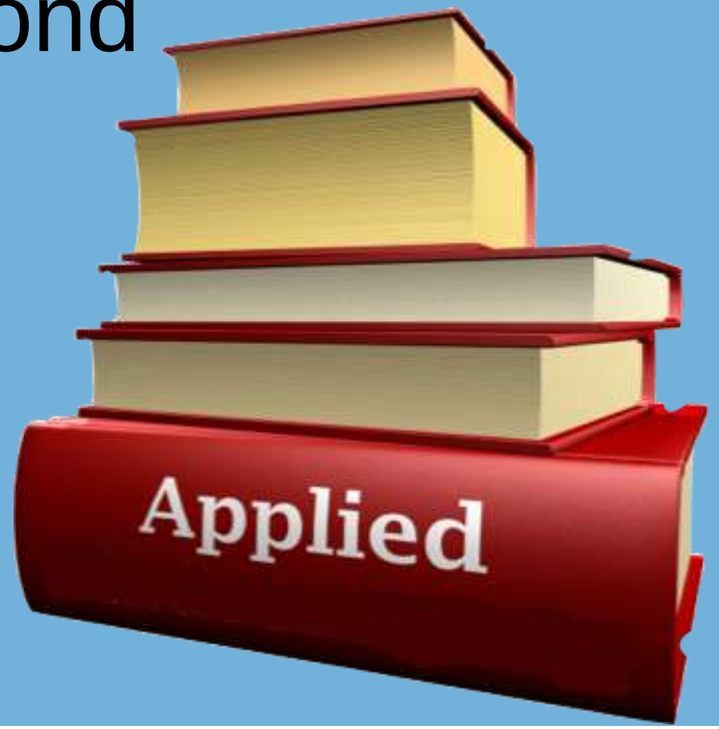
From Small Beginnings Come Greater Goods

Applying Evidence-Based Science Beyond Publications



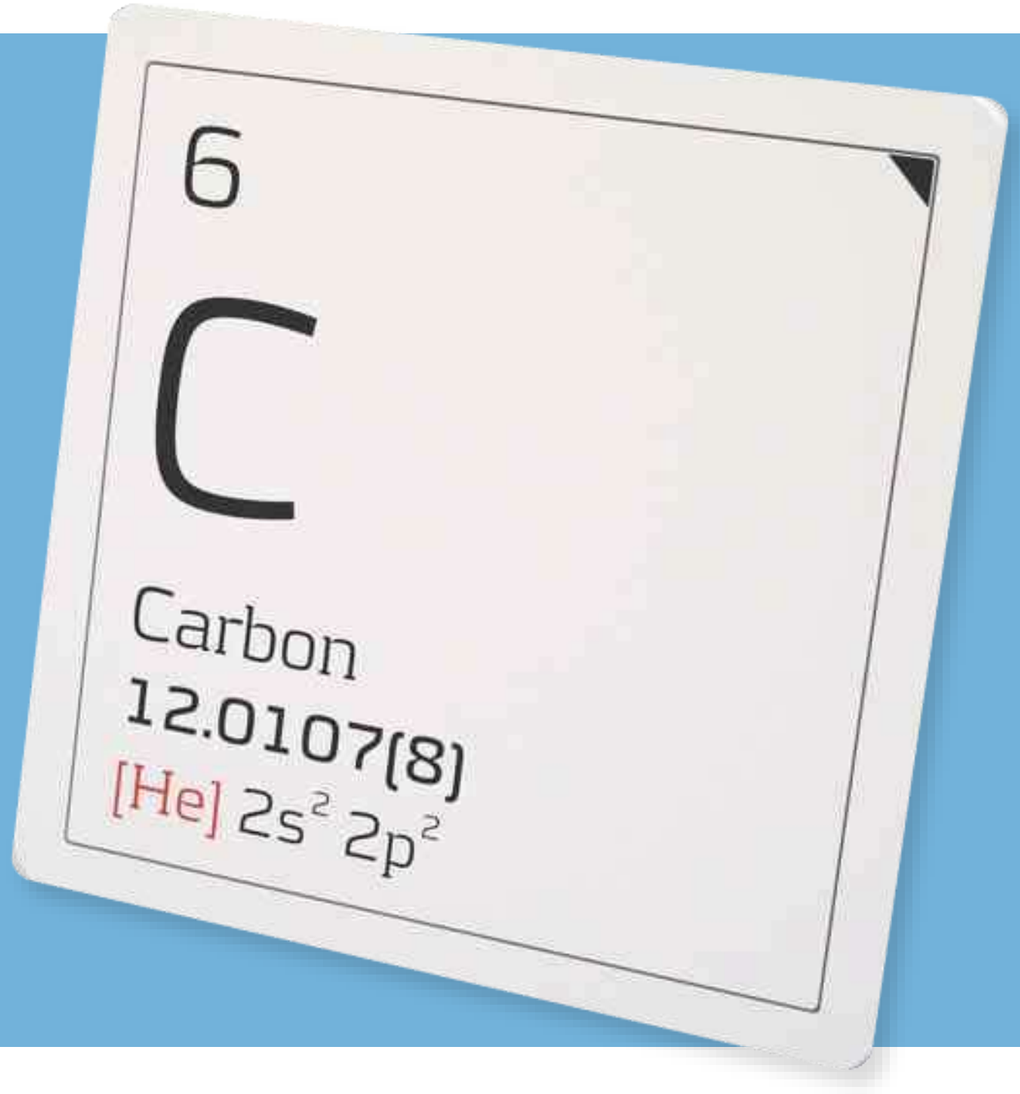
Dennis D. Embry, Ph.D.
President/Senior Scientist, PAXIS Institute

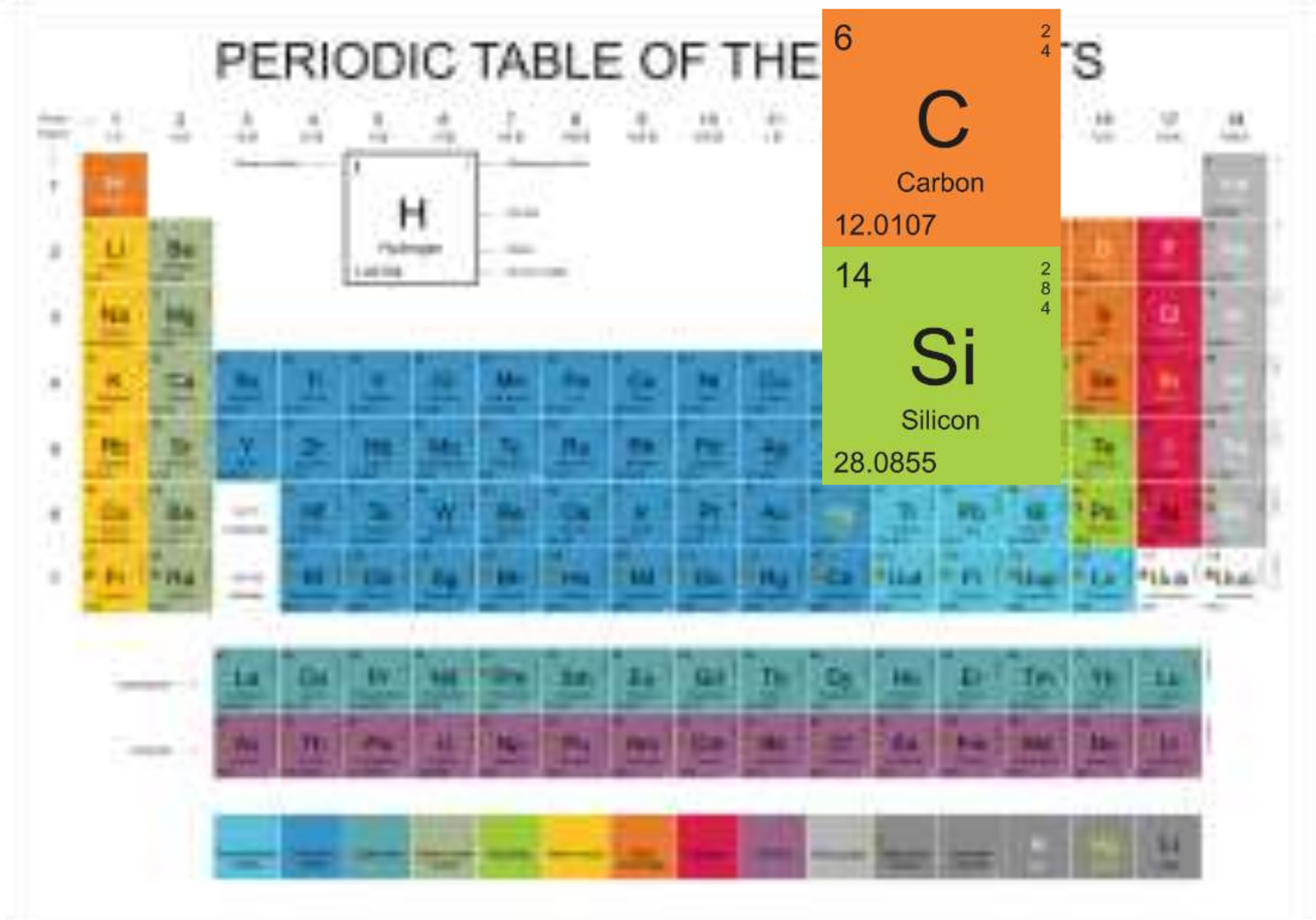
American Speech-Language Hearing Association's • Carlsbad, CA • 03/20/2014

Foretelling my talk today

- Identifying fundamental units of change for speech, language, and hearing
- Developing a testable approach for improving improving speech, language, and hearing outcomes at a population level

