGWB
HPL
QWB

He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me.

Thomas Jefferson, 1813

I made it, I created it, it is mine; it would not exist without me.

John Locke, date unknown

…the spirit of science…follows no flag, recognizes no geographical boundaries, and sets up no trade barriers. Complete freedom of scientific thought, and the free interchange of knowledge, are prerequisites for the survival of the spirit of inquiry. They are to the Commonwealth of Science what the Bill of Rights is to the life of democracy.

Gregory, 1941

A Metaphor…Commons

Tragedy of the Commons

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- As rational beings trying to maximize personal gain and wealth, people take more than their due share of resources and dump more than their due share of waste
- Ultimately, greed and population growth results in the collapse of the commons – therein lies the tragedy of the commons

Just What the Heck is the Analogy to Item Banking and CAT?

Tragedy of the Anticommons

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- Anticommons is the mirror image of commons property – *undergrazing* and *underuse* instead of overgrazing

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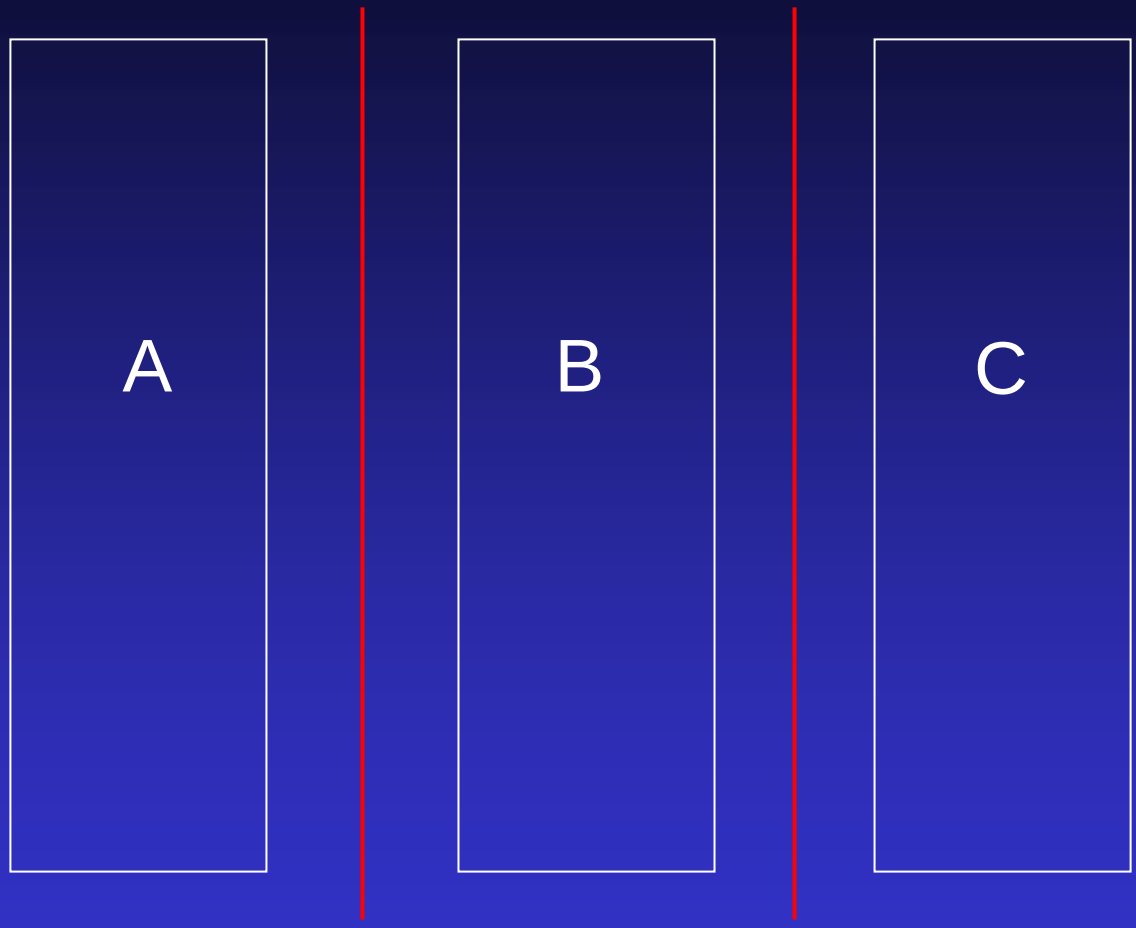
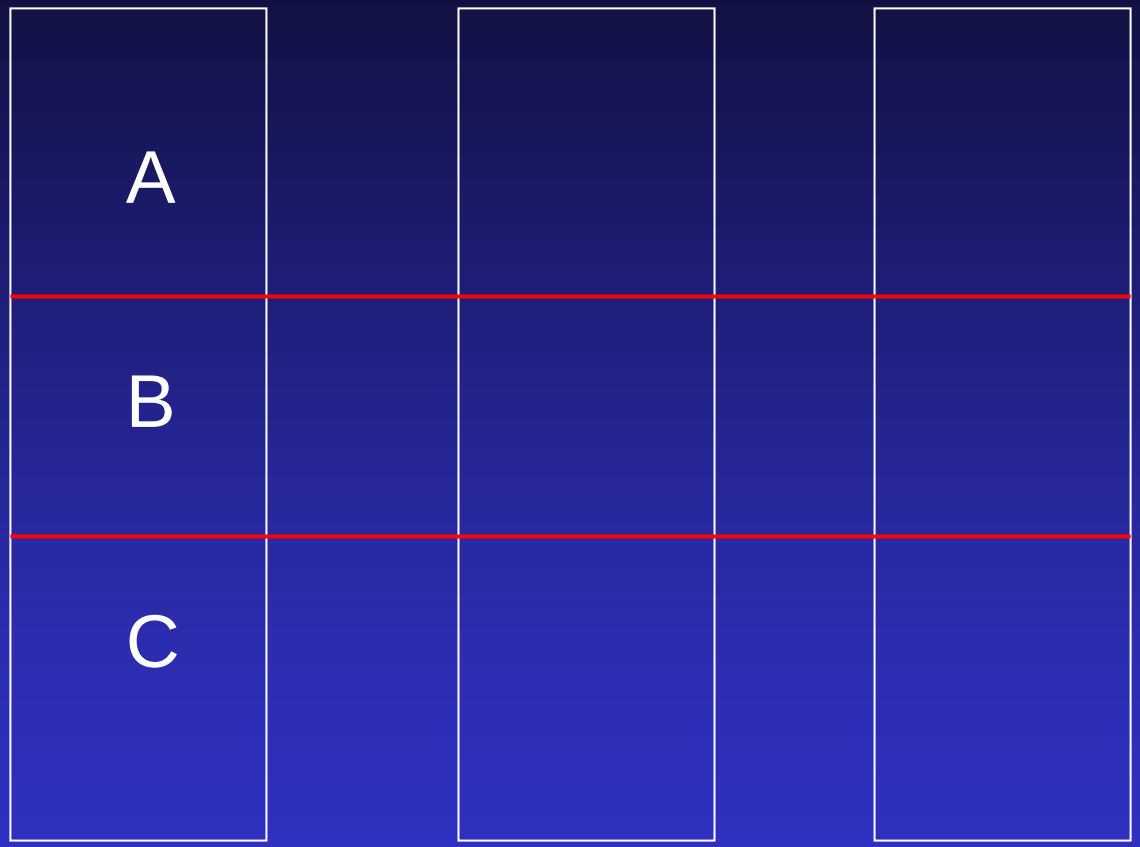


