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# El self: Una encrucijada entre lo biológico y lo social.

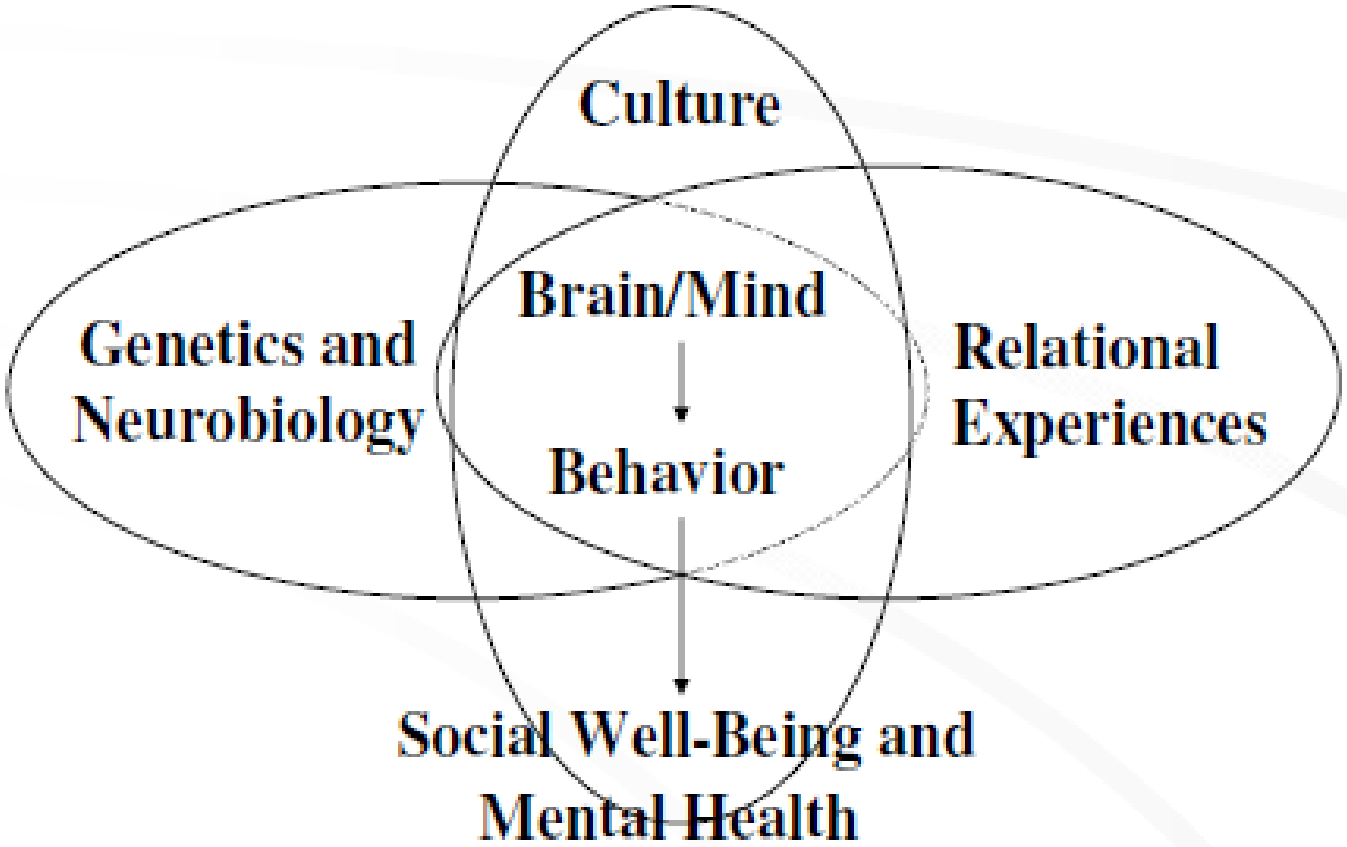
**Carmen Bayón, MD**

**Psiquiatra. Psicoterapeuta**

NATURE

NURTURE

# Relationships of Biology, Experiences, Culture and Mental Health: A Biopsychosocial Perspective



# Psychobiology model of personality. C.R. Cloninger

What does it teach us about personality and personality development….?

# Various theoretical approaches agree temperament

- biologically based/genetically influenced (identical twins more similar temperaments than ‘fraternals’)
- refers to individual differences
- exhibits a relative degree of stability over time, low to moderate stability from one developmental period to another.
- modifiable by environment, learning & life experience, not from one extreme to the other Kagan’s ‘high reactive’ infant will never be a ‘low reactive’ adult

# Temperament

- The endowment of temperament influences, and is influenced by person's experience that gives rise to adult personality (Rothbart, Ahadi & Evans, 2000)

- Understanding temperament is central to understanding personality and individual differences.

- Individual differences in temperament form the core around which personality develops

# Dimensional models of personality

- Traits or dimensions
- Normal personality
- Psychology

# Cloninger´s model of personality

- Cloninger attempts to discover links between temperament and personality structure and psychopathology:
  - Somatisation disorders and GAD (Cloninger, 1986)
  - Type I and Type II alcoholism
- Proposal of a comprehensive model of personality that purported to map personality at the genetic level

# Cloninger´s model of personality

- Dimensional model
- Temperament and character
- Integrative and coherent model

¡El vaso está casi lleno!

(Sanguíneo)

... en realidad el vaso está medio vacío.

(Melancólico)

¿Esta medio lleno o medio vacío?

(Flemático)

¿Quién no llenó mi vaso? ¡Me quejaré a la administración!

(Colérico)

"LOS CUATRO TEMPERAMENTOS BÁSICOS"

# Temperament Model

- Individual differences in quality of emotional responses that appear early in infancy
- Moderately inherited
- Evaluation in infancy
- Stable from infancy to adulthood
- Based in biological processes
- Consistent in different cultures, uninfluenced by sociocultural learning

**Buss y Plomin, 1987**

# Temperament Model (1987)

- Three dimensions that correspond with genetic structure
  - **HARM AVOIDANCE**
  - **NOVELTY SEEKING**
  - **REWARD DEPENDENCE**
- Assesssment: TPQ (Tridimensional personality questionnaire)

# Temperament: Harm Avoidance

- Behavioral inhibition system
- Cognitive anxiety, depression, hostility and low self-esteem
- Serotoninergic system

# Temperament: Harm Avoidance

- Pessimistic worry in anticipation of problems
- Fear of uncertainty
- Shyness with strangers
- Fatigability

# Temperament: Novelty Seeking

- Behavioral activation system
- High NS: initiation and frequency of hyperactivity, binge eating, sexual hedonism, drinking, smoking and other substance abuse.
- Dopaminergic system

# Temperament: Novelty Seeking

- Exploratory activity in response to novelty
- Impulsiveness
- Extravagance
- Disorderly

# Temperament: Reward Dependence

- Maintenance of behavior in response to cues of social reward
- Sensitivity to social stimuli and distress in response to social separation. Attachment and affiliative system
- Noradrenergic projections from the locus ceruleus and serotonergic projections from the median raphe