We don’t need another Silicon Valley.
We need a Carbon Valley…

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Silicon
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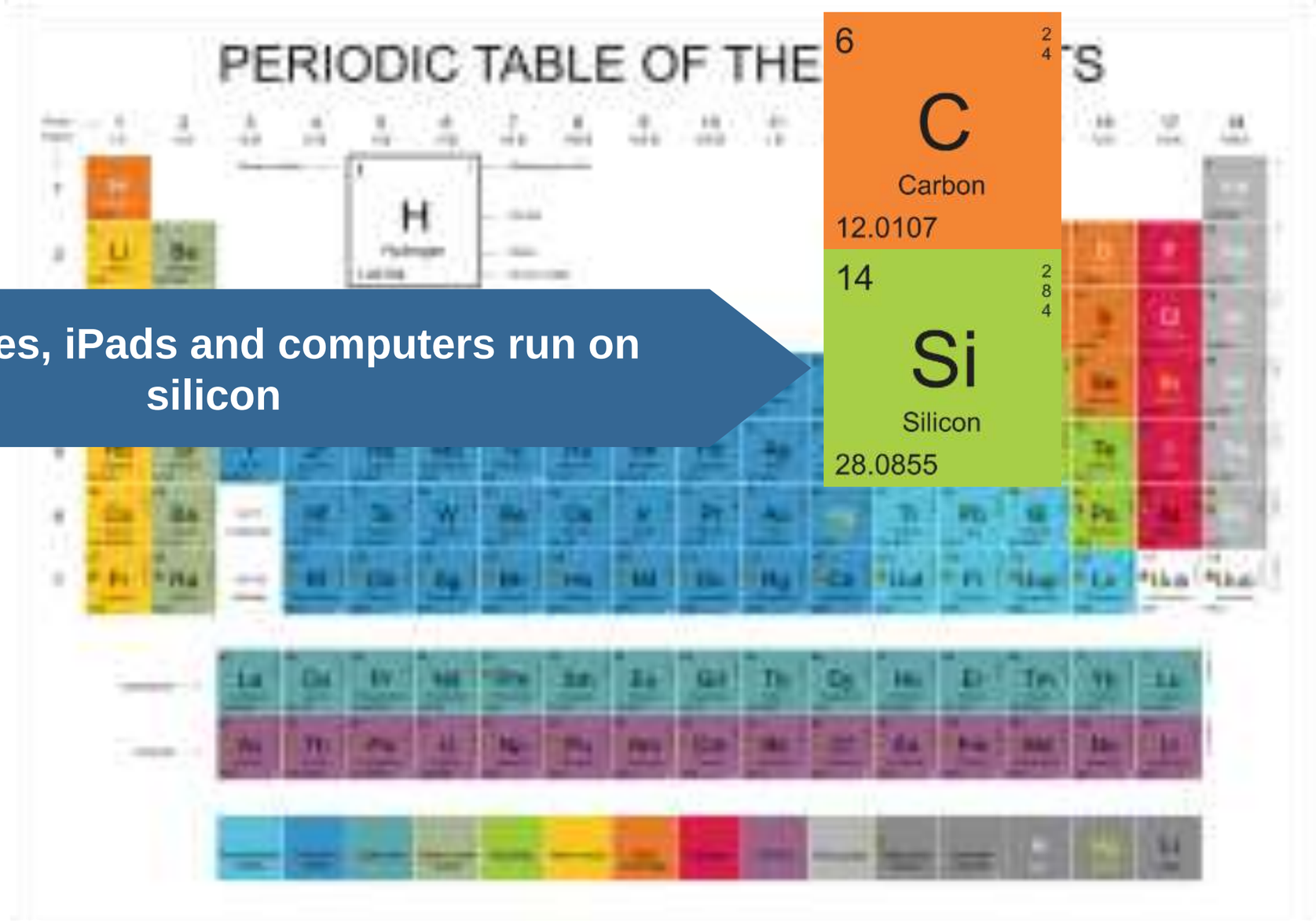
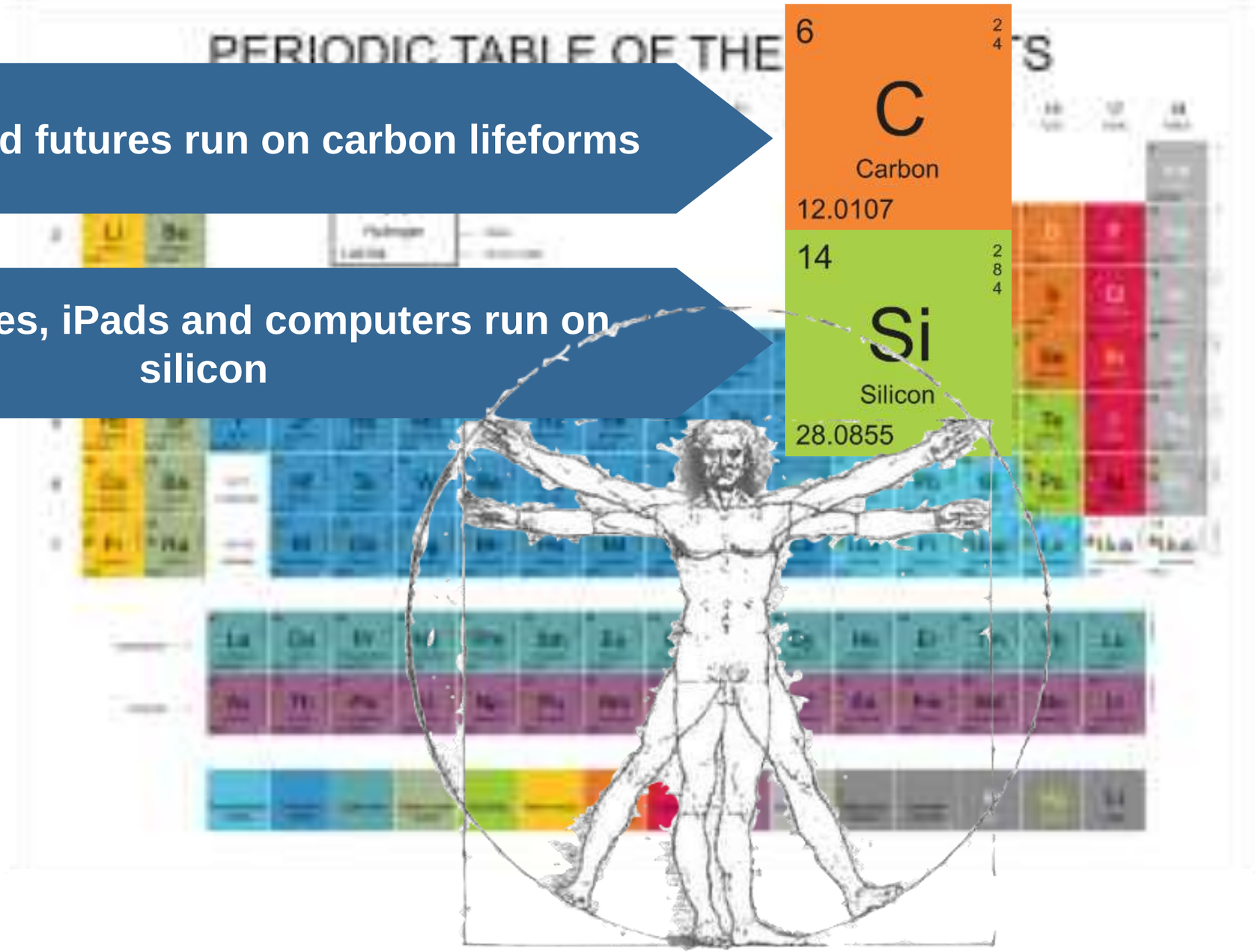
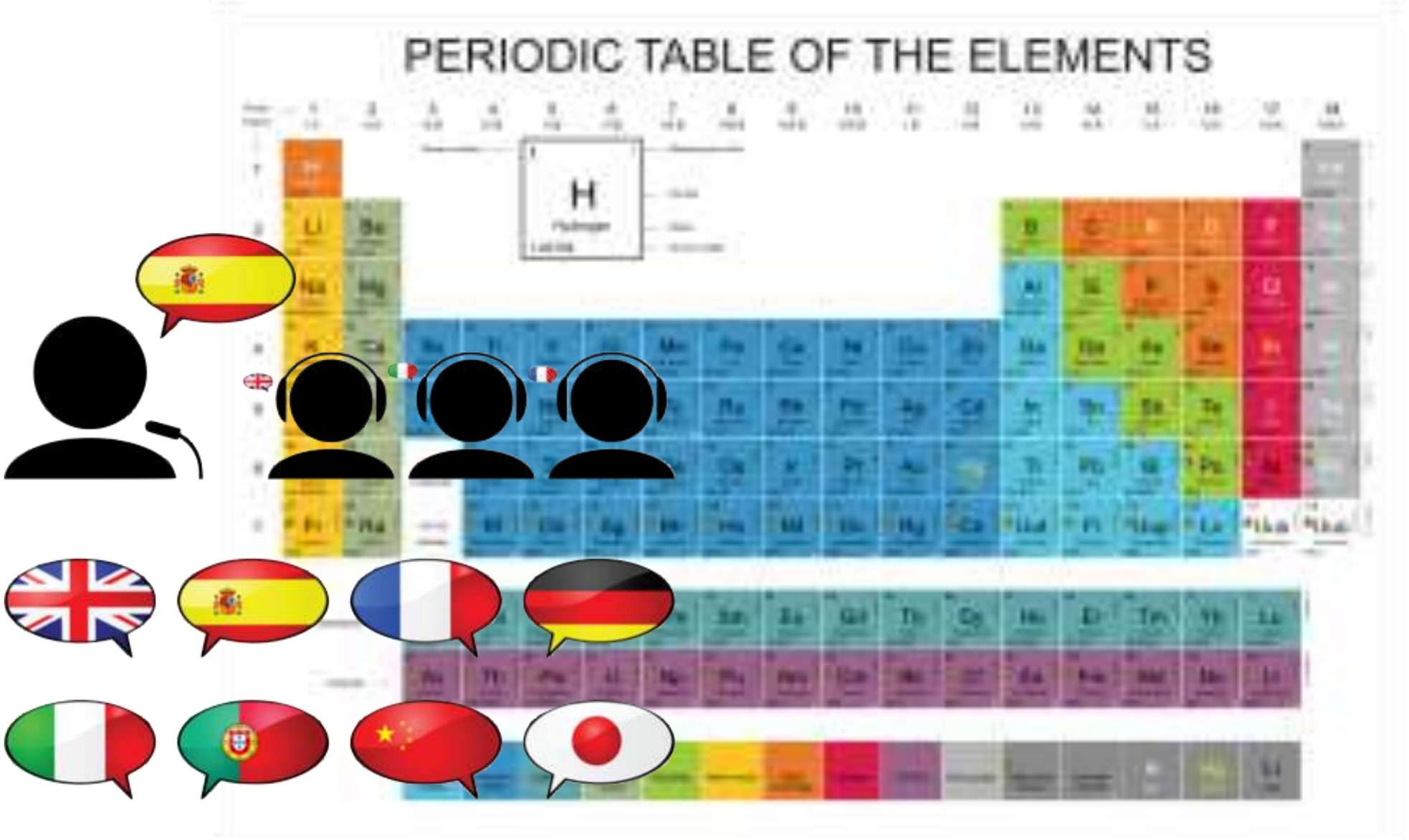


