Dr. Arturo Hernandez

Lecturer

1886

Arturo A. Example

native Italian speaker

learned French and English

Suffered a hemiplegic stroke

Never recover French and

English.

How is the bilingual

brain organized?

Familiarity
Jean Albert Pitres
The language resistant
to damage would be
the language spoken
at the time of stroke.

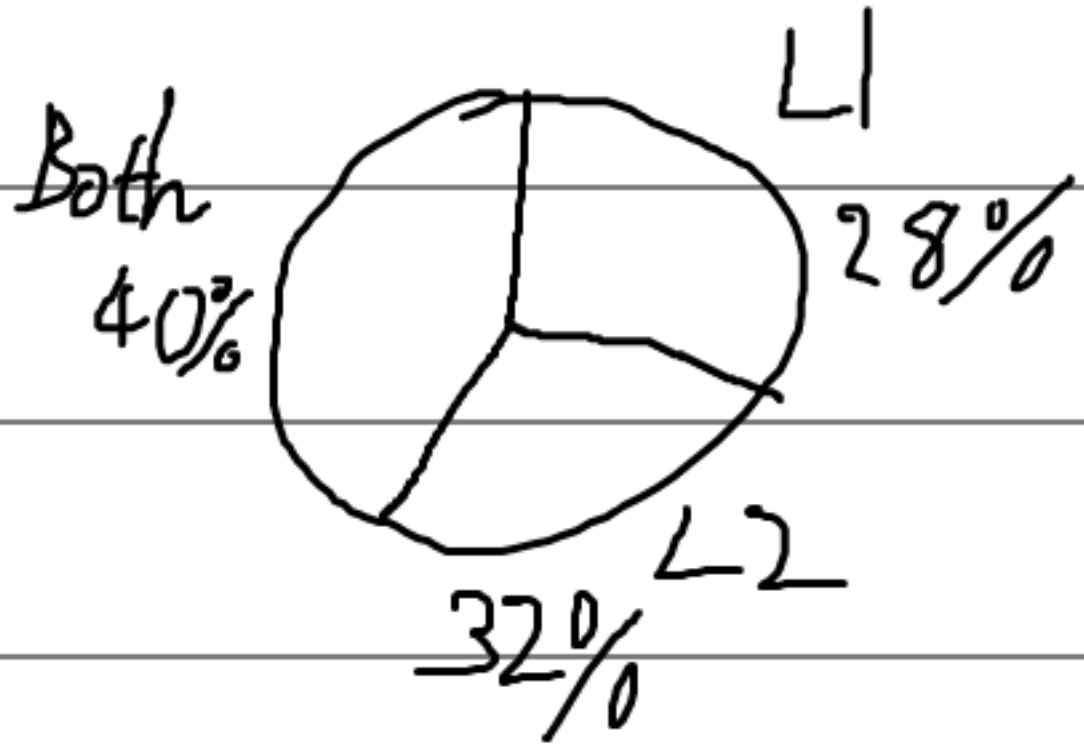
Law of Regression
Theodore Ribot
Memories learned in
early life are organic.

Dementia Example
lose skills from the
complex to simple.

Story of a Forester
L1 Polish L2 German
L2 is primary
During anesthesia,
speak Polish for hours.

1999 Fabbro, Neurolinguistics
of Bilingualism.

Recovery in Bilingual Aphasia



Patient A. S.

native Farsi

L2 German L3 English

alternate between L1 and L2 during recovery from a stroke.

Natural Antagonism
Between Languages

Language Switch
Otto Poetzl
A neurological mechanism
that allows a speaker to
remain in one language
and switch to another.

Get Stuck
Language Fixation
L1 Czech, learn L2 German

at 14

Understood both Czech and German

Could only speak Czech.

Outline

- Age of Aquisition — Law of Regression
- Proficiency - Familiarity
- Control - Fixation

	How does the mind work?
	Computer metaphor
	Information processing
Layers	Linguistic metaphor
Brain	Location metaphor
	Language is not one thing and is complex.
	Language developes over time.

Language is like two species coexisting in an ecosystem.