Private Property



Anticommons Property

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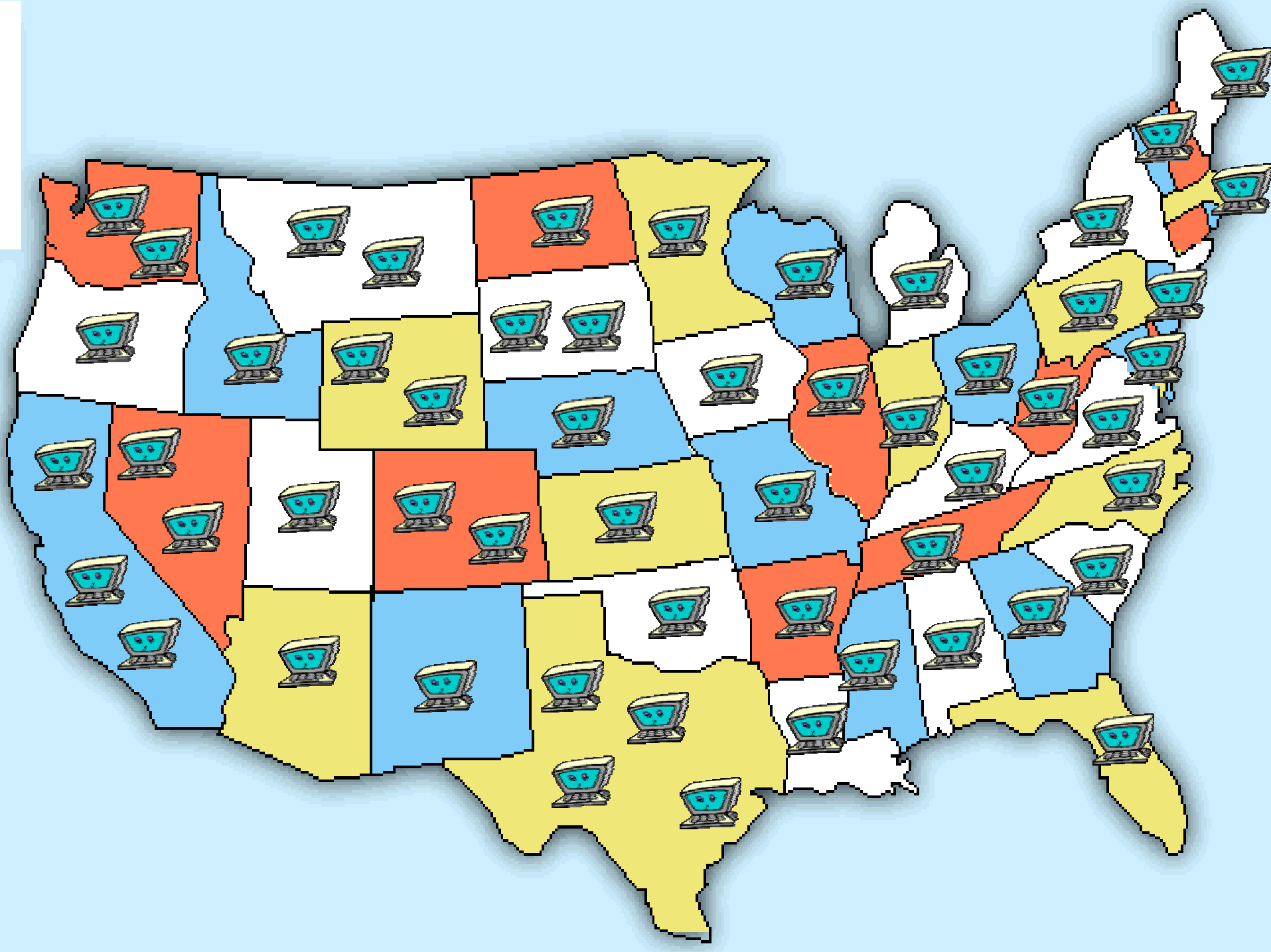
- An anticommons is bad - it wastes resources as they can lie idle
- Could there be too many tollbooths on the road to product development?
- Could there be too many concurrent fragments of intellectual property rights which might, ultimately, hinder scientific progress?

If You Build Too Many of Them, Will They Not Come?

The family is the natural and fundamental unit of society. It follows that any choice and decision with regard to the size of the family must irrevocably rest with the family itself and cannot be made by anyone else.

Hardin, 1968



Are we a family?

Who will decide?

Should we view our commonwealth of items as a common resource?

How do we protect a common resource?

How do we agree to use communal resources?

[The challenge becomes] how a group can organize and govern themselves to obtain collective benefits in situations where the temptations to free-ride are substantial.

Ostrom, 1990

Do We Need Stewardship and Governance of Our Collective Goods to Reach Collective Goals?

Concerns about Privatization and Commercialism of Item Banking and CAT…..

[When] commercial interests dictate the research being done…we have a recipe for a distortion of the moral goals of research.

Williams and Rowell, 1999

Hippocratic Oath for Scientists

I vow to practice my profession with conscience and dignity; I will strive to apply my skills only with the utmost respect for the well-being of humanity, the earth, and all its species; I will not permit considerations of nationality, politics, prejudice, or monetary advancement to intervene between my work and this duty to present and future generations.

Weinstein, 2002

It is generally considered to be a moral “good” to seek to put an end to human suffering.