Our iPhones, iPads and computers run on silicon

Our lives and futures run on carbon lifeforms

Our iPhones, iPads and computers run on silicon

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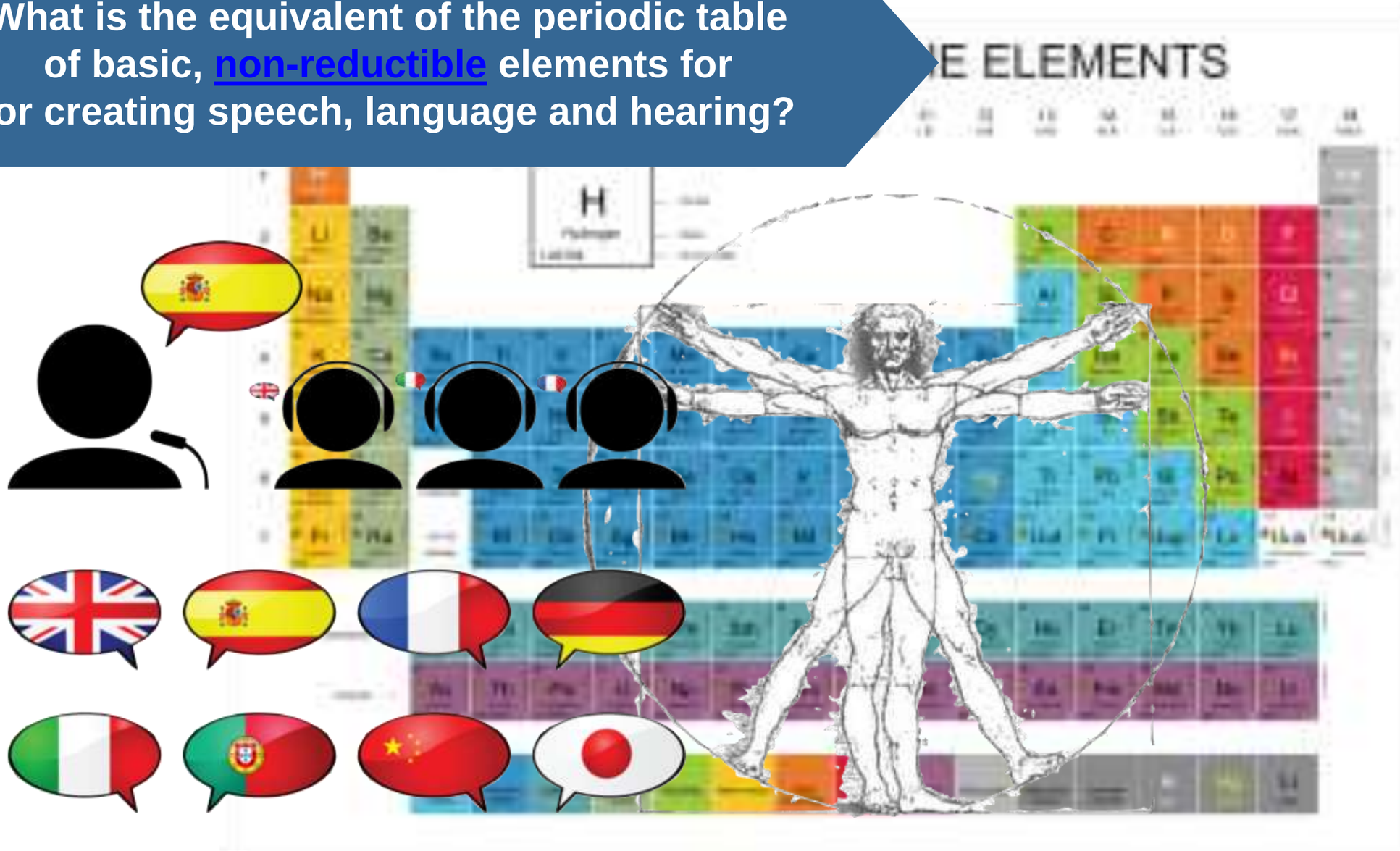
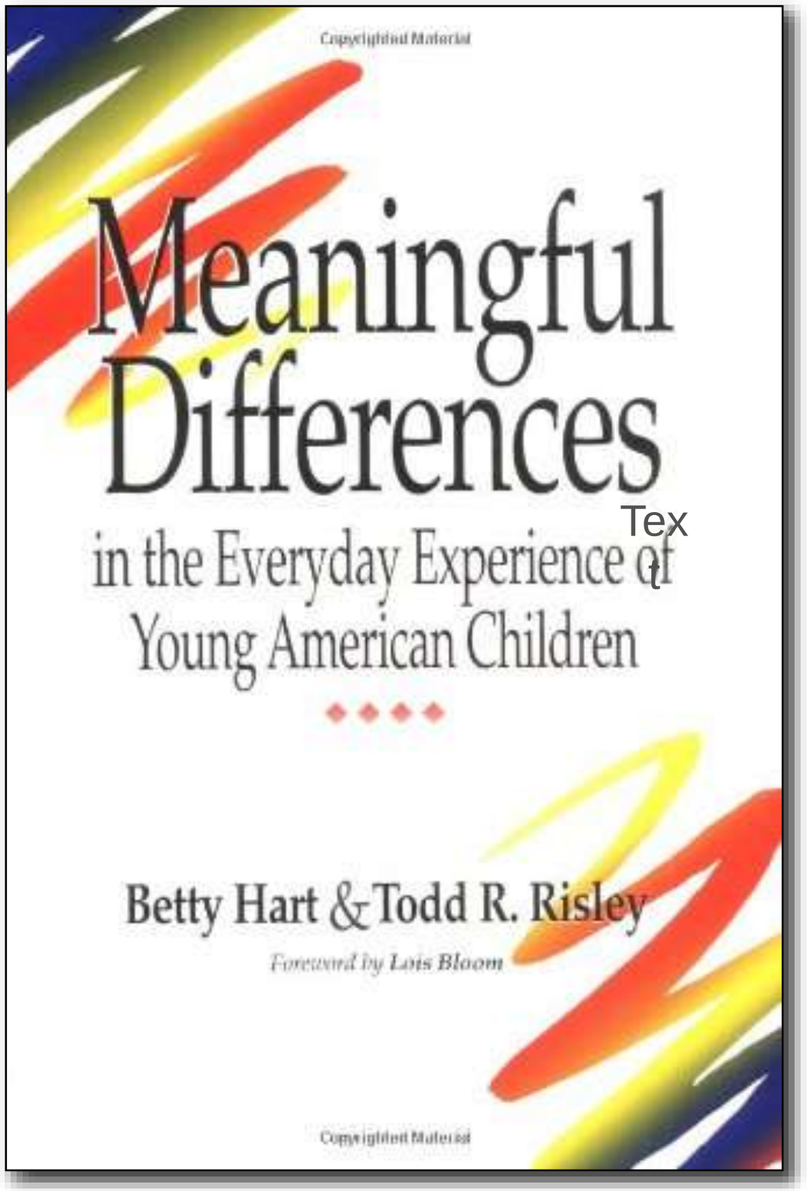
H

What is the equivalent of the periodic table of basic, non-reductible elements for for creating speech, language and hearing?





This work establishes a scientifically substantiated link between children's early family experience and their later intellectual growth—a link that exists regardless of a child's race.

This story describes the authors' years of research as they search for the roots of intellectual disparity. Hart and Risley examined the daily lives of 1- and 2-yr-old children in typical American families. They found staggering contrasts at the extremes of advantage—and within the middle class—in the amount of interaction between parents and children.

These differences in the amount of early family experience translate into striking disparities in the children's later vocabulary growth rate, vocabulary use, and IQ test scores.

Citation Index: 1,485
as of March 19, 2014

Reflecting on your knowledge of Speech, Language and Hearing

Simple, proven, practical tools to help

Action…

1. Write the name of the strategy
2. Write what it increases
3. Write what it decreases
4. Write how many people could benefit by using the strategy in North America
5. What's a good reference for the strategy
6. How difficult is it to learn (time, skill, other)
7. Can this be evaluated in a single-subject design (Yes, no, unclear)
8. Write you name and email
9. Give your note to the organizers before the end of the day

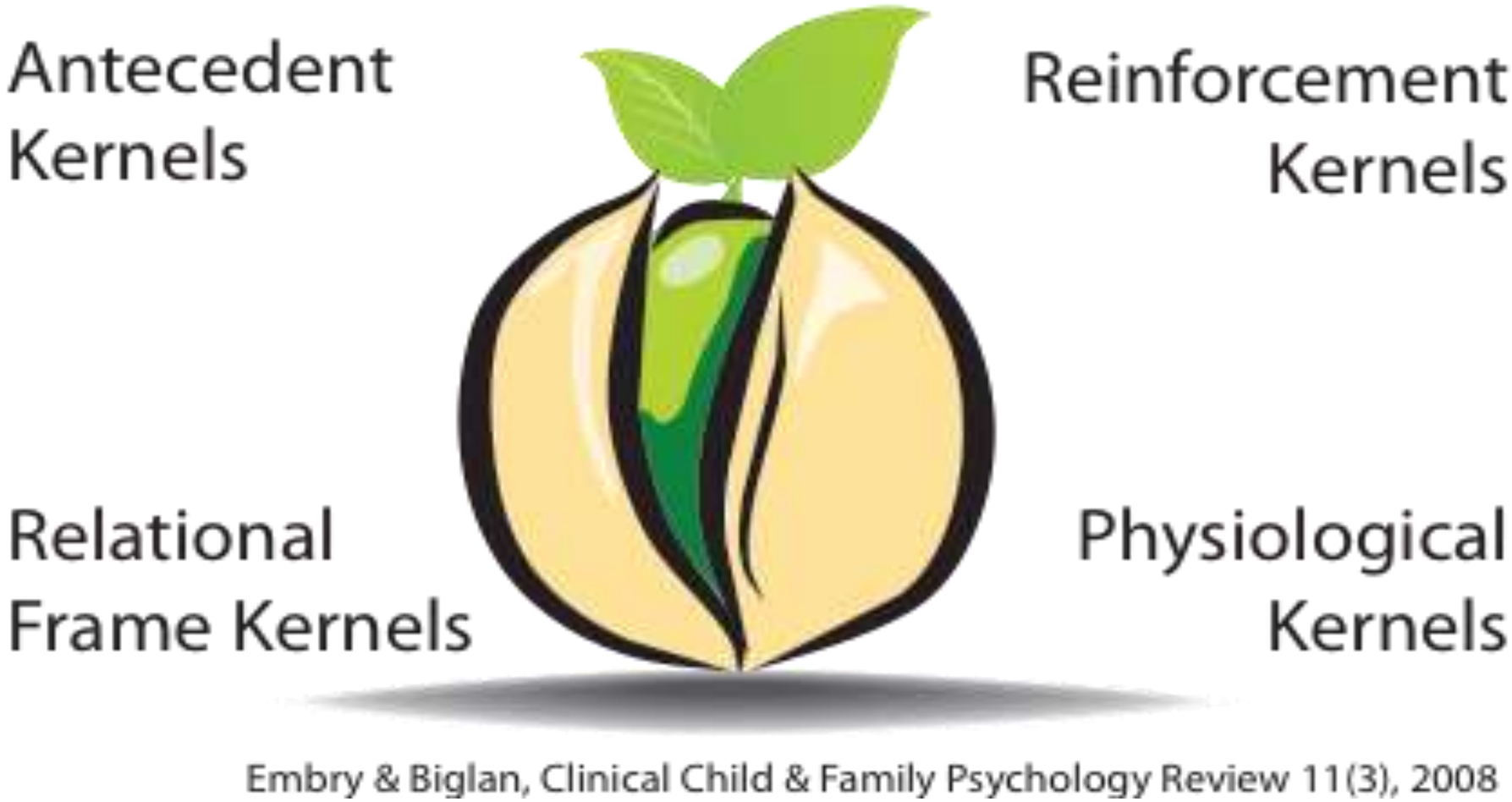
Richly Reinforce Pro-social Behaviors

Limit Exposure to Problematic Behaviors

Reduce Toxic Influences

Increase Psychological Flexibility

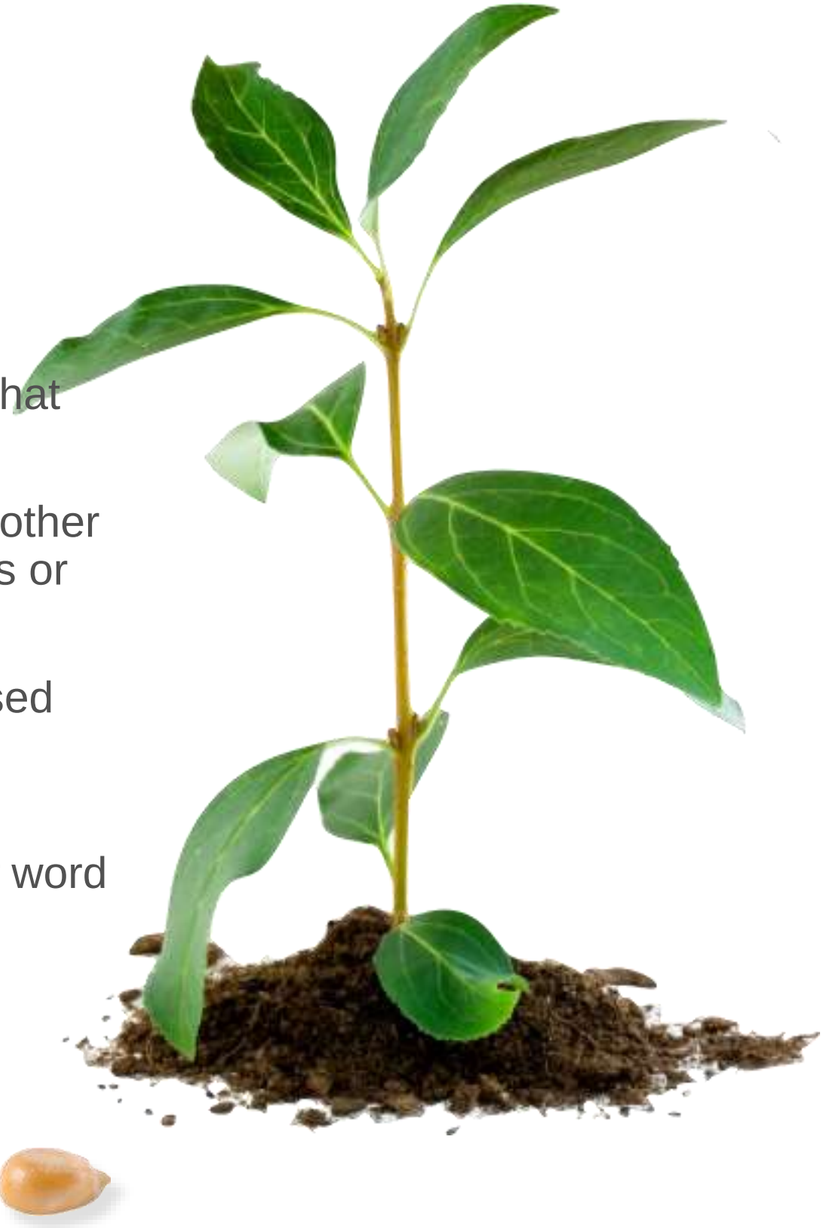
Biglan, A., B. R. Flay, et al. (2012). "The critical role of nurturing environments for promoting human well-being." American Psychologist 67(4): 257-271.



Embry, D. D. and A. Biglan (2008). "Evidence-Based Kernels: Fundamental Units of Behavioral Influence." Clinical Child & Family Psychology Review 11(3): 75-113..