# Temperament: Reward Dependence

- Sentimentality
- Attachment
- Dependence on approval by others

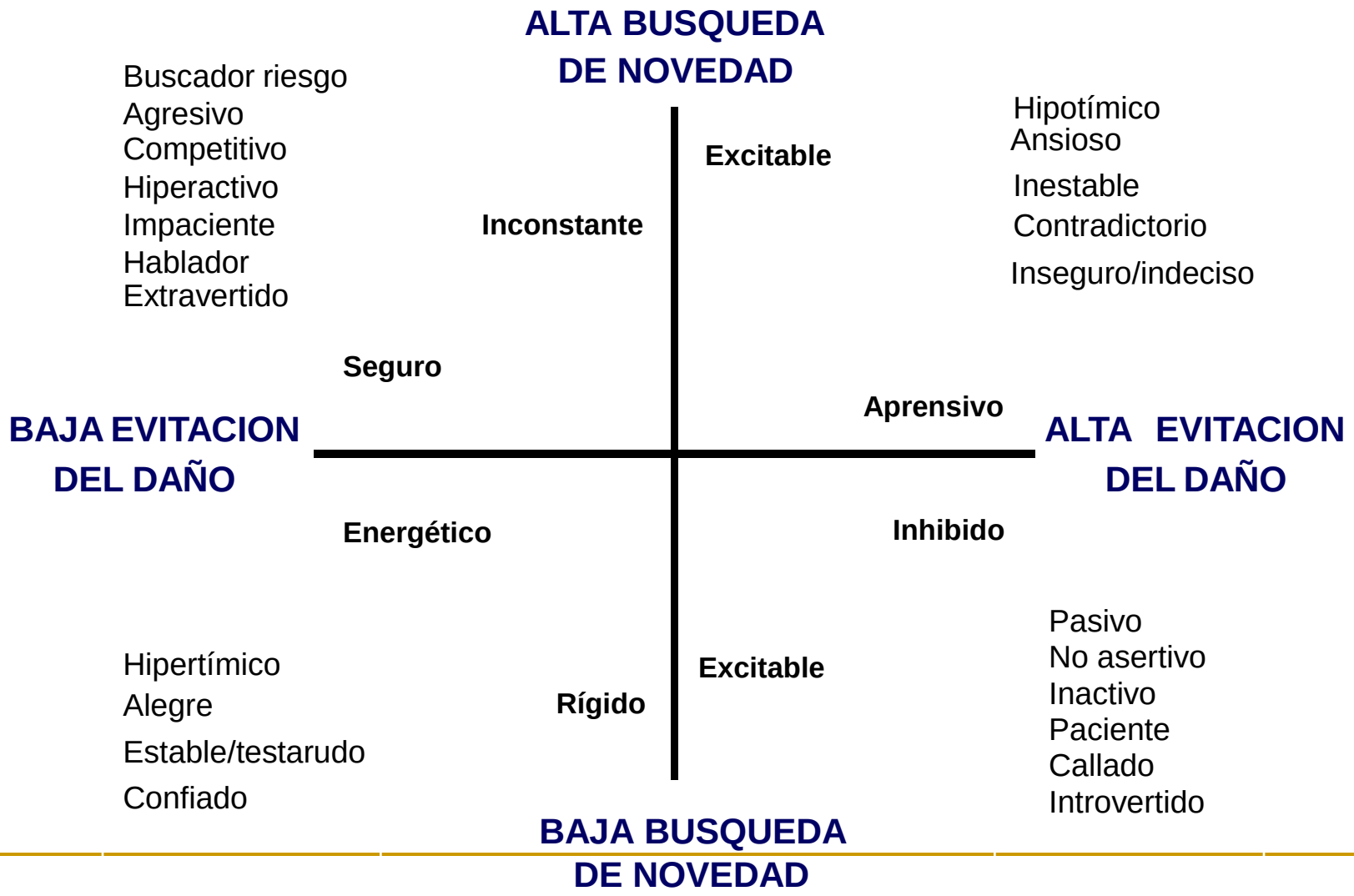
# Temperament: Persistence

- Maintenance of behavior despita frustration, fatigue and intermitent reinforcement.
- Subscale of RD in TPQ

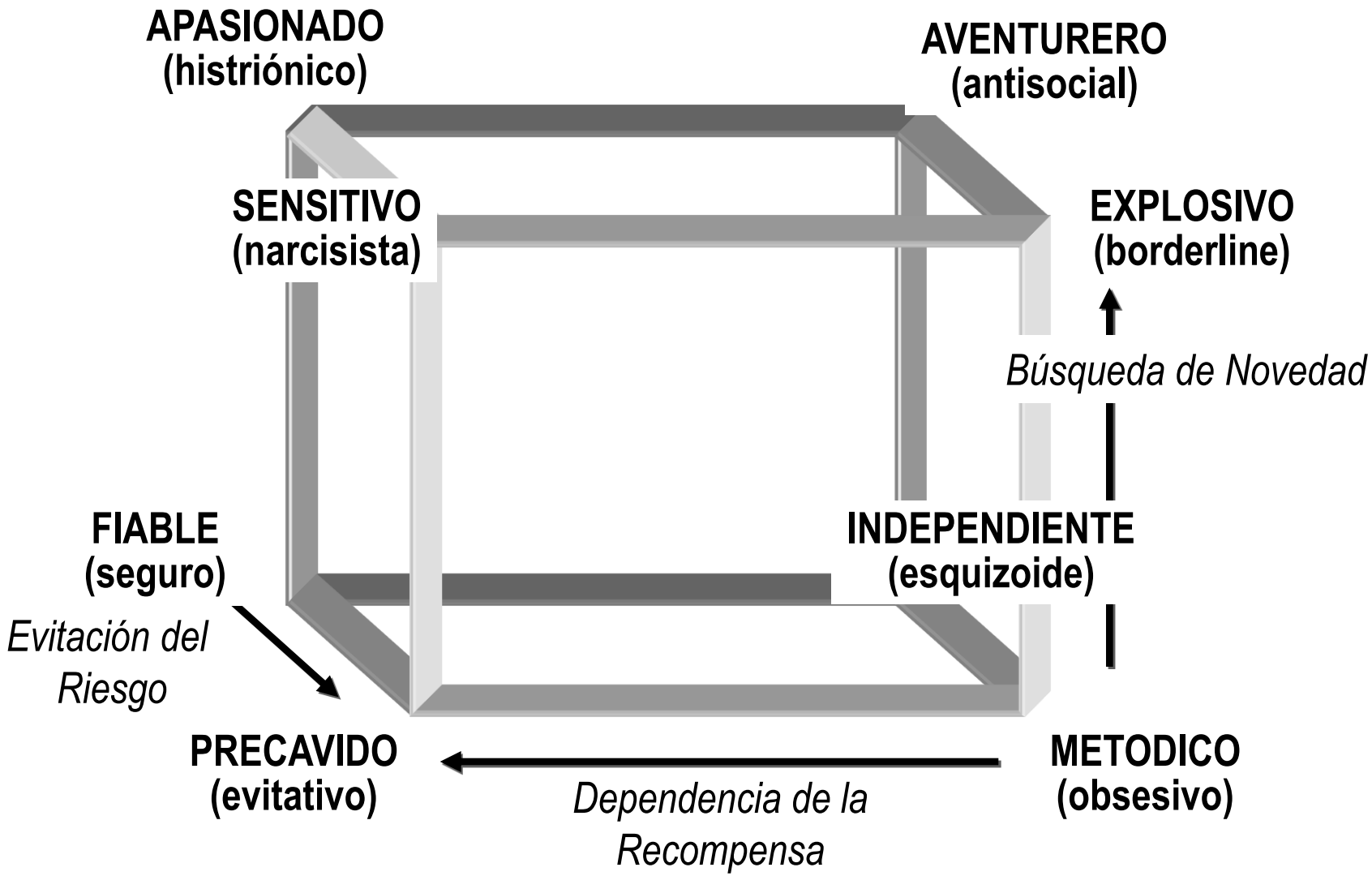
# Temperament Dimensions

- Each dimension has a unique group of behavioral, emotional and cognitive characteristics.
- Genetically homogeneous and independently inherited from one another, 50% of heritability
- Developmentally stable, change little with age, psychotherapy or pharmacotherapy.
- The same external stimulus is likely to elicit responses via activation of multiple temperament dimensions.