Gannon, Guthrie, and Layrie, 1995

HRQL measures developed entirely with public monies should remain in the public domain; or at least be managed for the public good.

R. Berzon, D. Patrick, G Guyatt, J.M. Conley, 1994

Proprietary research…almost certainly leads to diminution of openness among scholars in the field. Lining up to publish results will take on less urgency than entering the queue to obtain a patent or copyright. In such an intellectual environment, publication will become less a means of communication with other scholars about how better to approximate some truth or another, than a medium for advertising a product or product line.

M.F. Shapiro, 1994

Should the Products of our Scientific Labors be a Private or Public Good?

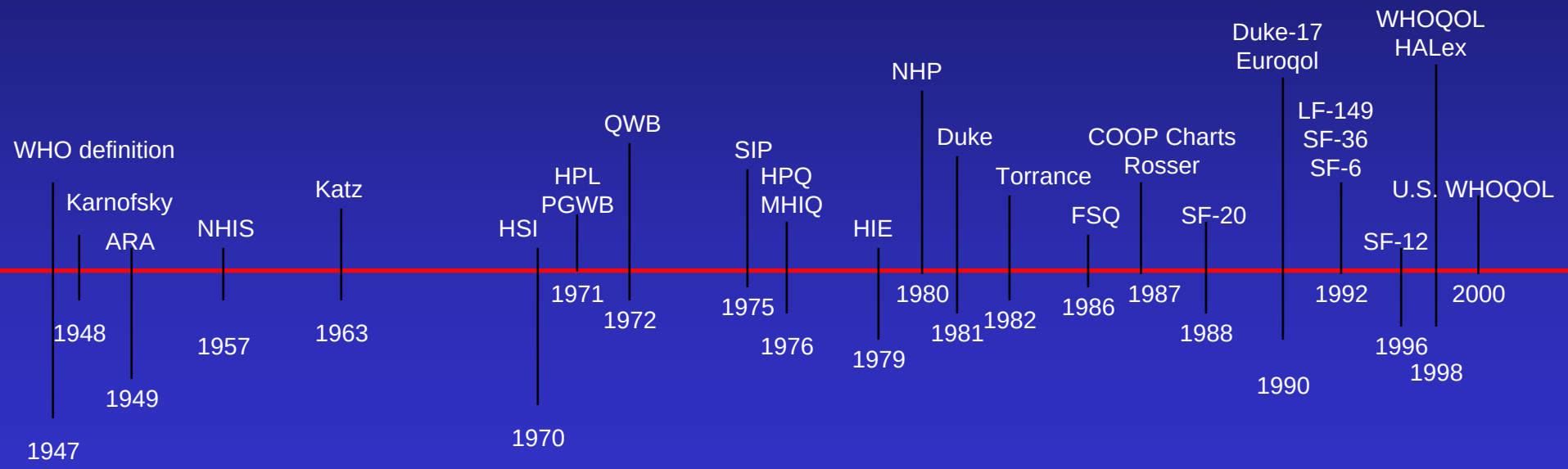
Knowledge is the product of centuries of man's experience, work, and thought. It is the heritage of all people; the contribution of each man to the body of knowledge are based on the efforts of countless others before him. Knowledge…is not a private possession of those who have attained it; their responsibility includes the transmission to all who wish and need it.

HR Holman, 1971

Technological inventions are mostly a social creation of collective, cumulative, and interrelated work to which we all contribute, and, therefore, no one person or firm should be able to claim the property. Ownership of technological inventions might be immoral… [if they] prevent inventors from using or appropriating from ideas that they have collectively been a part of creating.

B. Andersen, 2004

Adult Health Measurement Timeline: Generic Measures



Source: McHorney, C.A., 1997

Critical assessment of [an] instrument's strengths and weaknesses requires access to the questionnaire and a meaningful exchange of supporting data between developers and evaluators. Those who use HRQL instruments in clinical research must be able to ask hard questions and receive candid answers. Anything less can be characterized as an impediment to the scientific process.