What is an evidence-based kernel?

- Is the smallest unit of scientifically proven behavioral influence.
- Is indivisible; that is, removing any part makes it inactive.
- Produces quick easily measured change that can grow much bigger change over time.
- Can be be used alone OR combined with other kernels to create new programs, strategies or policies.
- Are the active ingredients of evidence-based programs.
- Can be effective at a public-health or population level, even spread by media or word of mouth.
- Can heal or reduce past disparities.



Kernels are building blocks of behavior change

- Humans survive individually and collectively by influencing the behavior or other humans
- The 2008 paper by Embry and Biglan identifies 52 evidence based kernels that can be used to design or improve programs.
- We in this room can find **new** kernels.

- For advancing Speech-Language Hearing Nurturing Environments widely

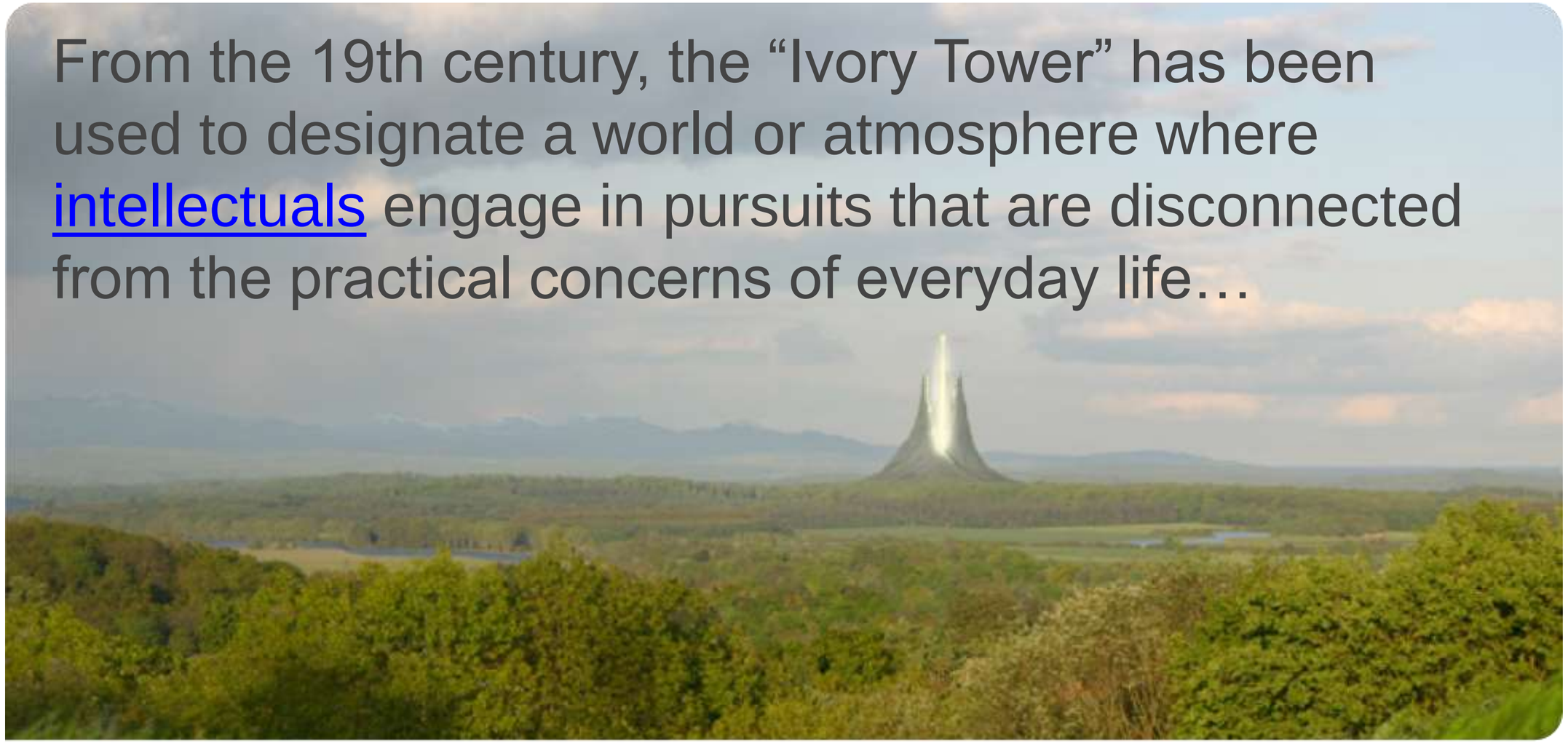


Illustration credit: Tim Ketzer.com

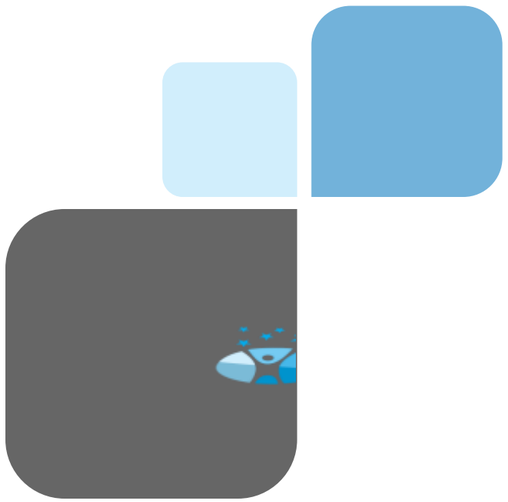
Our pursuits in the Ivory Tower

Planting and growing your evidence-based kernels

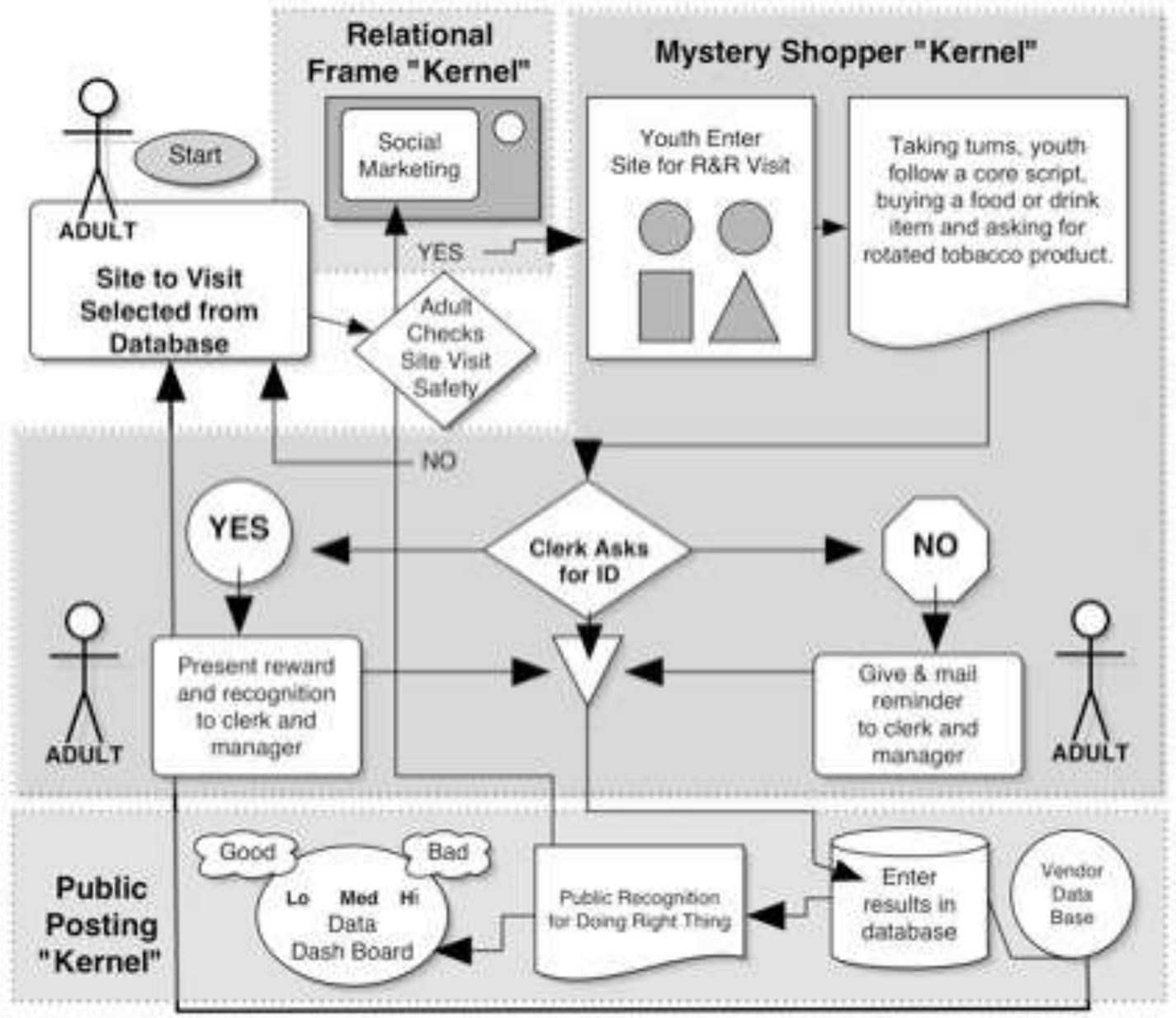
- The kernel can fit into naturally occurring human ecologies and routines
- Develop with subject-designs before randomized trials
- Has easily perceived/measured proximal gains Has robust reliability when implemented versus depending on tight dose and fidelity
- Consilient with multiple theoretical perspectives
- Can grow symbiotically with other kernels
- Can it fit into selection by consequences
- And…

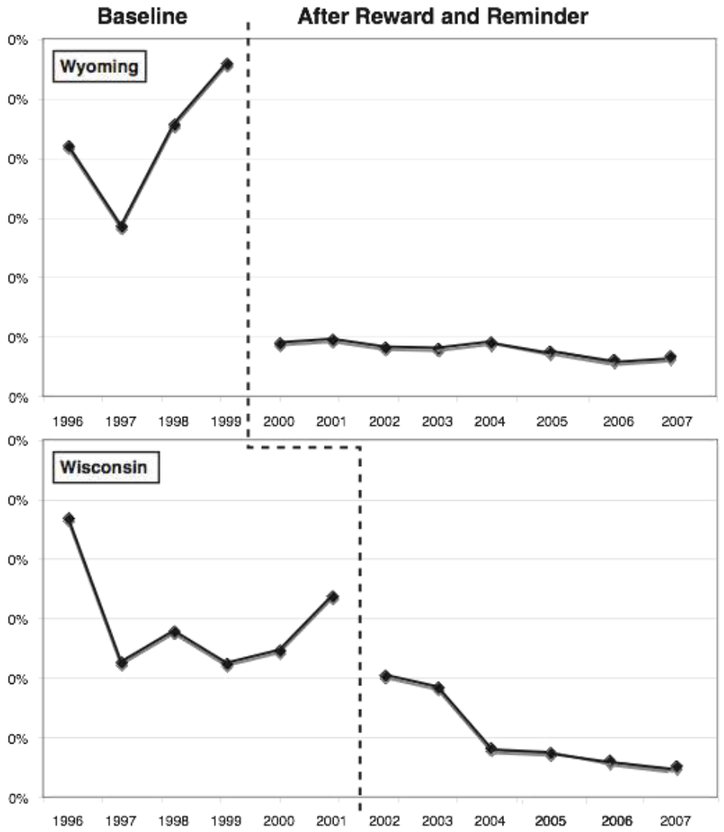
If some kernels, or combination of kernels, are used often…

- May improve indicators of wellbeing, reduce morbidity and possibly mortality (a behavioral vaccine) to affect lifetime language, hearing and speech plus other related outcomes beneficial to the individual, his or her family, and the larger society…