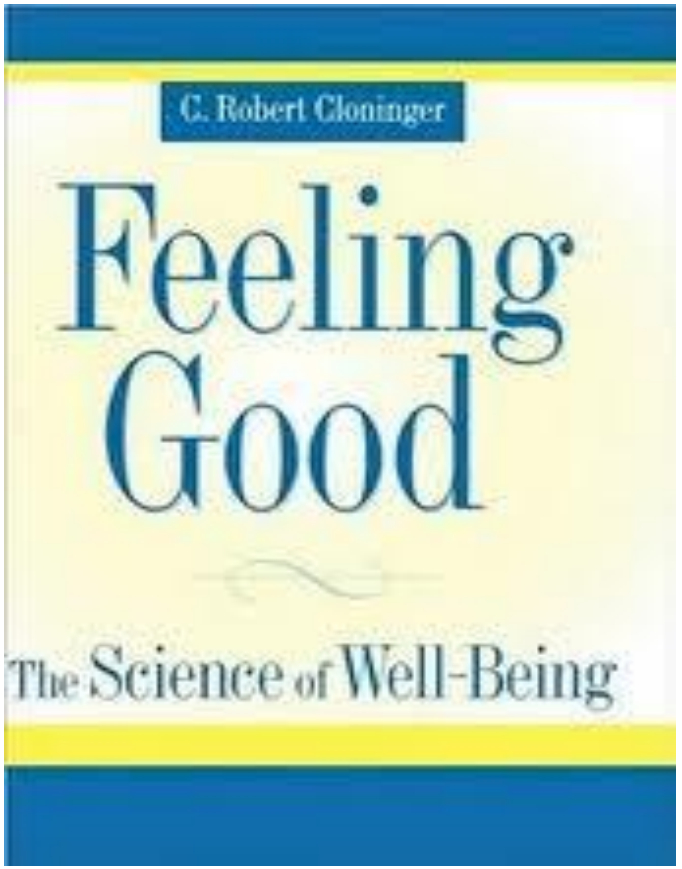
# Novelty seeking & Harm avoidance



# Temperament

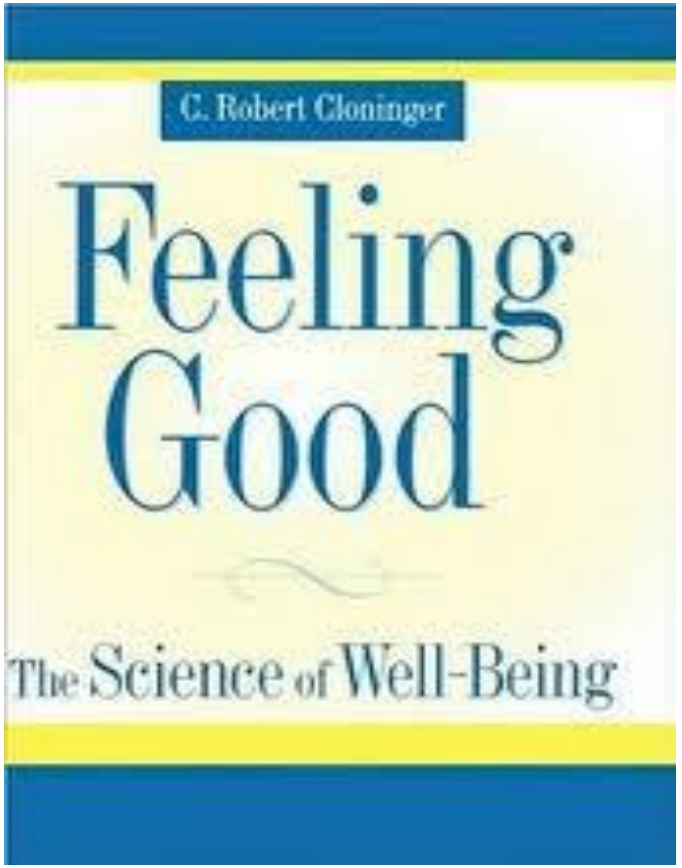


“Temperament can be reliably measured and studied by self-report and by observations at many levels of organization from genetic, chemical, anatomical, and physiological to behavioral. Temperament provides a useful account of individual differences in processes of selective attention and emotional salience…




R. Cloninger (2004): Feeling Good – The Science of Well-Being

“…but does not stand alone as a description of human personality or consciousness. It provides no account of the self-organizing property of human personality, which gives it properties of executive control or empathic cooperation as observed in primates generally.
“It also provides no account of intuition or subjective awareness that underlies uniquely human characteristics such as symbolic invention, or the drive for coherence and integration itself.”



# Psychobiological Model (1994)

- Three dimensions
  - Self-directedness
  - Cooperativeness
  - Self-Transcendence
- Measured by the Temperament and Character Inventory (TCI and TCI-R)

Cloninger, Svrakic and Przybeck, 1993

# Cuestionario de Temperamento y Carácter de Cloninger, versión revisada


*Traducción española por: Fernández Aranda F.; Badia Casanovas A.; Bayón Pérez C., Aitken A.*

En este cuestionario encontrará una serie de frases que la gente utiliza normalmente para describir sus actitudes, opiniones, intereses u otros sentimientos personales.

**Intente describir cómo actúa y se siente "habitualmente", no cómo se siente o actúa en este momento.**

Para cada una de las siguientes preguntas, por favor marque con una "X" el número que mejor describa como se siente o actúa habitualmente (sólo un número para cada pregunta).

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| *Falso* | *Probablemente falso* | *Igual verdadero que falso* | *Probablemente verdadero* | *Verdadero* |

Conteste a todos los enunciados aunque no esté completamente seguro de la respuesta. No es necesario estar mucho tiempo para decidir ya que no hay respuestas correctas o incorrectas, únicamente son descripciones de sus posibles opiniones personales o sentimientos.

# Character

- Conceptual learning: construction, evaluation, and invention of abstract symbols
- Higher cognitive functions regulated by hippocampus and neocortex
- Association con markers of cortical activation
  - P-300 parietal with Self-directedness
  - VCN Cooperativeness and self-transcendence

# Self-Directedness: self-concept

- Ability to adapt the behavior according to individually chosen, voluntary goals based on a realistic assessment of facts.
- Mature, responsible, reliable, resourceful, goal-oriented, self-esteem, self-confident.
- REALISTIC AND EFFECTIVE

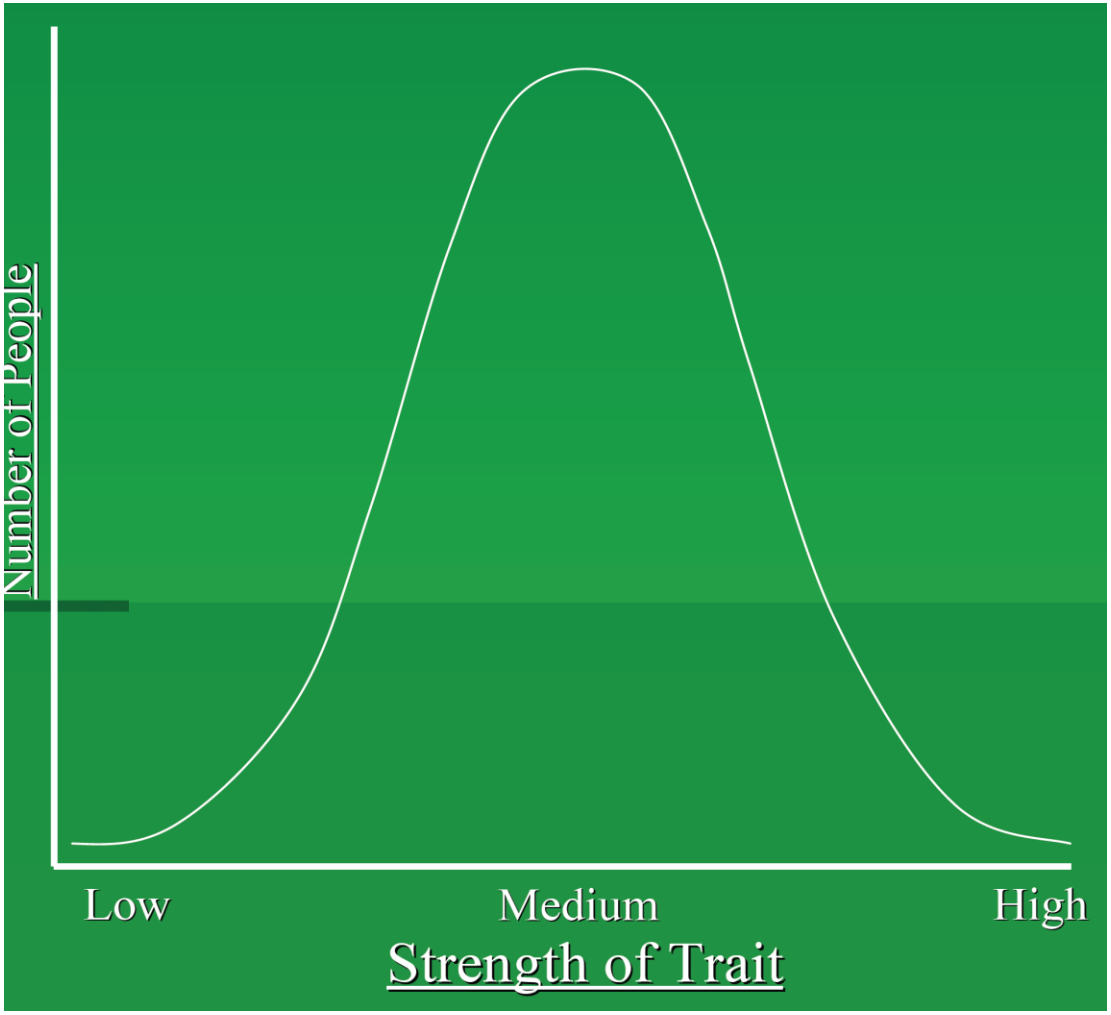
# Cooperativeness: self-in relation with others

- Measure of interpersonal effectiveness
- Empathy, tolerance, compassion, supportive and with principles.