R. Berzon, D. Patrick, G Guyatt, J.M. Conley, 1994

Stopping Rules

Scoring

IRT Model

Item bank size

Equating

Item Discrimination

Item Difficulty

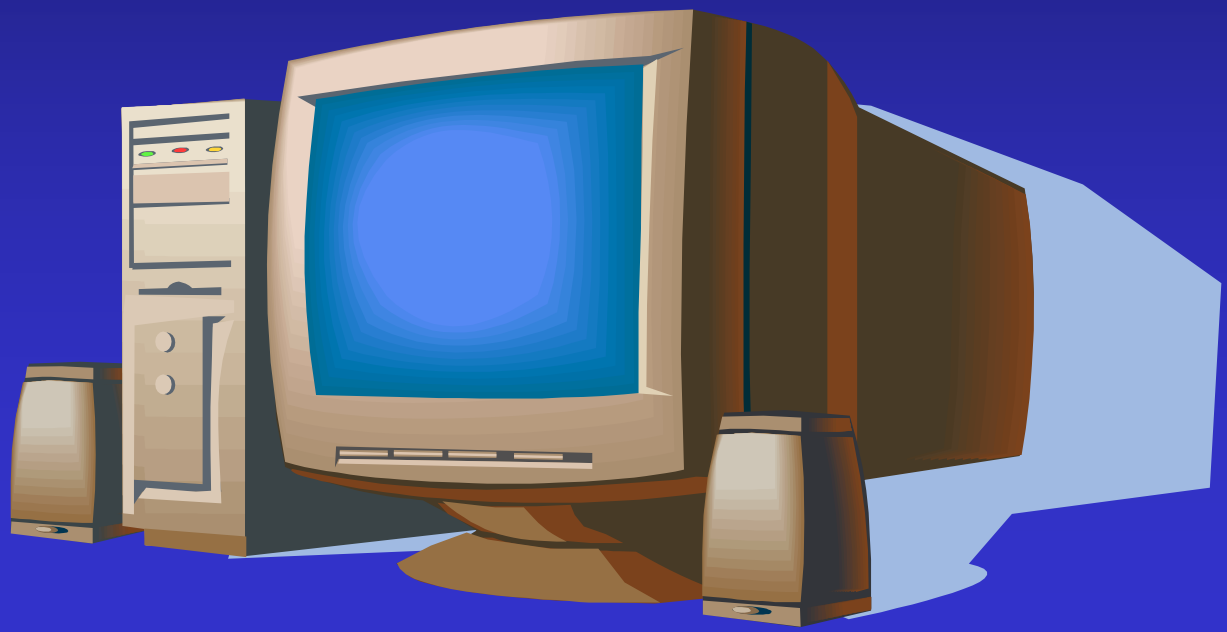
Guessing

Item selection

Unidimensionality

Estimation ability

Starting Rules



Nutrition Facts

Serving Size ½ cup (114g)
Servings Per Container 4

Amount Per Serving

Calories 90	Calories from Fat 30
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 0g	**0%**
Cholesterol 0mg	**0%**
Sodium 300mg	**13%**
Total Carbohydrate 13g	**4%**
Dietary Fiber 3g	**12%**
Sugars 3g	
Protein 3g	

Vitamin A 80%	•	Vitamin C 60%
Calcium 4%	•	Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

CAT Facts

Number of Items	???
IRT Model	???
Range of Item Difficulty	???
Range of Item Discrimination	???
Dimensionality	???
DIF	???
Starting Algorithm	???
Stopping Algorithm	???
Estimation Algorithm	???

Science and Publishing……

Disclosure of Methods In Scientific Manuscripts Submitted for Publication

Identify methods…and procedures in sufficient detail to allow other workers to reproduce the results…Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results.

International Committee of Medical Journal Editors, 1997

Case Study: Methods Available Upon Request

- 1995 *Medical Care* article on risk adjustment – methods available upon request
- Scott Ramsey, MD, PhD requested the methods
- Response: submit your data and we will analyze it for $200,000
- Dr. Ramsey's response: "In my opinion, *Medical Care* unwittingly published an 'infomercial' for John Doe's proprietary methodology since, apparently, the only way readers can utilize it is to pay him for the privilege."
- *Medical Care's* response 1996;34(11): 1071. "Too high a price makes the instrument useless to the field and we would most likely reject the article."

Secret ingredients are not part of science. Scientific methods need to be public.

Goldberg and Neuhauser, 1996

Protection of proprietary information through secrecy is a legitimate business function. But it is antithetical to the traditions of science and is certainly not the function of a scientific publication.

Reidenberg, 1996

As a nation, we seem to respond to crisis in formulating a science and research policy.

David Nagel, 1989

I made it, I created it, it is mine; it would not exist without me.