Example of evidence-based kernel recipe as behavioral vaccine




Baseline
After Reward and Reminder
Wyoming
Wisconsin
0%
1996
1997
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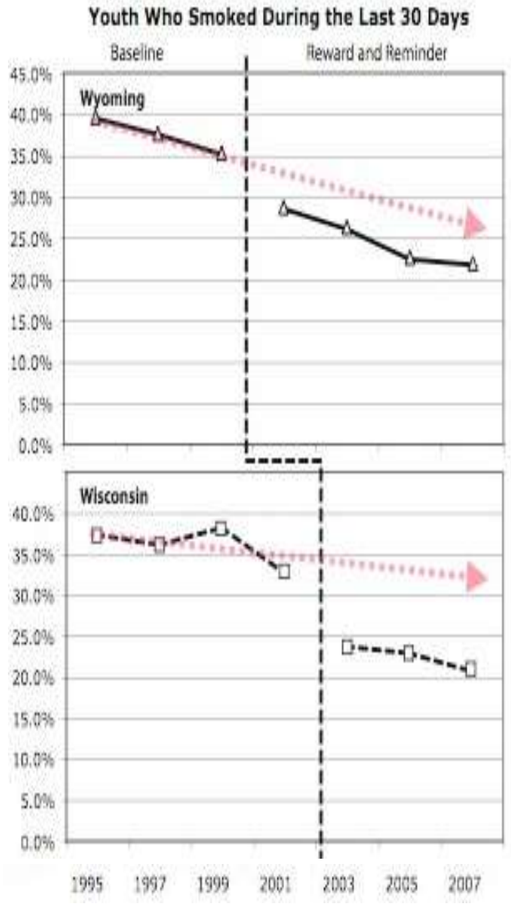
1999
2000
2001
2002
2003
2004
2005
2006
2007


Youth Who Smoked During the Last 30 Days
Baseline
Reward and Reminder
Wyoming
Wisconsin
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
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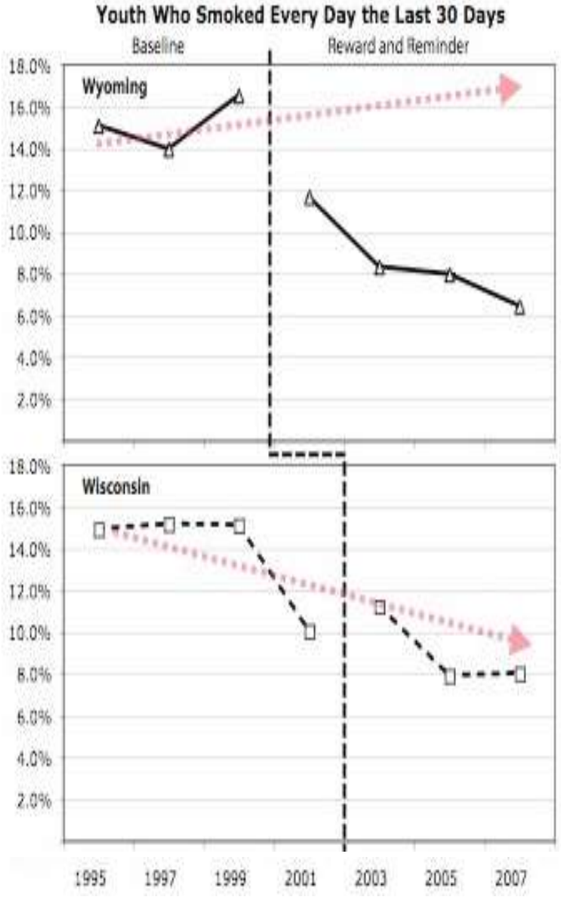
Youth Who Smoked Every Day the Last 30 Days
Baseline
Reward and Reminder
Wyoming
Wisconsin
18.0%
16.0%
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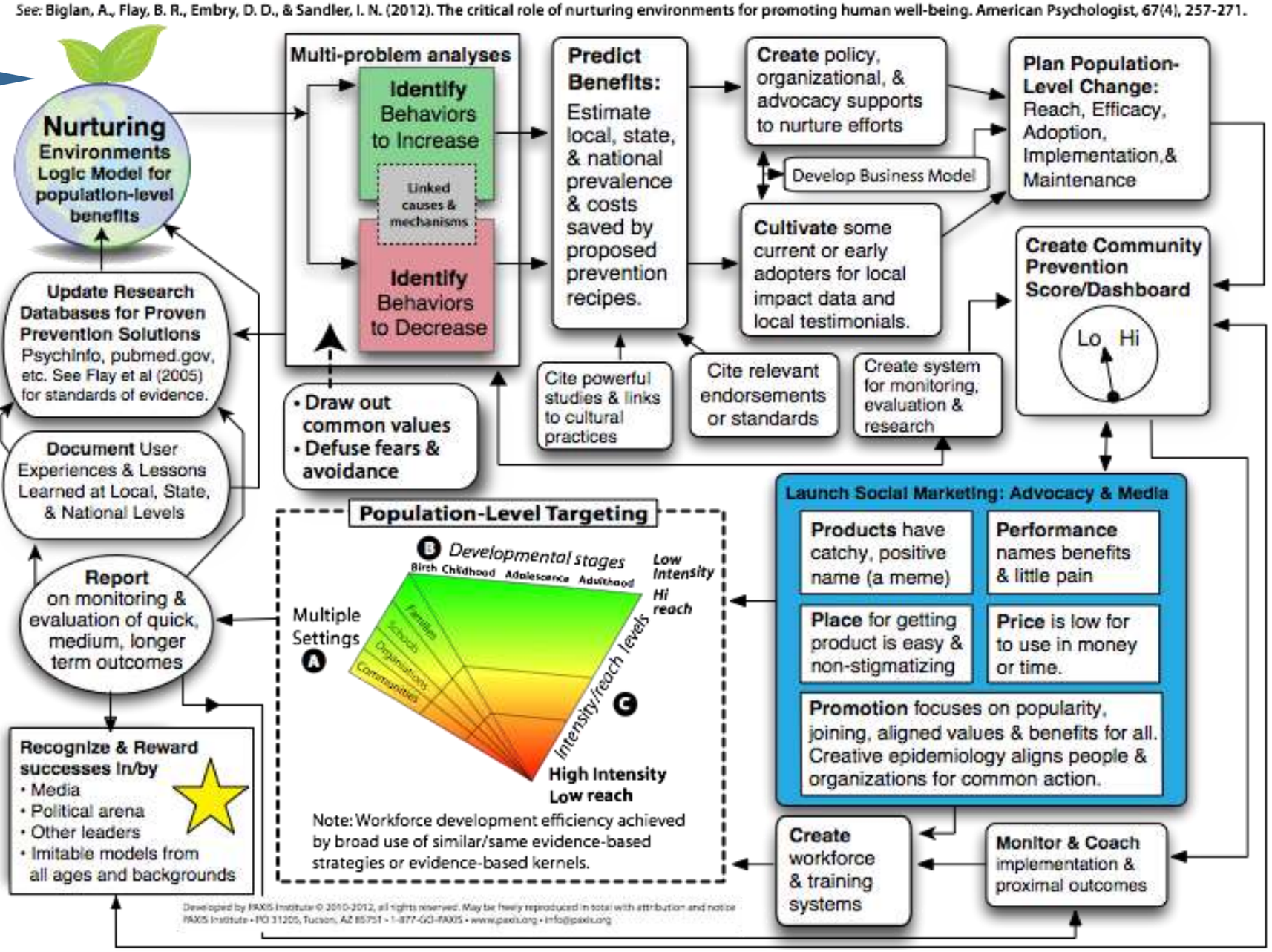
Building and testing logic model for population-level influence or change



RE-AIM Calculator for Prevention for Everyone™

RE-AIM = Reach, Efficacy, Adoption, Implementation & Maintenance

Start

Baseline Data

1. Total number of people (ages) to be **reached** in the population (www.census.gov):

*This is the number to be **reached**.*

2. How will your plan get at least 25% of the reached population to **adopt** the strategy/kernel?

2b. Who might sponsor* or support the effort?

*Sponsors are more than governments; they are private businesses that get marketing value from a universal community good like being a sponsor of a leading sports team.

3. What are the ways actual **implementation** of the strategy will be promoted, reinforced and supported:

3b. What is the monitoring for **implementation**?

2c. What is the monitoring for % **adoption**?

4. How will individuals, groups and organizations use of the strategy be **maintained** over time?

5. How will changes in behavior be **measured** each day, week, month, or year and reported as a public scoreboard?

6. How will changes be celebrated?

* Embry DD. Community-Based Prevention Using Simple, Low-Cost, Evidence-Based Kernels and Behavior Vaccines. Journal of Community Psychology 2004;32(5):575.
Embry DD, Biglan A. Evidence-Based Kernels: Fundamental Units of Behavioral Influence. Prevention Science revised and re-submitted.

The first whole classroom study of behavioral psychology in the world…

JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1969, 2, 119-124 NUMBER 2 (SUMMER 1969)

GOOD BEHAVIOR GAME: EFFECTS OF INDIVIDUAL CONTINGENCIES FOR GROUP CONSEQUENCES ON DISRUPTIVE BEHAVIOR IN A CLASSROOM[1]

HARRIET H. BARRISH, MURIEL SAUNDERS, AND MONTROSE M. WOLF

UNIVERSITY OF KANSAS

Out-of-seat and talking-out behaviors were studied in a regular fourth-grade class that included several "problem children". After baseline rates of the inappropriate behaviors were obtained, the class was divided into two teams "to play a game". Each out-of-seat and talking-out response by an individual child resulted in a mark being placed on the chalkboard, which meant a possible loss of privileges by all members of the student's team. In this manner a contingency was arranged for the inappropriate behavior of each child while the consequence (possible loss of privileges) of the child's behavior was shared by all members of this team as a group. The privileges were events which are available in almost every classroom, such as extra recess, first to line up for lunch, time for special projects, stars and name tags, as well as winning the game. The individual contingencies for the group consequences were successfully applied first during math period and then during reading period. The experimental analysis involved elements of both reversal and multiple baseline designs.

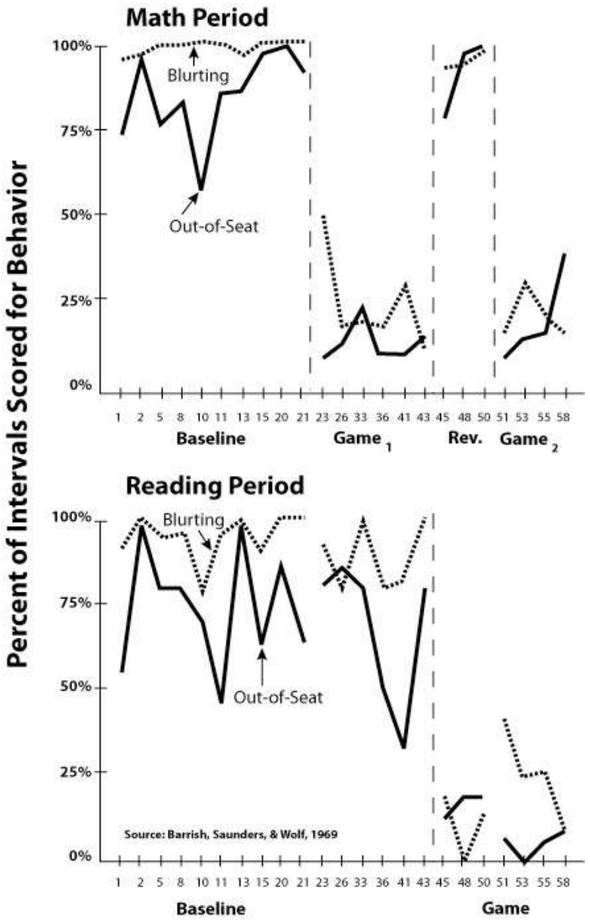
Researchers have recently begun to assess the effectiveness of a variety of behavioral procedures for management of disruptive classroom behavior. Some investigators have arranged token reinforcement contingencies for appropriate classroom behavior (Birnbrauer, Wolf, Kidder, and Tague, 1965; O'Leary and Becker, 1967; Wolf, Giles, and Hall, 1968). However, these token reinforcers often have been dependent upon back-up reinforcers that were unnatural in the regular classroom, such as candy and money. On the other hand, several investigators have utilized a reinforcer intrinsic to every classroom, *i.e.*, teacher attention (Zimmerman and Zimmerman, 1962; Hall and Broden, 1967; Becker, Madsen, Arnold, and Thomas, 1967; Hall, Lund, and Jackson, 1968; Thomas, Becker, and Armstrong, 1968; Madsen, Becker, and Thomas, 1968). Even so, at least one group of investigators (Hall *et al.*, 1968) encountered a teacher who apparently did not have sufficient social reinforcers in her repertoire to apply social reinforcement procedures successfully. The present study investigated the effects of a classroom behavior management technique based on reinforcers natural to the classroom, other than teacher attention. The technique was designed to reduce disruptive classroom behavior through a game involving competition for privileges available in almost every classroom. The students were divided into two teams and disruptive behavior by any member of a team resulted in possible loss of privileges for every member of his team.