# Self-Transcendence

- Our participation in the world as a whole
- Individuals who are spiritual, unpretentious, humble and fulfilled.
- Related to creativity, openness to new associations

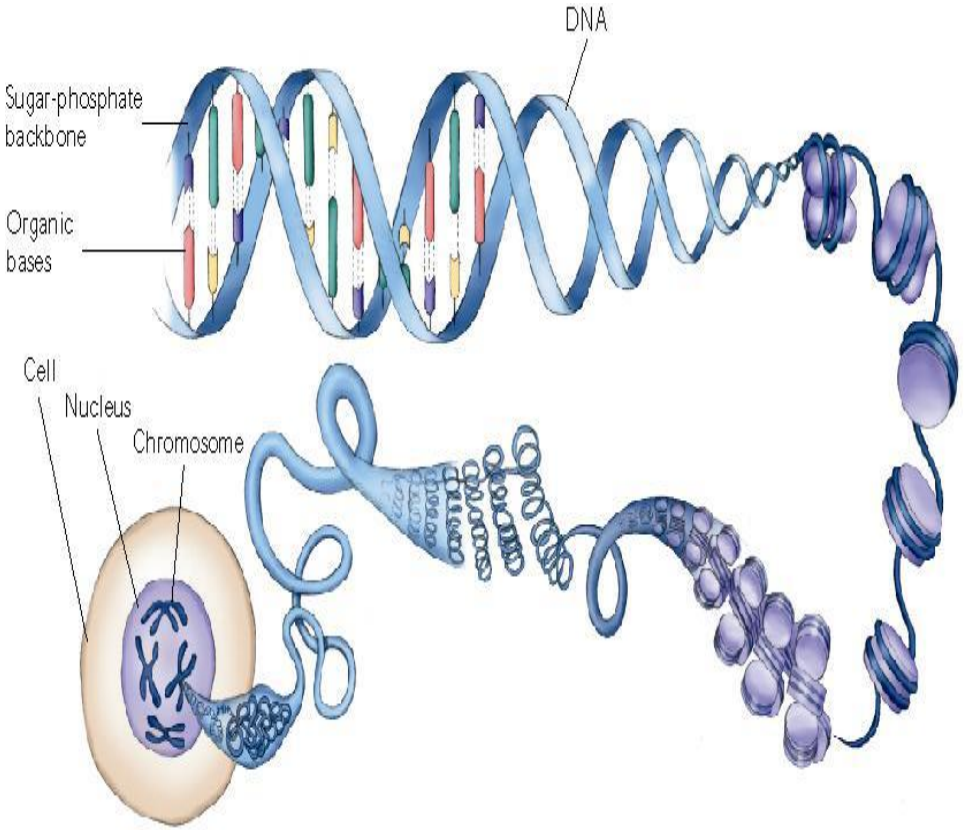
# Dimensions



# Cloninger´s model of personality

- Data from:
  - Genetic structure of personality
  - Learning and memory processes
  - Neurobiological studies in humans and animals
  - Phylogenetic analyses
  - Clinical data and development studies


TIME
THE GOD GENE
Does our DNA compel us to seek a higher power? Believe it or not, some scientists say yes
PLUS: A quiz – How spiritual are you?


DNA
Sugar-phosphate backbone
Organic bases
Cell
Nucleus
Chromosome

"…aunque tengamos un genoma humano completo, no seremos capaces de predecir la conducta humana"

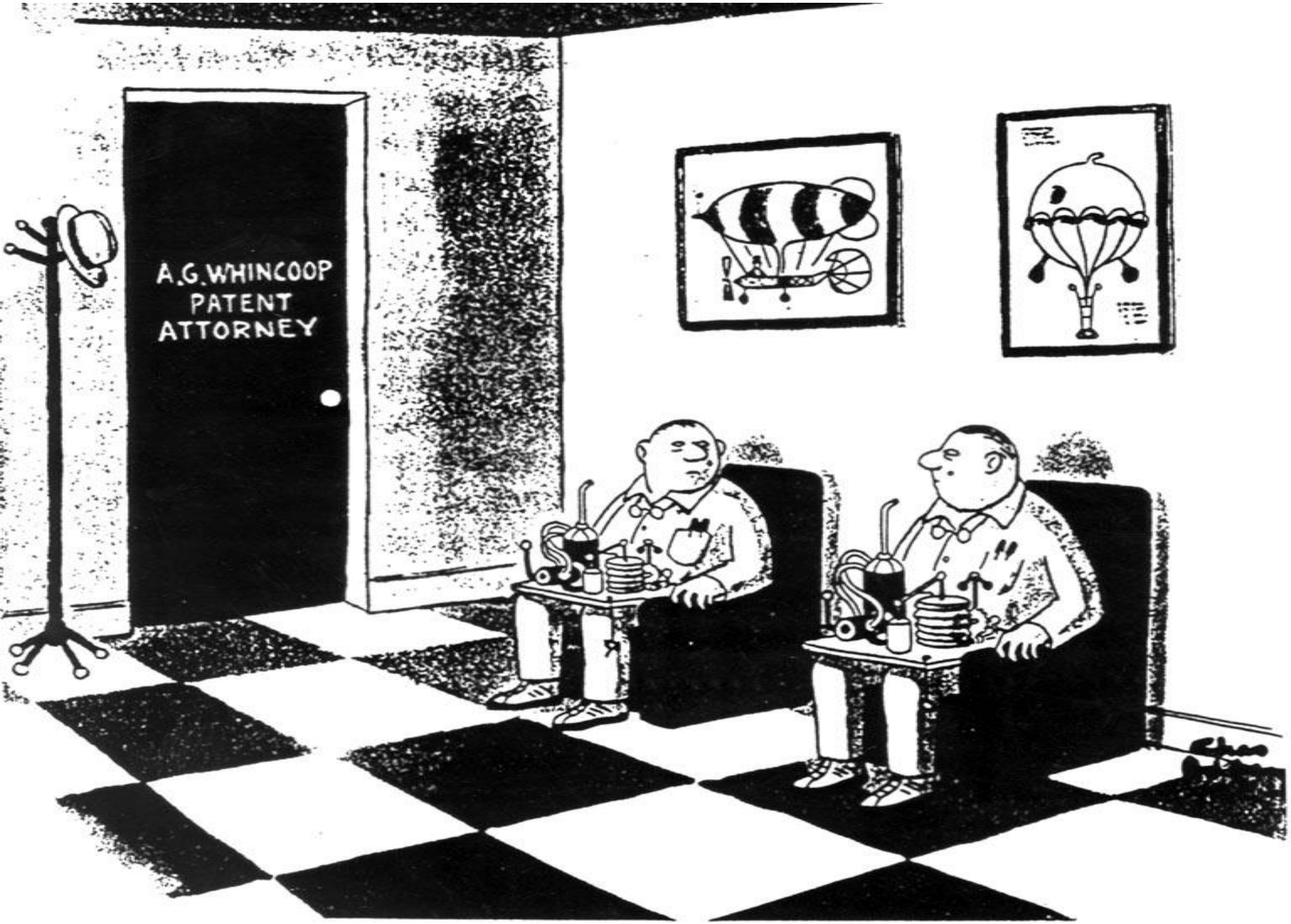
Lewontin, 1992

“Un único gen raramente especifica alguna parte identificable de un organismo. En su lugar lo que especifica es la liberación de una proteína en momentos específicos del desarrollo, un ingrediente de una receta compleja, que generalmente tiene algún efecto en modelar un conjunto de partes que son afectadas por otros genes.”

Pinker, 1994

# Genes and Personality

- Behavioral genetic studies
  - Family studies
  - Adoption studies
  - Twin studies
  - Biological markers




*Separated at birth, the Mallifert twins meet accidentally.*

# Behavioral genetic studies

- About 40-50 % of the variance for single personality characteristics is determined by genetic factors.
- Environmental factors may explain 50% (non-shared environment)

# Gene-environment interaction

- Understanding nonshared environmental effect
  - Much of the parenting unique to each child to be due to the genetic characteristics of that child (Reiss ,1997; Reiss et al.,1999)
- Kinds of nature-nurture interaction
  - The same environmental experiences have different effects on individuals with different genetic constitution
  - Individual with different genetic constitution evoke different responses from the environment
  - Individual with different genetic constitution select and create different environments

# Genetic Studies. Cloninger´s model of personality

- Differences in the heritability for each dimension in twin and adoption studies
  - Temperament (Heath, 1994; Stallings, 1996)
  - 2517 australian twins, 50 y old, TCI (Gillespie, 2003):
    - Correlation between each of the seven dimensions of personality was higher in MZ twin than in DZ twin pairs
    - Heritability for each dimension varied from 27% to 45%
    - Both additive genetic and environmental influences unique to inidividual were significant.

# Molecular genetic studies of linkage and association

- Molecular genetic paradigm
  - Identifying specific genes that are linked with personality traits
- Serotonin and dopamine are neurotransmitters that influence the growth of connections
- Genes that promote, transport and catabolize these neurotransmitters.