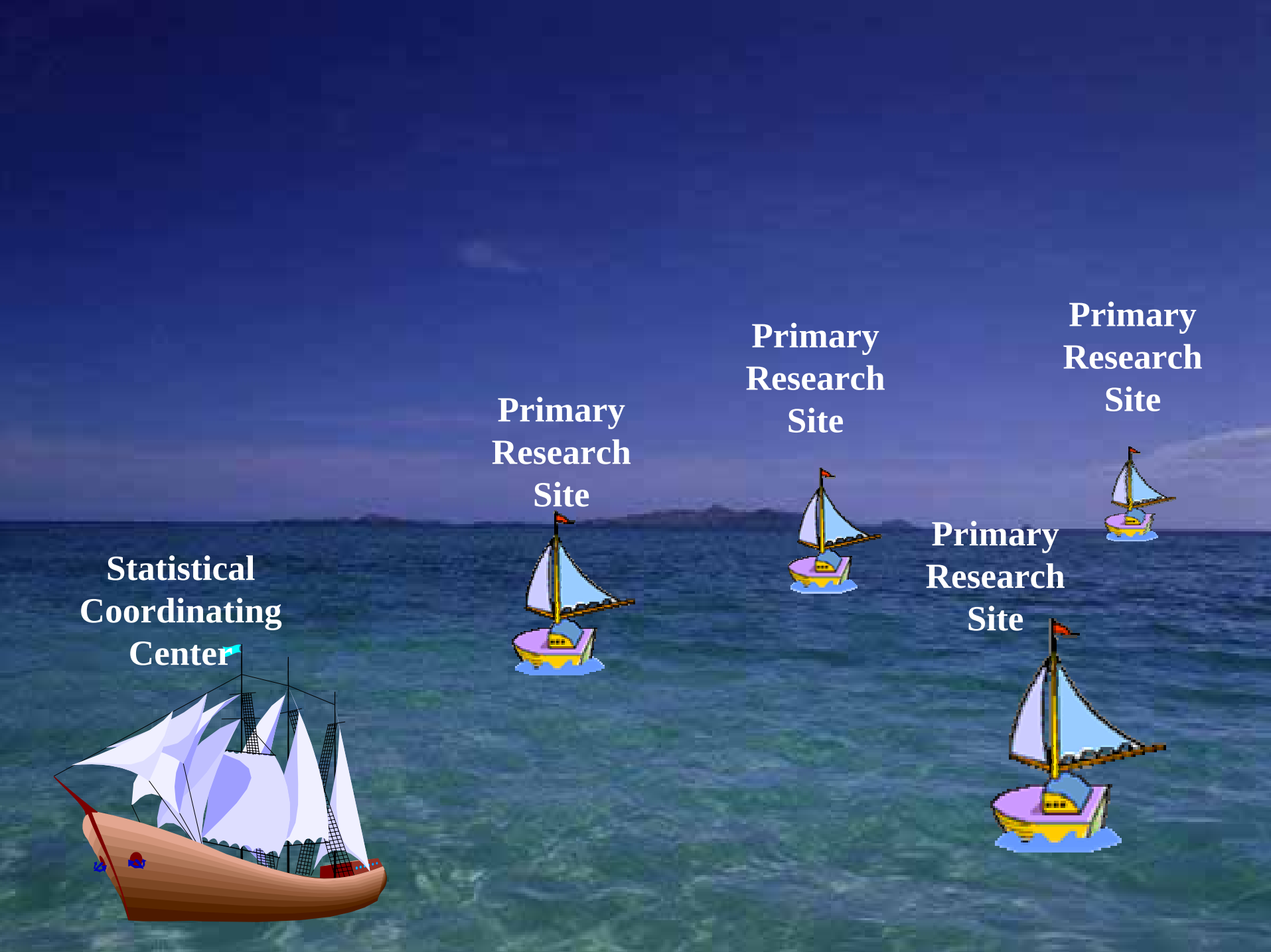
John Locke, date unknown

If I have seen farther, it is by standing on the shoulders of giants.

Isaac Newton, 1675

I find that the greatest thing in this world is not so much where we stand as in what direction we are moving. To reach the port of heaven, we must sail sometimes with the wind and sometimes against it – but we must sail, and not drift, nor lie at anchor.

Sir Oliver Wendell Holmes, 1891


Statistical Coordinating Center
Primary Research Site
Primary Research Site
Primary Research Site
Primary Research Site