[1]This study is based upon a thesis submitted by the senior author to the Department of Human Development in partial fulfillment of the requirements for the Master of Arts degree. The research was supported by a Public Health Service Fellowship 1FI MH-36, 384-01 from the National Institute of Mental Health and by a grant (HD 03144) from the National Institute of Child Health and Human Development to the Bureau of Child Research and the Department of Human Development, University of Kansas. The authors wish to thank Drs. Donald M. Baer and Don Bushell, Jr., for helpful suggestions in preparation of the manuscript; Mr. Ken Hawks, Mr. Frank A. Branagan, and Mrs. Betty Roberts for their invaluable help in conducting the study, and Mrs. Susan Zack, Mrs. Sue Chen, and Mr. Jay Barrish for their contributions of time for reliability checks. Reprints may be obtained from the authors, Department of Human Development, University of Kansas, Lawrence, Kansas 66044.

METHOD

Subjects and Setting

The study was conducted in a fourth-grade classroom of 24 students. Seven of the students had been referred several times by the teacher to the school principal for such problems as out-of-seat behavior, indiscriminate noise and talking, uncooperativeness, and general classroom disruption. Further, the school principal reported that a general behavior management



Barrish, H. H., Saunders, M., & Wolf, M. M. (1969). Good behavior game: Effects of individual contingencies for group consequences on disruptive behavior in a classroom. Journal of Applied Behavior Analysis, 2(2), 119-124

Longitudinal Johns Hopkins Studies of GBG

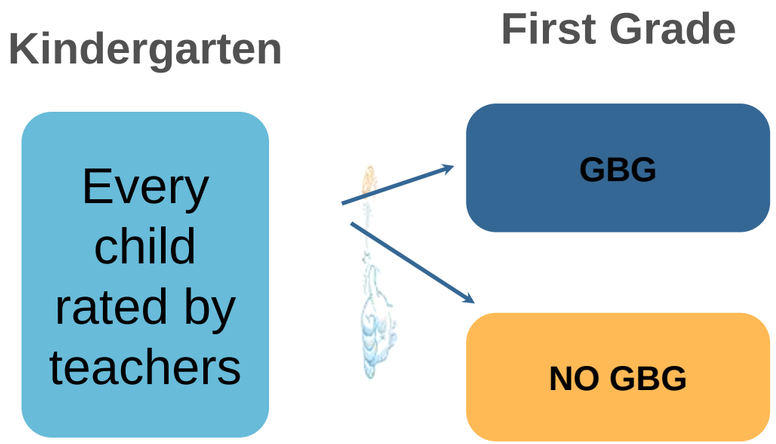
Kindergarten

Every child rated by teachers

National Registry of Evidence-Based Programs and Practices

Please visit http://bit.ly/NREPP

Longitudinal Johns Hopkins Studies of GBG



Tested in 41 first- and second-grade classrooms within 19 elementary schools with two consecutive groups of first graders.

National Registry of Evidence-Based Programs and Practices

Please visit http://bit.ly/NREPP

Longitudinal Johns Hopkins Studies of GBG

Kindergarten

Every child rated by teachers

First Grade

GBG

NO GBG

Grades 2 thru 12 Follow Up

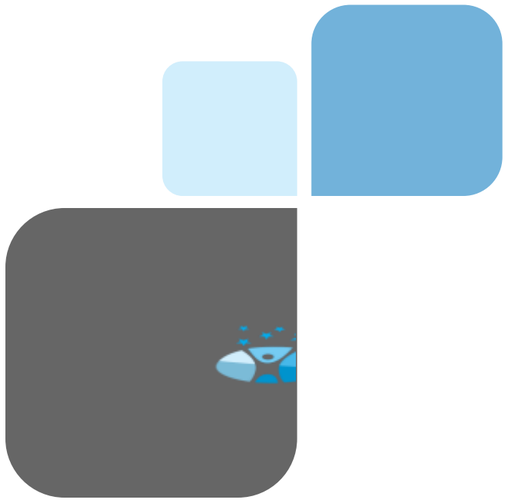
No More GBG

No GBG

Tested in 41 first- and second-grade classrooms within 19 elementary schools with two consecutive groups of first graders.

Purpose: To find out if GBG affected their adolescent lives.

Note: Some kids got GBG in 1st Grade only, and some in both 1st & 2nd grade,



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Longitudinal Johns Hopkins Studies of GBG

Kindergarten

Every child rated by teachers

First Grade

GBG

NO GBG

Tested in 41 first- and second-grade classrooms within 19 elementary schools with two consecutive groups of first graders.

Grades 2 thru 12 Follow Up

No More GBG

No GBG

Purpose: To find out if GBG affected their adolescent lives.

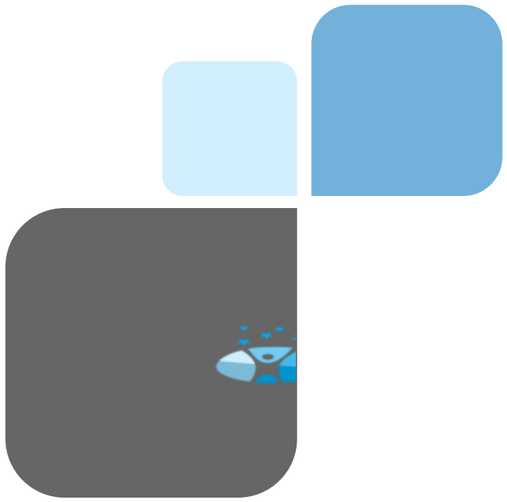
Note: Some kids got GBG in 1st Grade only, and some in both 1st & 2nd grade,

Young Adulthood Follow Up

Age 19-21 **Age 26** **Age 30**

Age 19-21 **Age 26** **Age 30**

Purpose: To find out if GBG affected their adult lives.

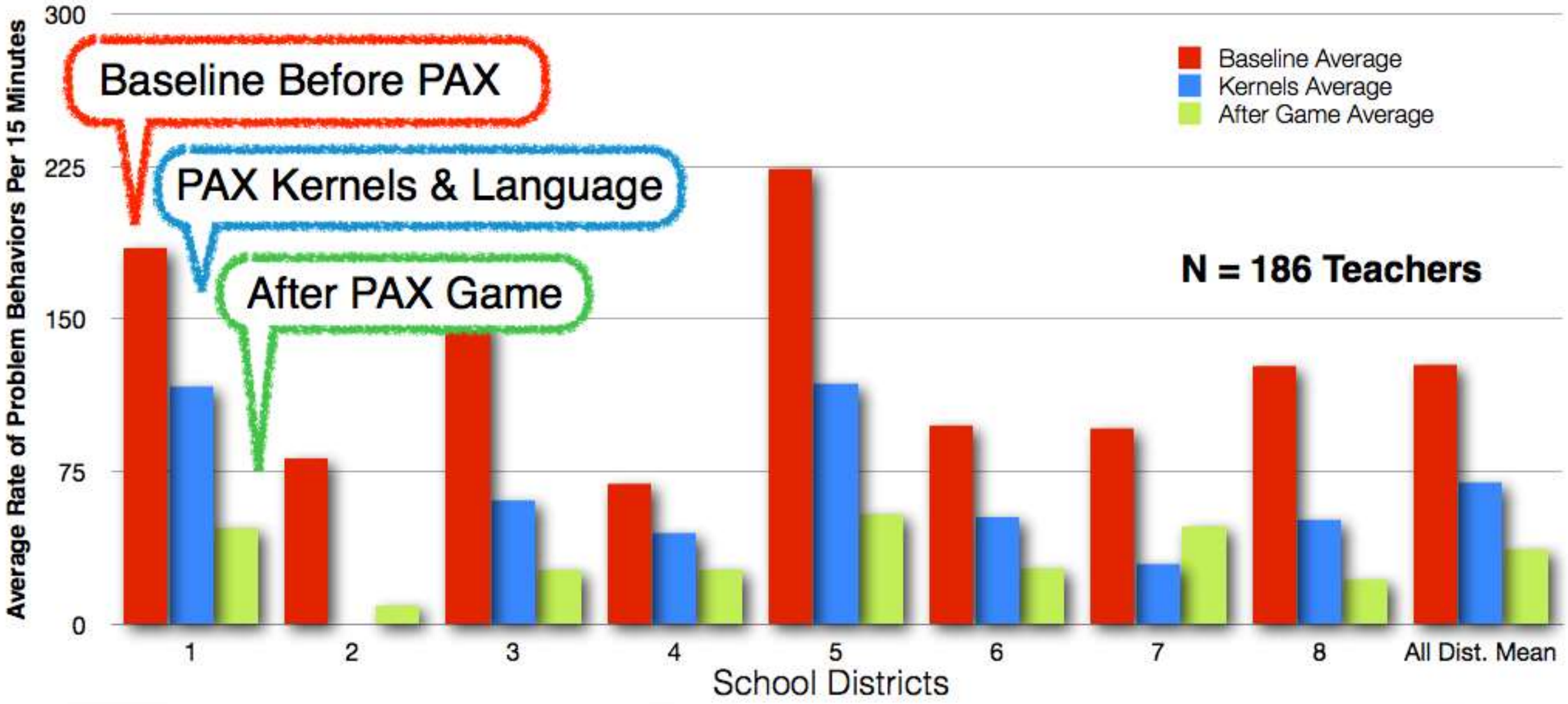


NREPP

National Registry of Evidence-Based Programs and Practices

Please visit http://bit.ly/NREPP

3-Month Impact of PAX in Eight US School Districts on Disturbing, Disruptive and Inattentive Behaviors Per 15 minutes



pax Good Behavior Game | Jeu de la bonne conduite

GoodBehaviorGame.org

4,000,000 First graders exposed to PAX GBG for one year had these benefits at age 21.

Impact	Long Term Outcome Indicator at Age 21
350,306	More boys predicted to graduate from high school
226,668	More boys predicted to enter university
272,002	More girls predicted to graduate from high school
361,444	More girls predicted to enter university
282,440	More boys' lives protected from violent crime & criminal records
39,564	More boys' of lives protected from serious drug addictions
391,518	More boys' lives protected from regular smoking
267,881	More boys' lives protected from alcohol addictions or abuse
144,244	More boys' lives protected from needing any service use
197,510	More girls' lives protected from suicidal thoughts
267,881	More boys' lives protected from suicidal thoughts
$54 Billion	Total Predicted Savings to Child, Family, Community, State, and Federal Agencies when the cohort of first-graders reach age 21

SOURCE: Aos, S., et al. (2013) Good Behavior Game, Return on Investment: Evidence-Based Options to Improve Statewide Outcomes. 8