# Genes and personality

- Association of the DRD4 dopamine receptor and Novelty seeking (Ebstein, 1996; Benjamin, 1996)
- Not replicated in other studies (Kluger, 2002; Schinka, 2002)

# Molecular Genetic Studies of linkage and association

- “Genes that have shown to have a robust association wiht some kind of outcome that you are interested in but don´t cause it in a direct fashion” (Rutter, 2006)
- Nonadditive interactions between genes examined by measuring specific genetic polymorphisms (Benjamin, Ebstein, et al 2002)
- NS depends on the three-way interaction of DRD4 with COMT and 5-HTTLPR (Benjamin, 2000; Strobel, 2003)

- Evidence that personality development depends on the nonlinear effects of gene-gene (Benjamin, 2000; Strobel, 2003) and **gene-environment interactions** (Caspi, 2003; Keltikangas-Jaervinen, 2003)
  - Caspi et al. (2002): The effect of maltreatment in childhood and MAOA activity on antisocial behavior
  - Caspi et al. (2003): The effect of stress and serotonin on depression

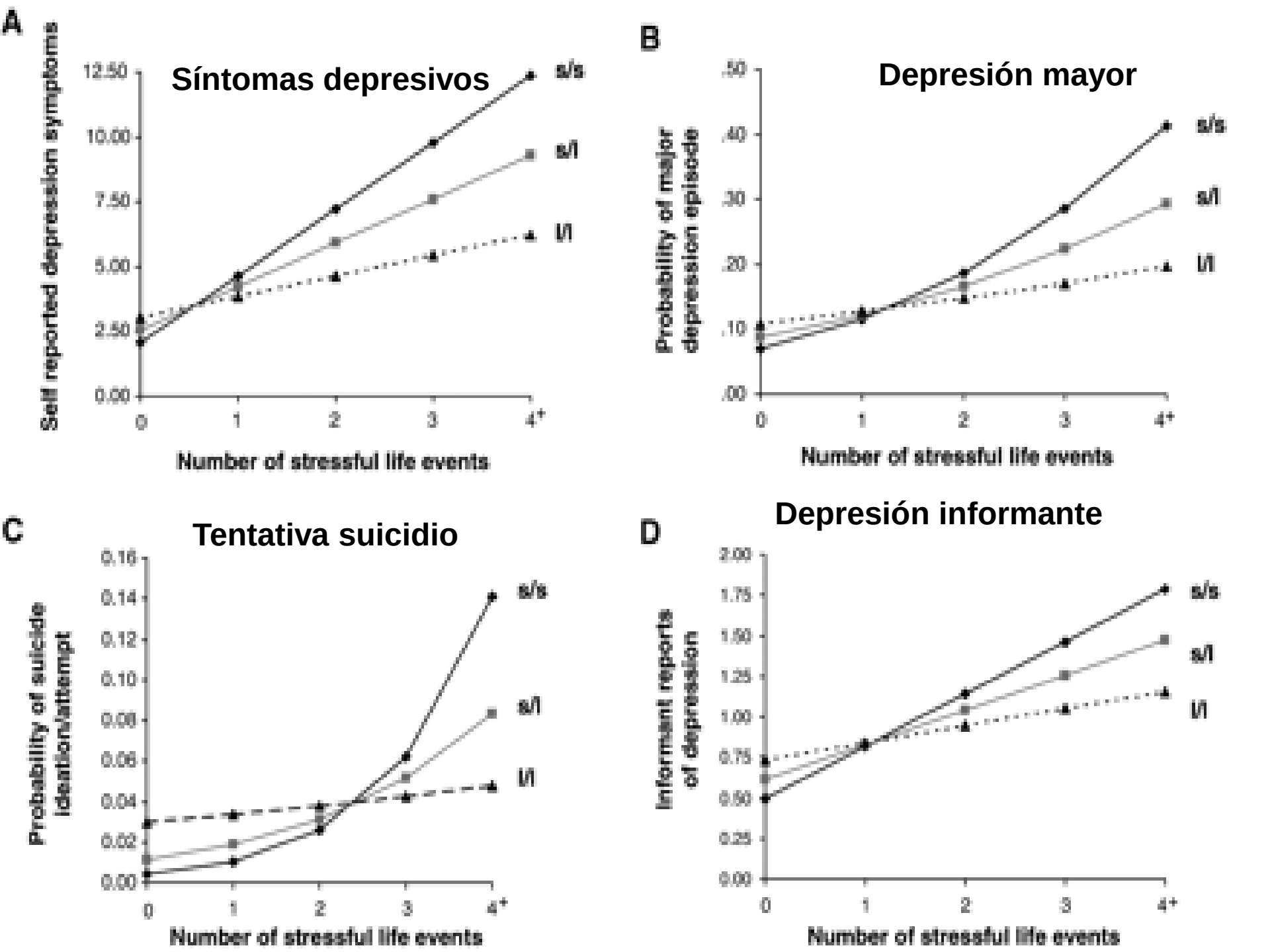
# Serotonin

- Human serotonin transporter (5-HTTLPR), short allele (l/l) associated with anxiety-related traits (neuroticism)
- Association with Cooperativeness and Self-directedness (Hamer, 1999)

# Influence of Life Stress on Depression: Moderation by a Polymorphism in the 5-HTT Gene

Avshalom Caspi,[1,2] Karen Sugden,[1] Terrie E. Moffitt,[1,2*]
Alan Taylor,[1] Ian W. Craig,[1] HonaLee Harrington,[2]
Joseph McClay,[1] Jonathan Mill,[1] Judy Martin,[3]
Antony Braithwaite,[4] Richie Poulton[3]

18 JULY 2003 VOL 301 SCIENCE www.sciencemag.org


A
Síntomas depresivos
Self reported depression symptoms
12.50
10.00
7.50
5.00
2.50
0.00
0
1
2
3
4+
Number of stressful life events
s/s
s/l
l/l
B
Depresión mayor
Probability of major depression episode
.50
.40
.30
.20
.10
.00
0
1
2
3
4+
Number of stressful life events
s/s
s/l
l/l
C
Tentativa suicidio
Probability of suicide ideation/attempt
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0
1
2
3
4+
Number of stressful life events
s/s
s/l
l/l
D
Depresión informante
Informant reports of depression
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0
1
2
3
4+
Number of stressful life events
s/s
s/l
l/l

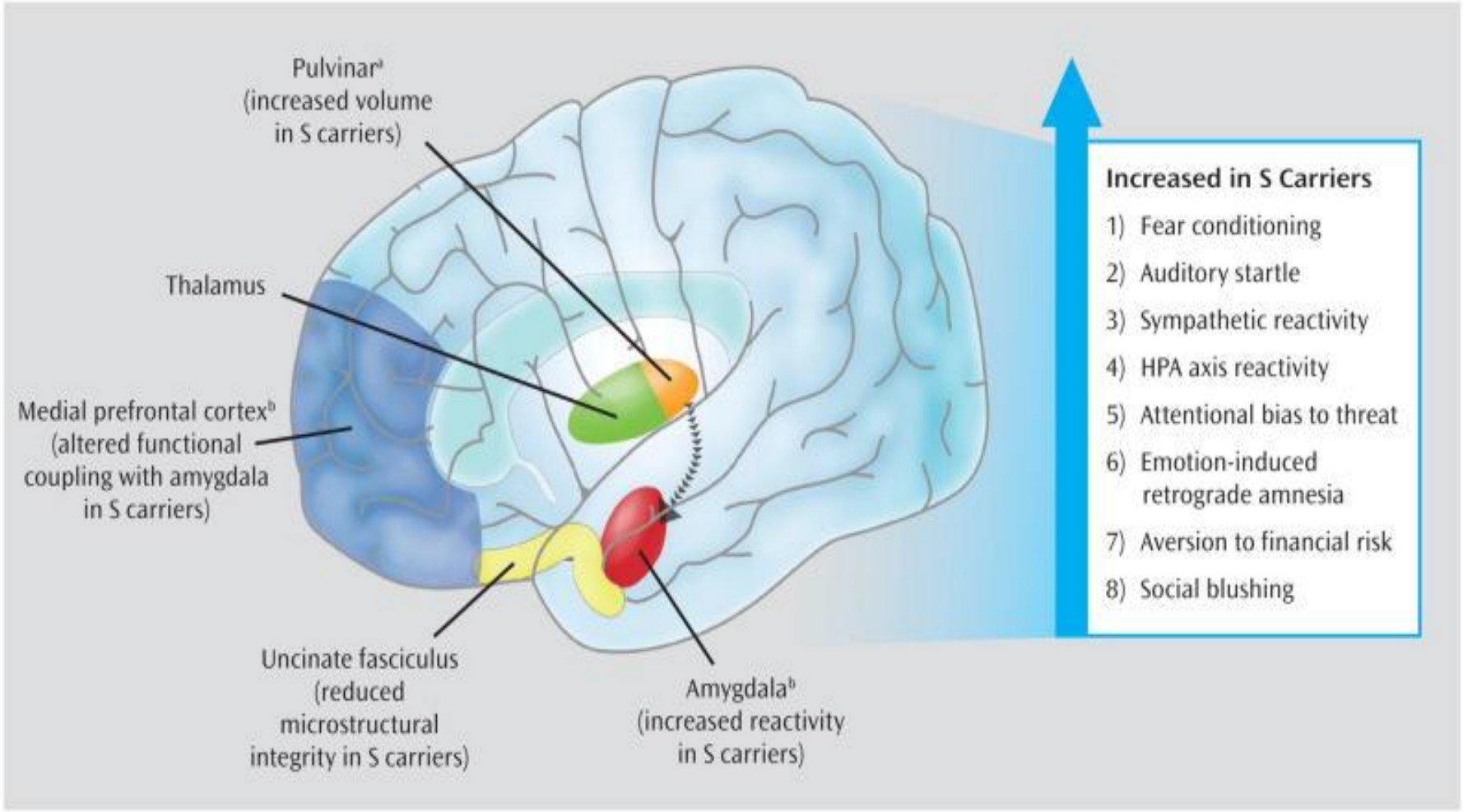
## Conclusions

- El HTT modulates response to stress

- Interaction HTTs and life events predicts risk of depression

" Nuestra hipótesis es que algunos trastornos multifactoriales en vez de ser el resultado de muchos genes de pequeño efecto, podrían ser la consecuencia de pocos genes cuya expresión este modulada por la interacción con factores de riesgo ambiental"

Genetic sensitivity to the environment: the case of the serotonin transporter gene and its implications for studying complex diseases and traits




Caspi, A, Hariri A, et al. Am J Psychiatry, 2010.

# Inconsistencies due to personality dimensions as moderator variables

- Interaction of high HA and low HA and magnitude of eye-blind startle (Corr et al, 1997)
- Differential susceptibility to affect induction by high and low HA
  - Activation of left amygdala, uncus and hippocampus in individuals low HA when shown happy faces (Canli, 2001; Canli, 2002). No activation in high HA
  - High HA and fearful faces, activation of right amygdala. No activation in low HA (Canli, 2002; Hariri, 2002)

# Gene-environment interaction

- Two large birth-cohorts of Finnish men and women (Ekelund,1999; Keltikangas-Jaervinen, 2003)
  - DRD4 polymorphism in a hostile childhood environment → high NS
  - DRD4 polymorphism in a cooperative environment, → low NS

# Brain-imaging studies

- Individual differences in SD correlate with activity medial prefrontal cortex during executive tasks (Gusnard, 2003)
- Self-trascendence is correlated with 5HT 1A in neocortex, hippocampus and raphe nuclei (Borg, 2003)
- Cooperativeness is correlated with activity in anterior insula, right parietal, right lateral prefrontal cortex (Pujol et al, 2002)
- Harm avoidance with anterior cingulate

# Take-home messages

- Any gene associated with a personality accounts for a small proportion of variance in the expression of that traits
- Personality traits reflect the expression of multiple genes
- Personality traits reflect the interaction of genes and environments
- Relationship between personality traits and biological processes are complex
- There is a bidirectional relationship between biological processes and experience

“Los genes que controlan el desarrollo embriónico modelan la estructura del cerebro infantil; la experiencia del niño en el ambiente es la que ajusta de una manera muy fina el modelo de conexiones neuronales que subyacen en la función cerebral.

Este ajuste o adaptación…continúa a través de la vida adulta.”

Torsten Wiesel, 1994

# Temperament can be shaped by cultural influences

US culturally ideal baby

- explores environment
- interacts with other people (shyness seen negatively)
- reacts to caregivers emotions, cues

Other cultures seek:

- more independence (e.g. Germany)
- More closeness (e.g. Japan)

# DEFINITION OF PERSONALITY DISORDER: two step model

**DISORDER**

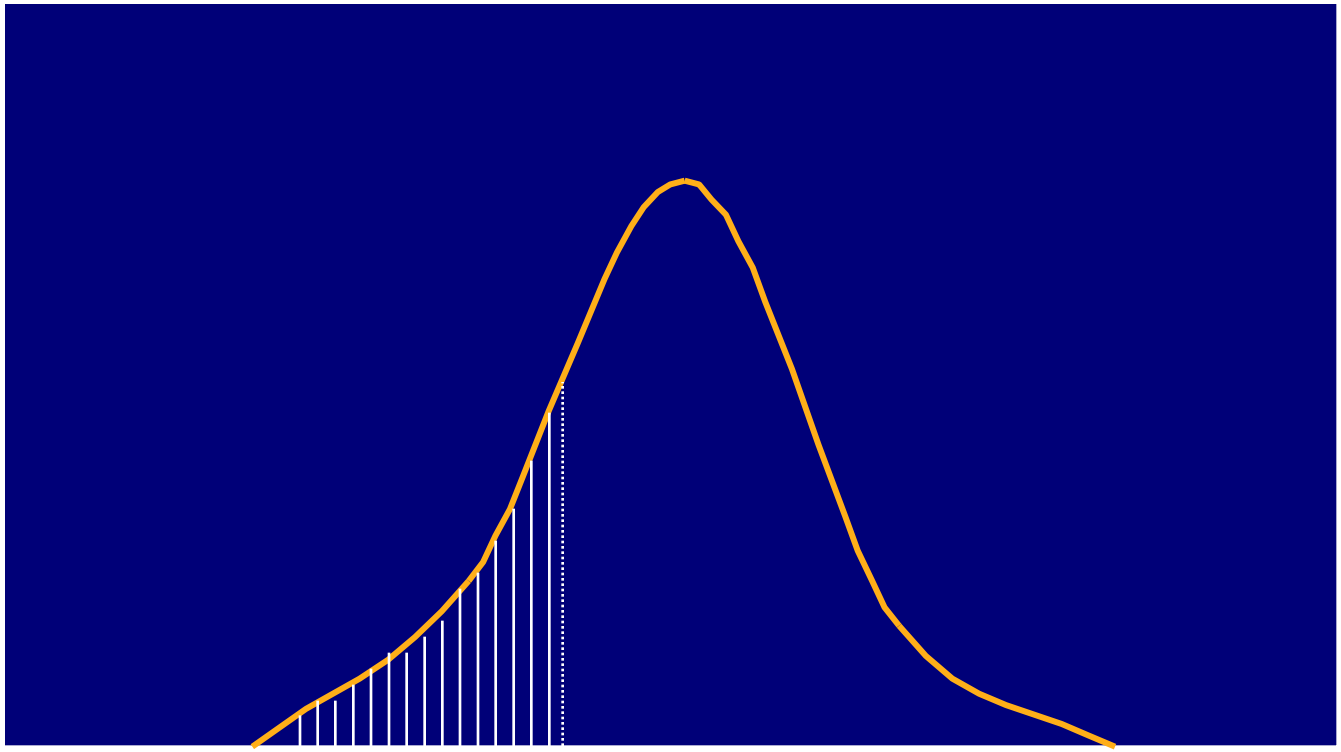
**Personality STYLE: temperamental configuration**

# Definition of Personality Disorder

Failures in the universal tasks of identity and affiliation.

- ↓ Self-directedness
- ↓ Cooperativeness

# Self-directedness



33%

# Integrating theory-driven and empirically-derived models of personality development and psychopathology: A proposal for DSM V

Patrick Luyten [a,*], Sidney J. Blatt [b]