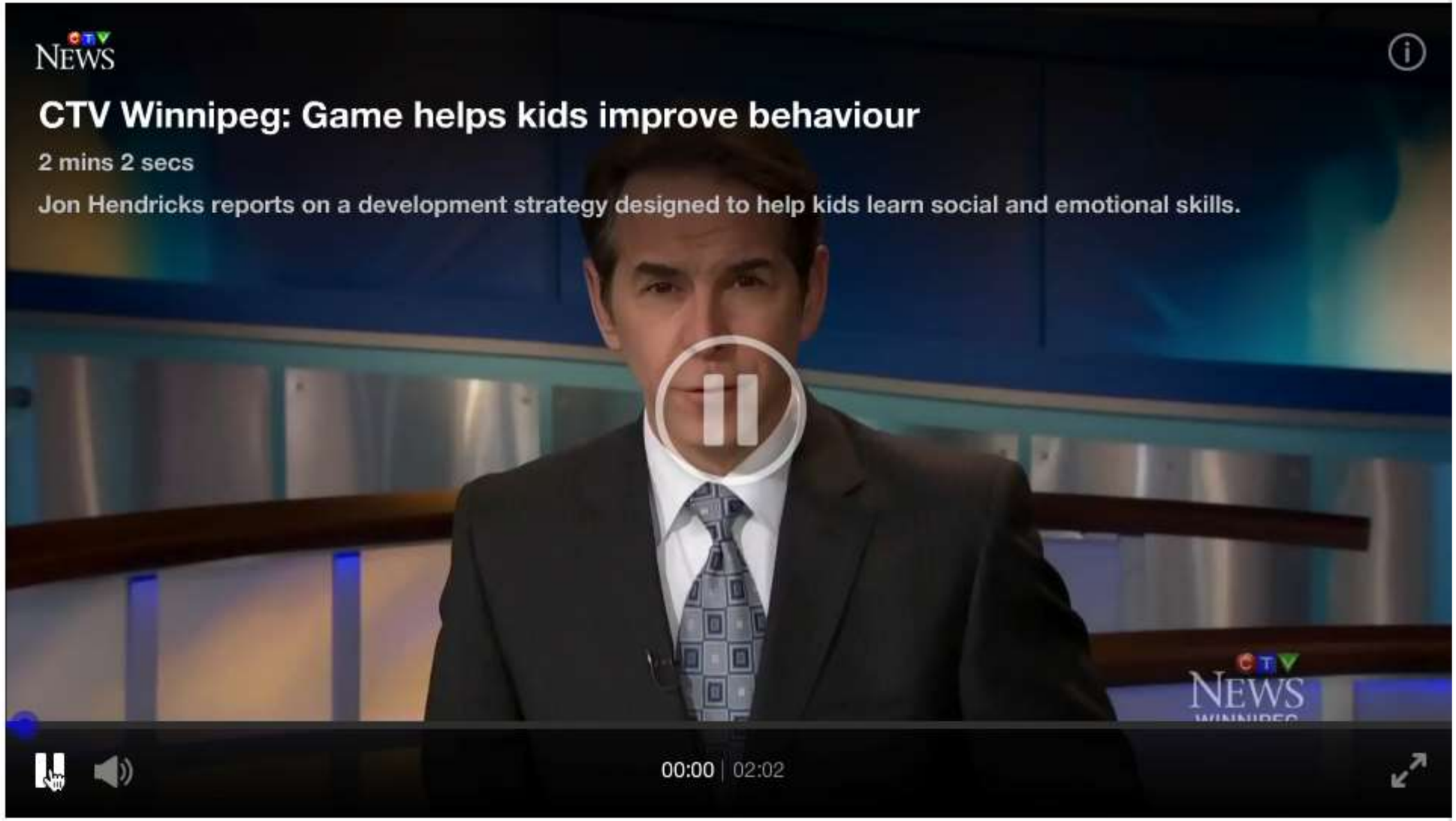
Read this and other studies about the Good Behavior Game at www.pubmed.gov

Refining active ingredients for population-level scale up for ROBUST implementation rath than "dose & fidelity"

Table 1: Analyses of Kernels in PAX Good Behavior Game

Kernel or Critical Component	Kernel Rationale
Response cost for negative behavior (e.g., Conyers et al., 2004)	*Easier to use and effective for ADHD like behaviors*
Team competition (e.g., Beersma et al., 2003)	*Creates positive peer pressure, and reduces negative peer attention*
Public posting of results (e.g., Parsons, 1982)	*Increases performance and peer pressure*
Team Rotations (deemed critical but no study)	*Reduces bullying and peer rejection*
Low emotional response to negative behaviors (e.g., Abromowitz et al., 1987)	*Reduces accidental attention to negative behavior by adult*
Three games per day (deemed critical but no study)	*Improves maintenance of skill*
Use of timer (e.g., Adams & Drabman, 1995)	*Creates pressure to succeed and excitement*
Secret Game (unannounced) – indescriminable contingency – (Freeland & Noel, 2002)	*Increases generalization to non-game times*
Lower points to win (e.g., Harris & Sherman, 1973)	*Causes more rapid improvement*
Student help design game rules (e.g., Fishbein & Wasik, 1981)	*Improves acceptance by students and occasions correspondence*
Relational frame language correspondence training (e.g., "I'm a PAX Leader) (Embry et al., 1996)	*Improves generalization of rule governed behavior*
Use of Premack Principle for prizes (e.g., Browder et al., 1984)	*Improves acceptability of game by students and adults*
Non-verbal cues (e.g., Rosenkoetter & Fowler, 1986; Cox, Cox, & Cox, 2000)	*Accelerates generalization and adoption of the game*
Meaningful roles as DRO (e.g., Rutter, 1981)	*Increases attention to positive behavior; reduces problem actions*
Setting generalization — recipe for carrying over the Game to hallways, restrooms, cafeteria, etc. (e.g., Fishbein & Wasik, 1981)	*Improves generalization by students and acceptability of game by adults*
Symbolic self-modeling (e.g., Embry et al., 1996)	*Improves imitation of behavior*
School-home note (e.g., Kelley et al., 1988)	*Prompts family reinforcement and generalization of behavior to home*
Peer-to-peer praise notes (e.g., Embry et al., 1996; Skinner et al., 2000)	*Improves social competence and reduces negative peer attention*
Self-monitoring by teacher (e.g., Agran et al., 2005)	*Improves mastery of skill and results by teacher*
Good behavior lottery (e.g., Putman et all, 2003	*Improves generalization when not playing the game*

CTV WINNIPEG... A PART OF THE CTV NEWS VIDEO NETWORK



Pax game helps kids improve behaviour

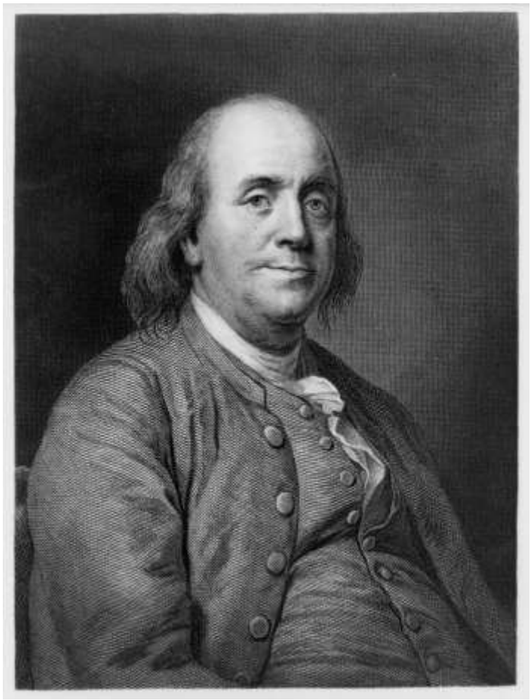
How and where we might go to create the first carbon valley?

We create and test evidence-based kernels for Speech, Language and Hearing that can be scaled to better the world. Lodge that database with the Foundation

“From small beginnings come greater goods…

…Attributed to St. Francis of Assisi

American science moved inquiry for ornamentation or aesthetics to practical invention, from the earliest roots of science in America.



Benjamin Franklin started the *Leather Apron Club* in 1727, when he was 21 years old.

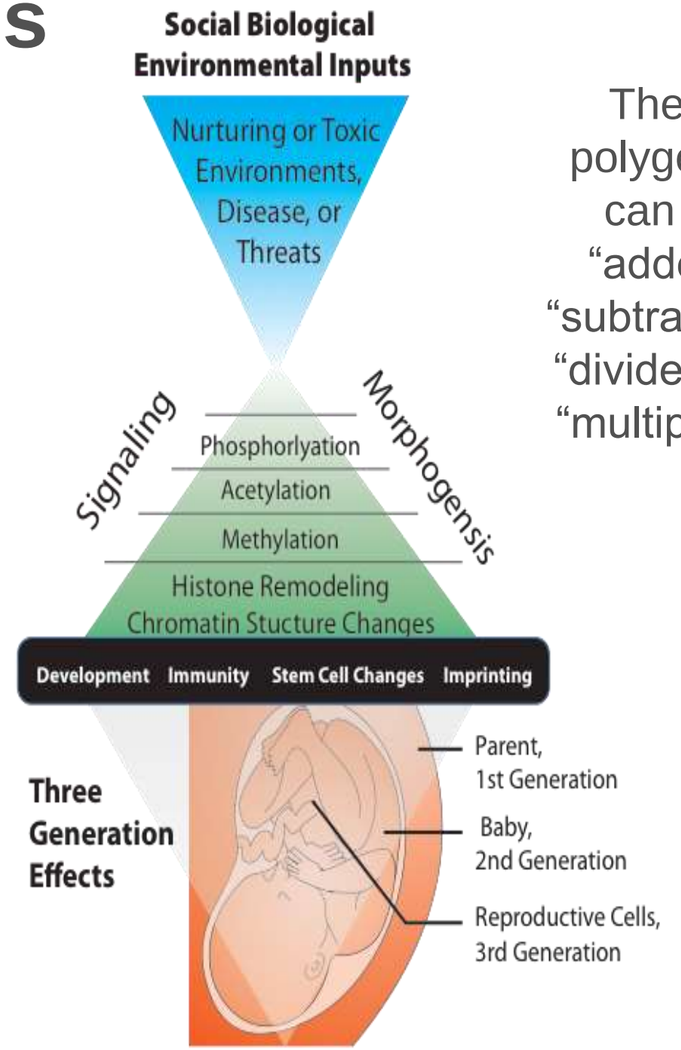
Franklin required each member “should produce one or more queries on any point of Morals, Politics, or Natural Philosophy, to be discuss'd by the company” at each meeting, followed by writing essays for practical improvements.