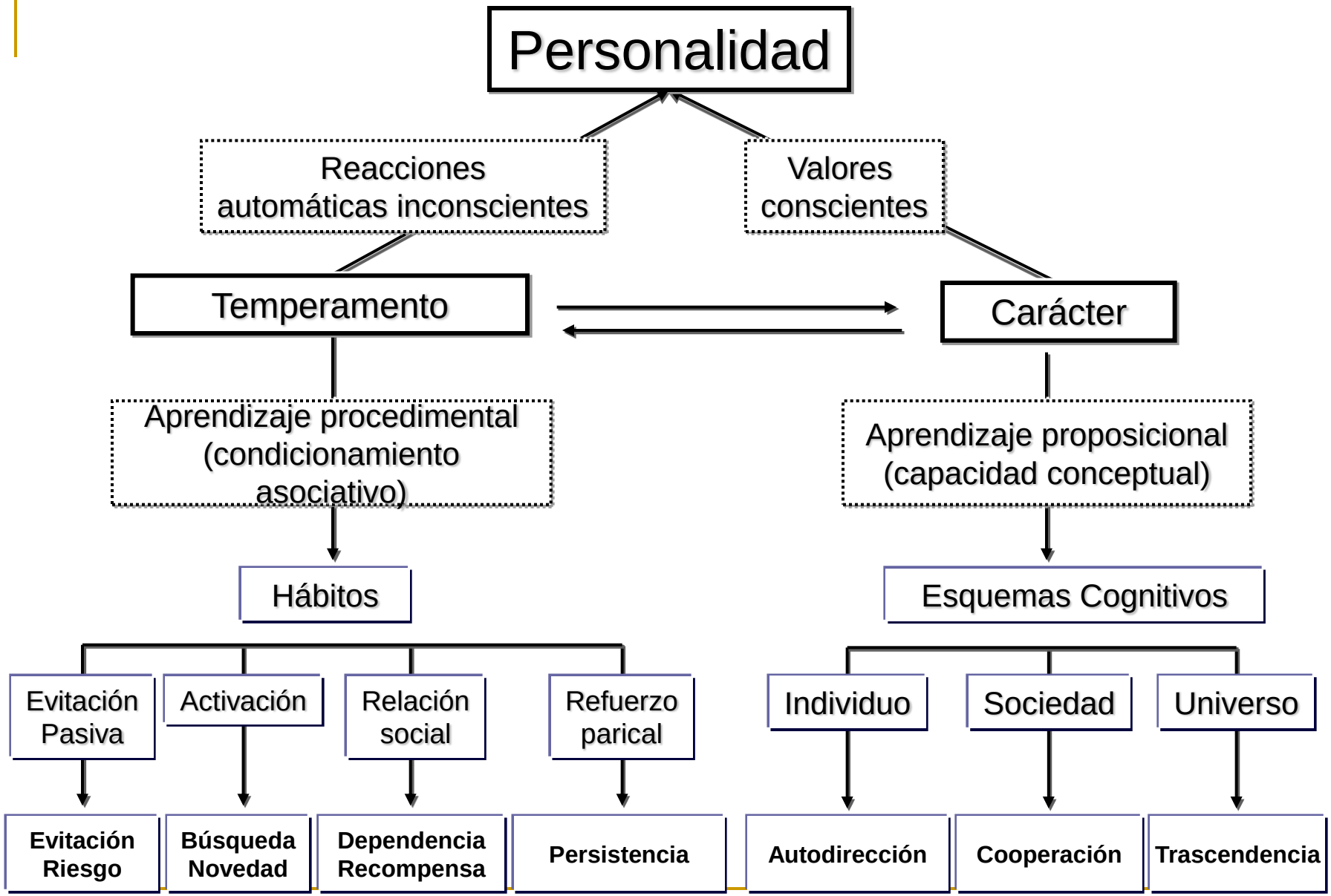
"we argue that temporary of chronic impaiments in the capacity for relatedness and self-definition underlie these descriptive features of psychiatric disorders and therefore provide central dimensions to organize both theroy-driven and empirically-derived approaches to psychopathology".

*Clinical Psychology Review, 2011*

*"The **dynamic** organization within the individual of those **psychophysical** systems that **determine** his unique adjustment to his environment"*

Gordon Allport
1897-1967

# LEARNING


Personalidad
Reacciones automáticas inconscientes
Valores conscientes
Temperamento
Carácter
Aprendizaje procedimental (condicionamiento asociativo)
Aprendizaje proposicional (capacidad conceptual)
Hábitos
Esquemas Cognitivos
Evitación Pasiva
Activación
Relación social
Refuerzo parical
Individuo
Sociedad
Universo
Evitación Riesgo
Búsqueda Novedad
Dependencia Recompensa
Persistencia
Autodirección
Cooperación
Trascendencia

# Different types of learning and memory

**Explicit memory**

**Medial temporal lobe; diencephalon**

**Facts (semantic)**

**Events (episodic)**

**Implicit memory**

**Procedural memory: skills & habits (basal ganglia)**

**Priming (neocortex)**

**Classical conditioning**

**Skeletal musculature (cerebellum)**

**Emotional Responses (amygdala)**

- There are nonlinear relationships between antecedent temperament dimensions and the level of character development.
- Longitudinal studies show that character develops in a stepwise manner, that correspond to increases in the level of self-aware consciousness

# Identity as a complex system

*Nonlinear, dynamic system*
*self-organizing process*
*recursive*
*external and internal constraints*
*maxima complexity*
*adaptive, stable and flexible states*
*balance between integration and differentiation*

# Identity as a complex system

**múltiples subsistemas diferenciados e integrados**

*rasgos (temperamento?)*

*estructuras de control y mecanismos que regulan los afectos e impulsos y coordinan la acción dirigida.*

*sistemas de conocimiento que codifican la información sobre el self , los otros y el mundo y guían la acción,*

# Problema mente-cerebro: del dualismo cartesiano a la integración

*El desarrollo del cerebro requiere de formas específicas de experiencia para dar origen y fomentar el crecimiento de los circuitos neuronales involucrados en los procesos mentales que comprenden la ATENCION, MEMORIA, EMOCION, AUTOCONCIENCIA*

*La experienca va dando forma al programa de desarrollo genético del sistema nervioso central“*

Siegel, 2000

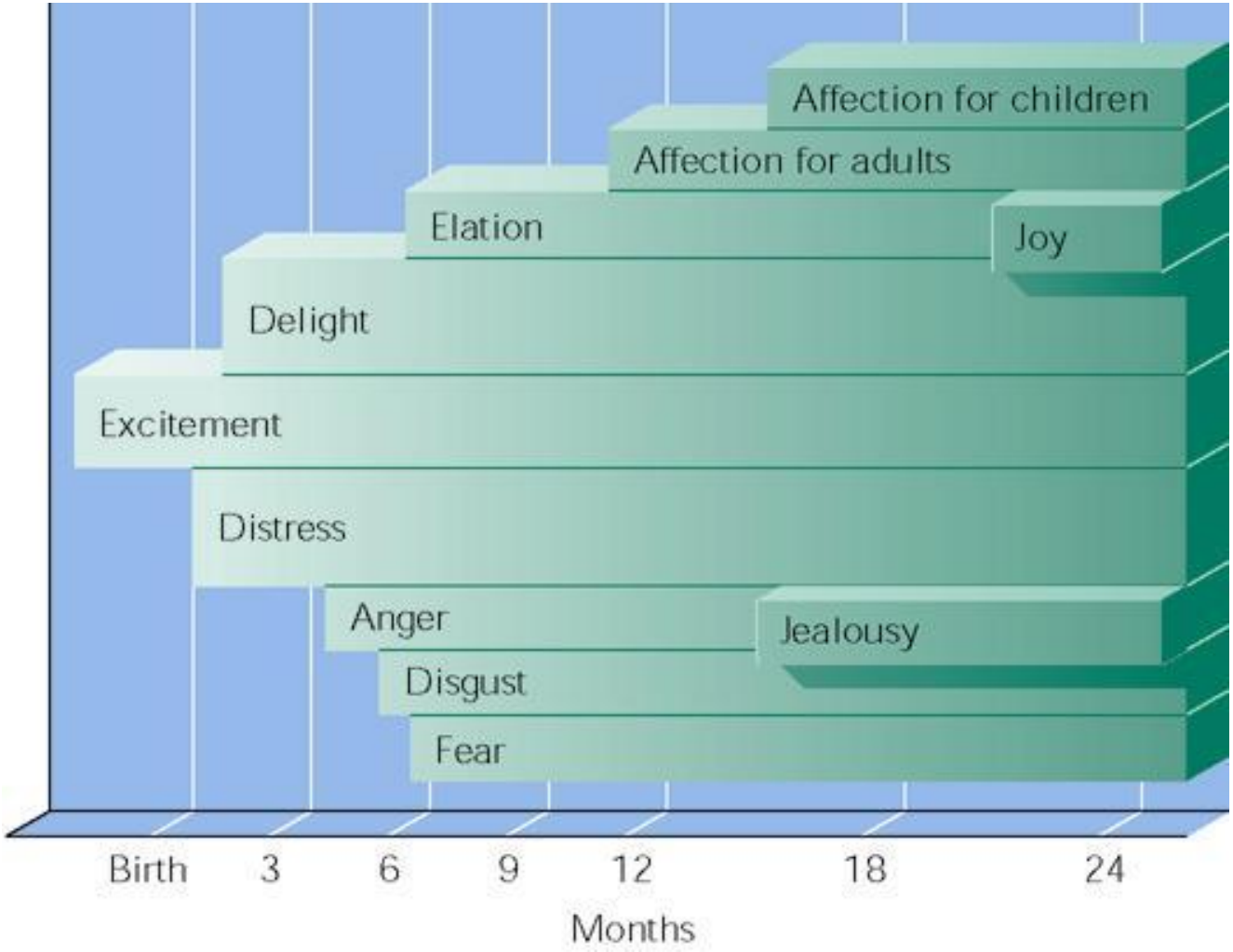
# Nature &Nurture

*There is no such thing as an infant, Winnicott*

- Psychobiological interaction between mother-infant
  - Innate potencial is only expressed facilitated by nurture
  - Environment affects structure and function of the brain.
  - BRAIN as a BIOSOCIAL organ