Bridging the ivory archipelago and the perils of cladistics…

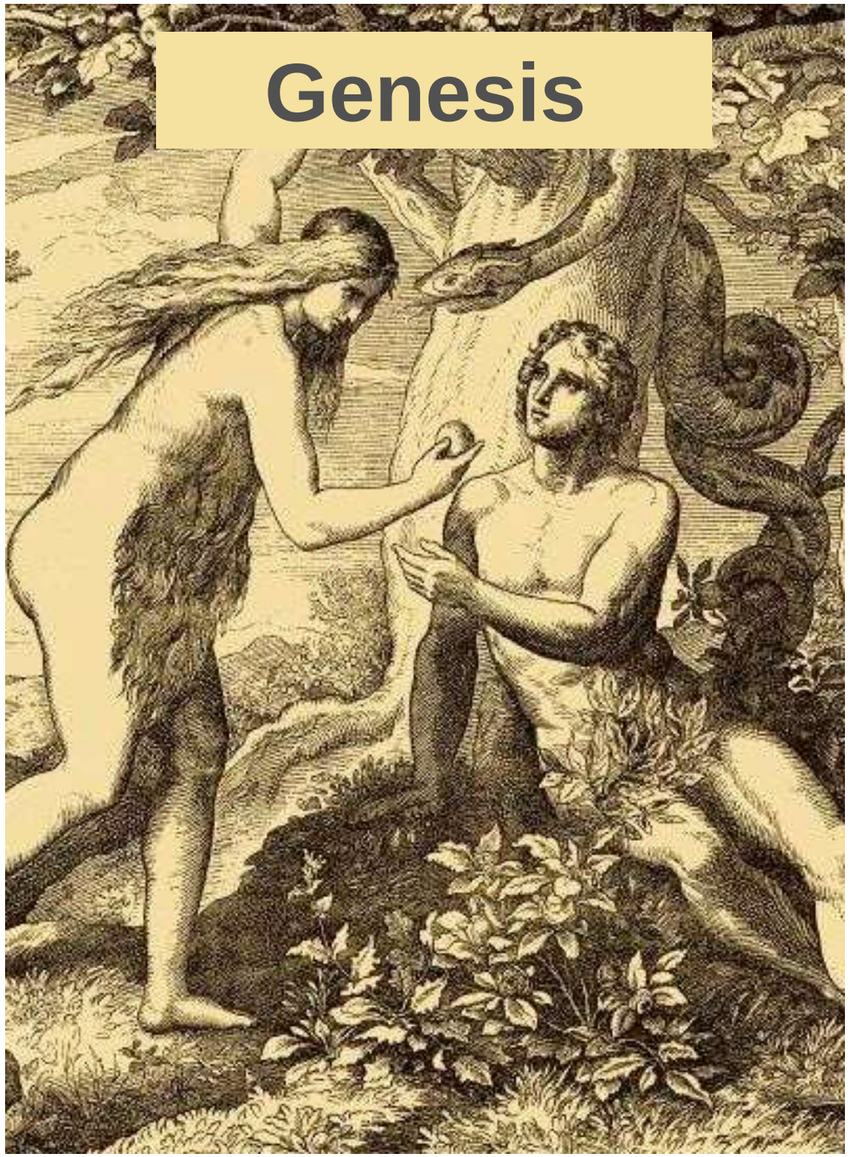
Epigenesis

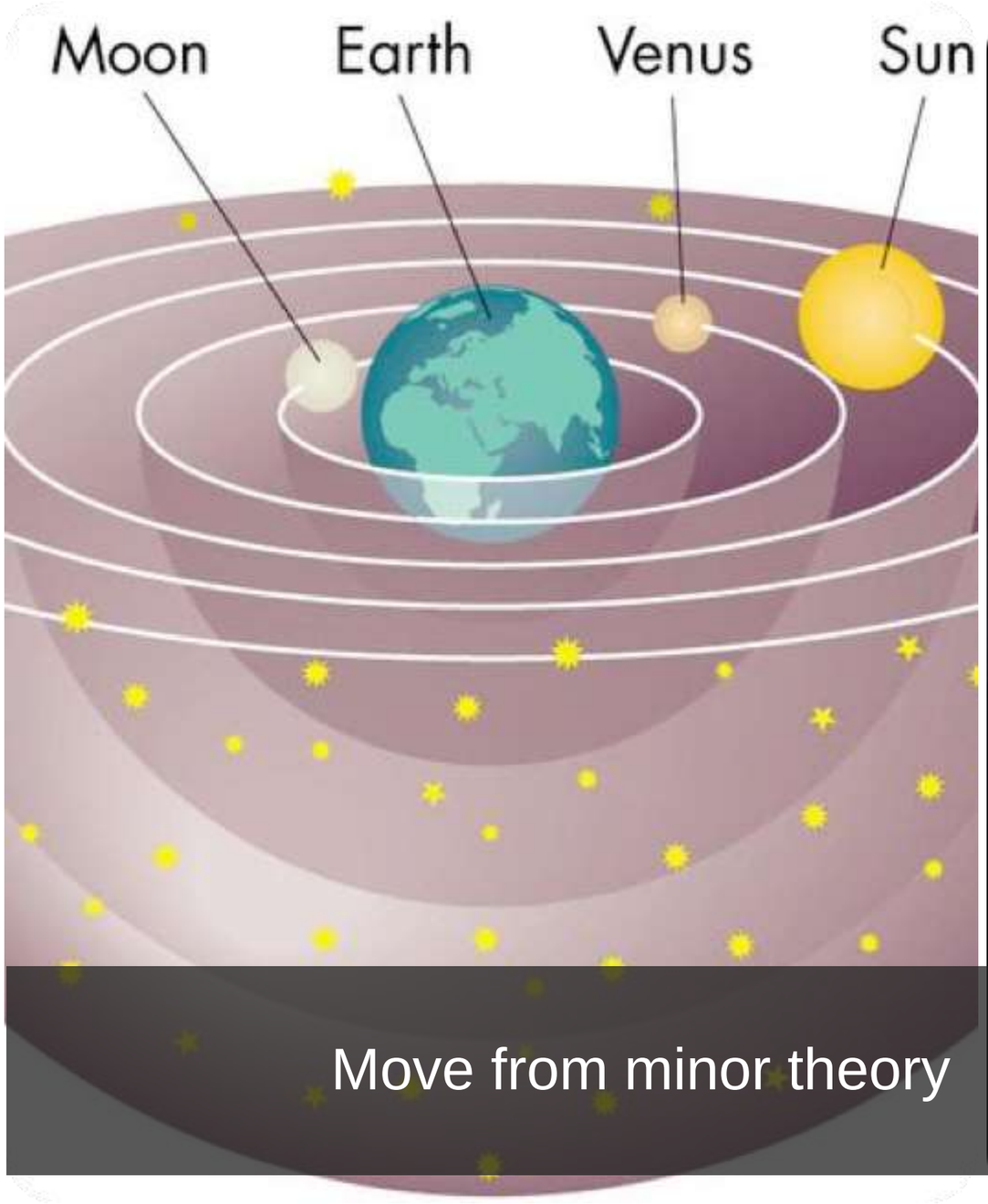
Epigenetics are heritable changes in gene expression caused by mechanisms other than changes in the underlying DNA sequence.

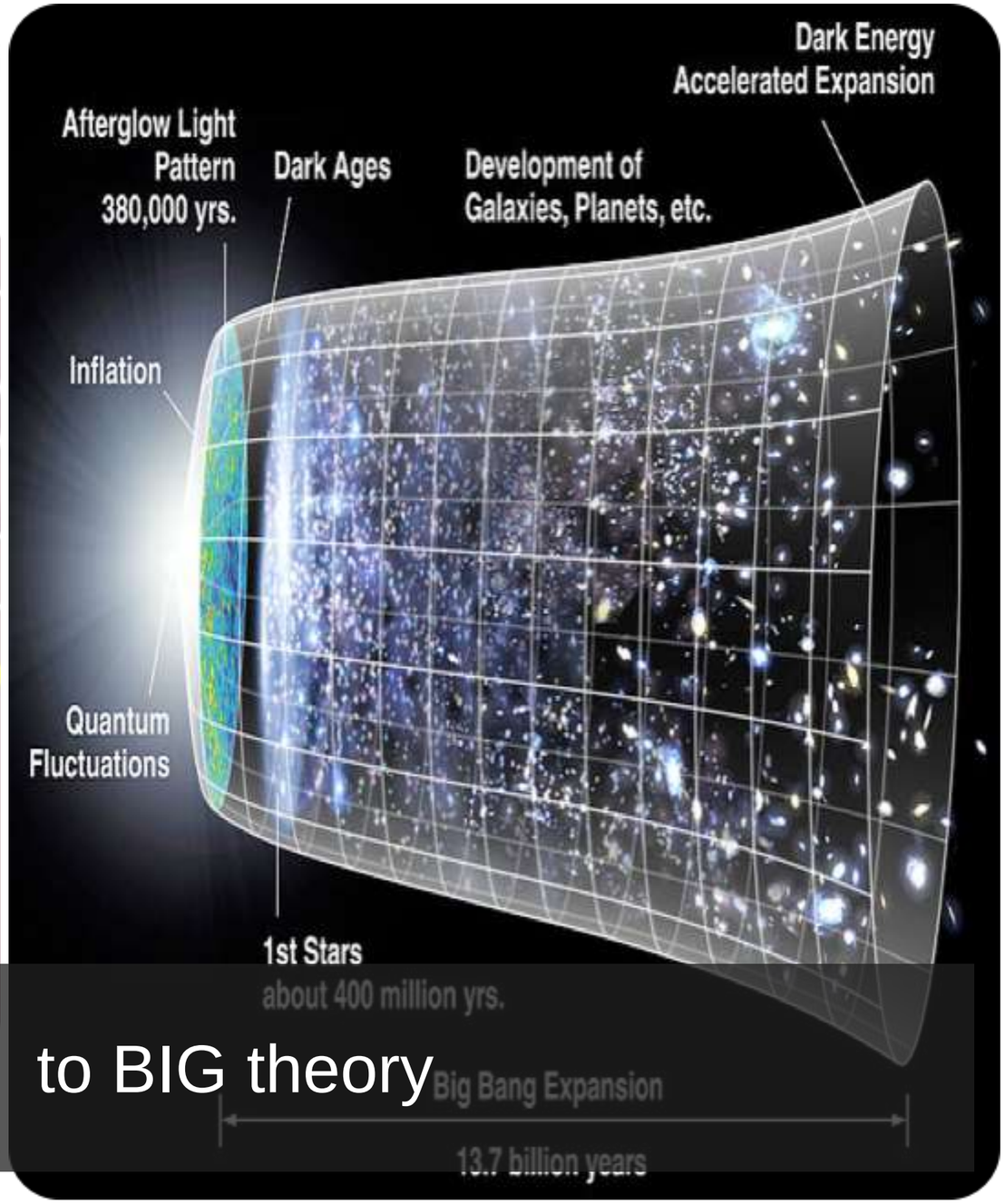
These changes can pass through multiple generations.



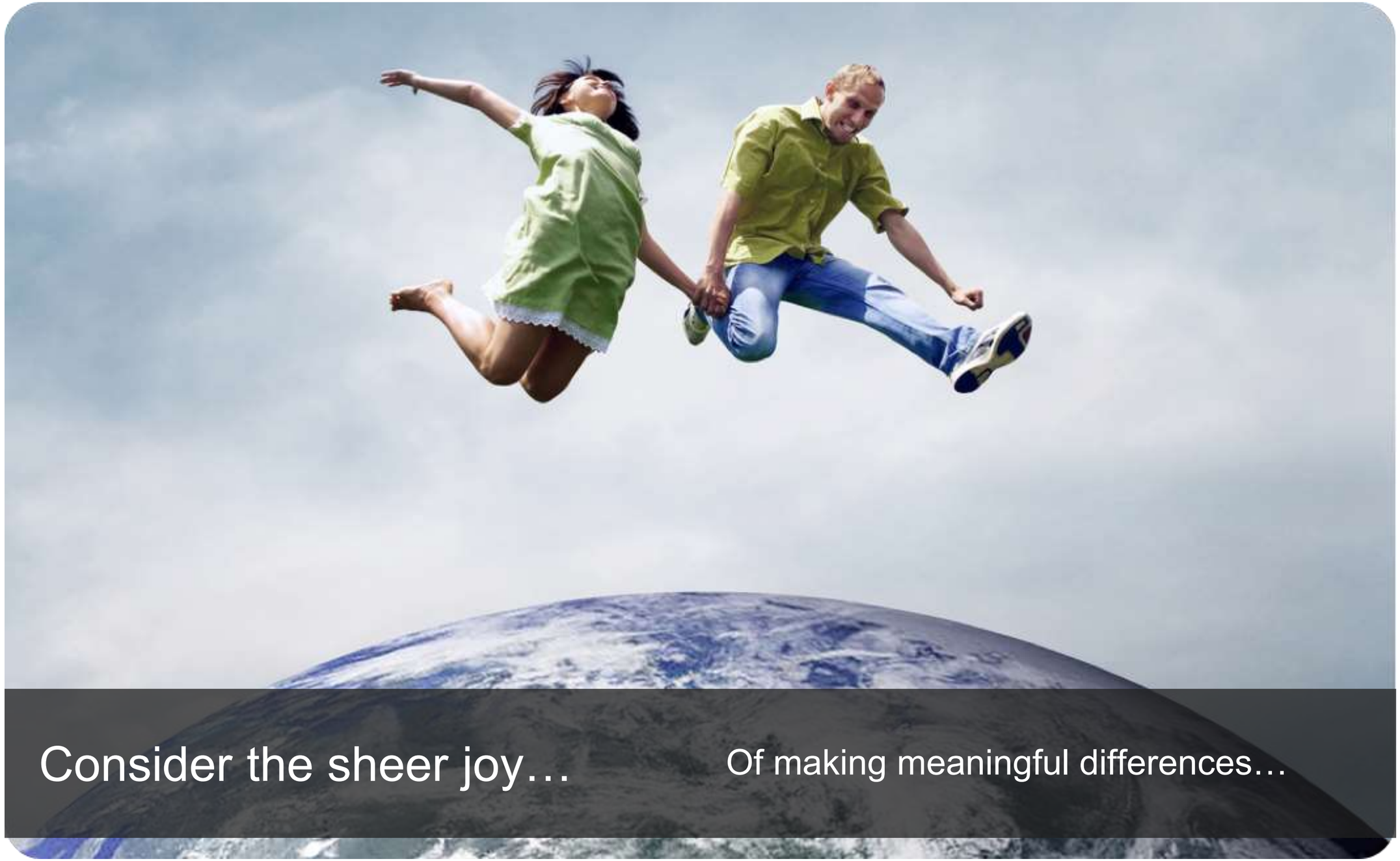
These polygenes can be “added”, “subtracted”, “divided”, or “multiplied.”







Move from minor theory to BIG theory


Consider the sheer joy…
Of making meaningful differences…

Our Futures

Thank you

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