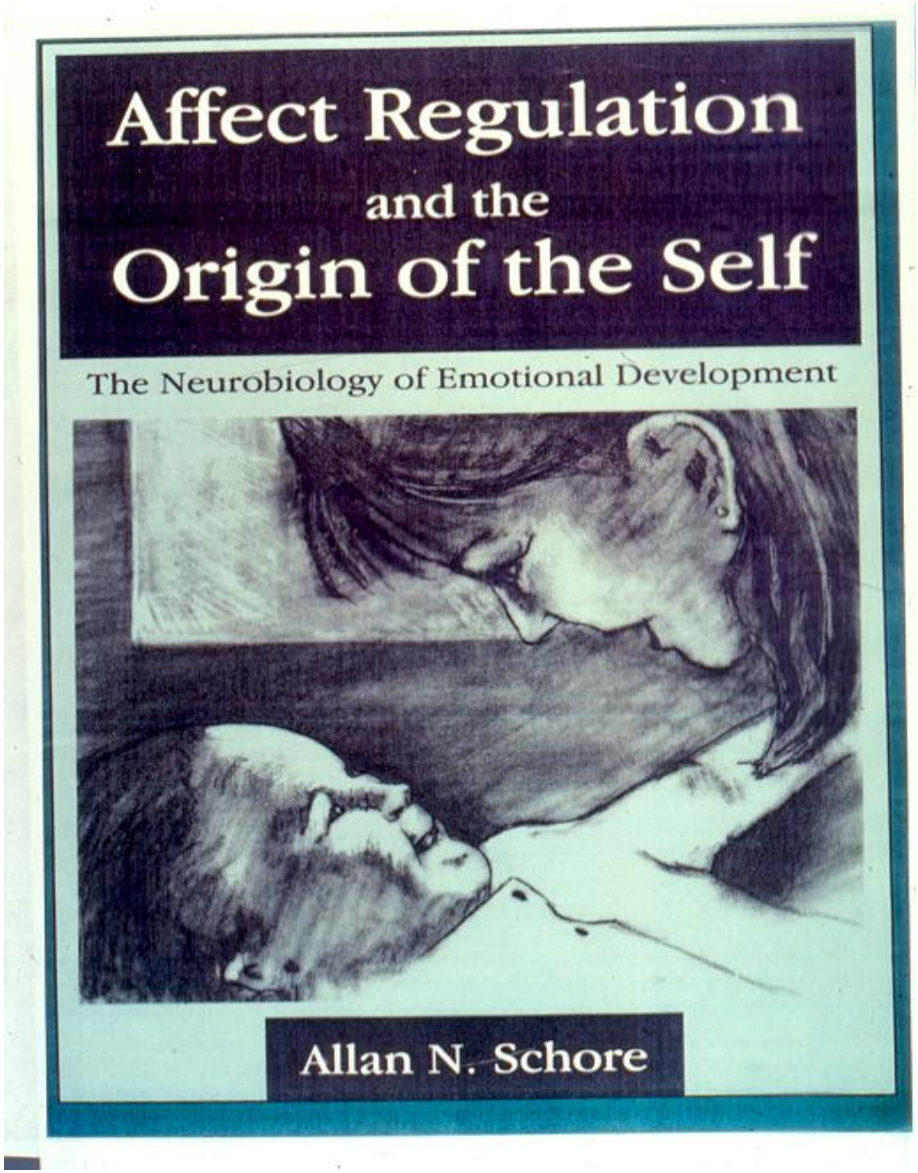
…virtually every aspect of early human development, from the brain's evolving circuitry to the child's capacity for empathy is affected by the environments and experiences that are encountered in a cumulative fashion, beginning in the prenatal period and extending throughout the early childhood years."

Shonkoff and Phillips, 2000




The traditional view of infancy holds that emotions are rapidly differentiated from an initial capacity for ecitement. (After K.M.B. Bridges, 1932. From “Emotional Development in Early Infancy.” Reprinted by permission of the Society for Research in Child Development.)

# AFFECTIVE NEUROSCIENCE




- Affect, neurobiological expression of emotion via ANS

- Affect is unconscious and requires a maternal response to make it apparent to us

- Regulation of affect is a developmental achievement.

# Interpersonal Neurobiology

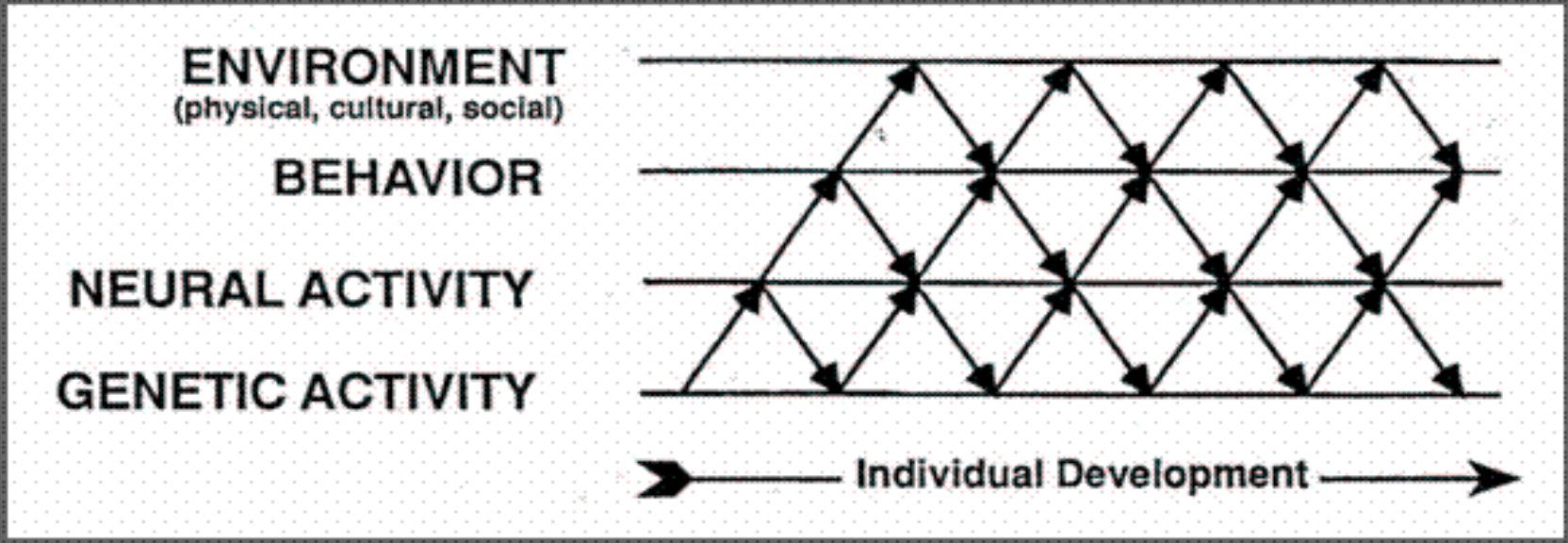
1) The MIND IS a Process that Regulates the Flow of Energy and Information
2) The Mind EMERGES within the interaction of the Internal Processes of the Brain/Body and the Interpersonal Processes.
3) The Mind DEVELOPS as the Genetically Programmed Maturation of the Nervous System is Shaped by Ongoing Experience.

- El self se describe como la dimensión invariante de “lo dado en primera persona” en medio de las múltiples experiencias cambiantes.
- La auto-organización de la experiencia ocurre simultáneamente en dos niveles: el nivel de la vivencia inmediata y el nivel de su ordenamiento lingüístico.
  - El primer nivel es tácito, emocional y continuo,
  - El segundo nivel es explícito, cognitivo y discontinuo. Ambos niveles, no obstante, están sujetos a la estructura narrativa de la experiencia.
- El self narrativo y el experiencial mantienen una relación de dependencia biunívoca

## SELF EN RELACIÓN

como un proceso en construcción conjunta con una figura de apego del sentido de ser uno mismo a través del tiempo, diferenciado de los otros y del mundo circundante.

# Influencias bidireccionales




Gottlieb, G. y Halpern, C.T. Relational view of causality in normal and abnormal development. *Development and Psychopathology*, 14, 3, 421-436

“Half of everything I am saying right now is wrong….unfortunately, I don´t know which half”

# What is left for the next ….?

- Self-aware consciousness
- How to help patients? The science of well-being
- Mindfulness as “being” and a tool for development of the self