- coexist
- share resources

Cortex is part of lobe

myelin, axon

Morrison and Ellis 1995

Age of Acquisition

Words learned earlier are remembered better.

AoA vs. Freq.

asked people to name picture.

AoA effect was present even for low freq. word.

Meschyan and Hernandez

2002

Used a 2x2 design

Found effects of both freq. and AoA.

Possible Theories

- Phonological complex late learned words.
- First arrival. Words arriving first are most important.

Critical (sensitive) periods

Nobel Laureates

Hubel and Wiesel

Visual Deprivation

Cells in the primary visual cortex respond to edges.

Bird songs example

Common in visual, motor, and auditory domains.

Perfect Pitch example

Corpus callosum

Expert vs. Novice effects.

Skill Motor Learning
different stressors
chunking

AoA & Language
Kids combine words at
about 50 words.

Genie and Victor example

Genie struggles with grammar and pronunciation.

Phonology

Coarticulation

Blurry vs. Big boundary

Grammar

'permit vs. per'mit

5~6 months of age infants can still distinguish novel sounds. At about 8 months, the ability begins to disappear.

Plasticity, relearn sound contrasts.

Trisyllabic breakup

elcarro → el carro

lacasa → la casa

Sensorimotor Nature of

AoA

Habituation

Infants at birth actually have preference for their native language.

speech sound & melody

prosody

Valley girl vs. Surfer dude

Catalan vs. Spanish

Active vs. Passive exposure

Phonology in L2

Quichua vs. Spanish

Accent & AoA

Individuality

Phonological Bootstrapping

Critical period in L2

grammar Age matters. 7 yrs

no period.

AoA & Orphaned language

More brain activity in late bilinguals

AoA effects disappear when proficiency is controlled

N400 brainwave

semantic violation

P600 brainwave

grammatical violation

Proficiency, efficiency, and expertise.

Adriaan de Groot from a chess playing family.

very well educated studied math & science eventually studied psychology

Max Euwe - chess champ

respond quickly
remember more chessboard
configuration
pictorial memory
redundancy is used
very well by experts

unnoticed for 20 yrs.

Eye Fixation
redundancy really
matters.

Perceptual Expertise
moon example

John Hughlings Jackson
face recognition

bias toward faces

Inversion effects

K. Anders Ericsson
Fact reconstruction

deep structures & feels

quantitative approaches

behavioral vs. cognitive psychology

digit span test

up to 20 digits with practice

chunkiness again

mythical stories of prodigies

3 hours a day of
deliberate practice
roughly a normal person
can handle
1000 hrs a yrs
10 yrs to be an expert

diagnostic doctors
don't always improve
but surgeons do improve
over time.

constant feedback

Deliberate Practice

directive vs. elaborative

low SES high SES

diffuse EEG focus EEG

automatic vs. effortful

Learning w/o knowing

Henry Gustav Molaison

example

procedural memory tasks

verbalizable rules vs.
non-verbalizable rules

Short-term → working memory

verbal working memory
example.
reading span test

Office Hours

CALP vs. BICS

Gomez Tortosa, 1997
a bilingual, L1 Spanish
L2 English, went thrugh
surgery, reduce L1.
Boston naming
test
Criticism on the
reasoning of Tortosa
19/30 L1 before
32/60 L1 after
44/60 L2
differential impairment

47/60 L2 34/60 L1
for a group of similar
bilingual

Language Loss
Hernandez's Farsi
example

Catastrophic Loss

Cheistophe adults adopted at
Pallier 4~8 yrs old by French
families lost L1 Korean.

brain activities are almost like monitored. can detect subtle sound differences scarce residual abilities

Robert Bjork, mem. retrieval

If you really want to remember something, you should almost forget it.

Plasticity & Transfer

ASL community

English vs. ASL

Early exposure to <u>cl</u>

language is important

Which one is not.

Restructuring

plasticity

Share vs. separate

Judith Kroll

parasitism, Brian McQuinny

Dichotic nature of language

Tamar Gollan
reversed dominance

Jim Cummins
BICS vs. CALP

Some bilingual professors have high CALP but low BICS.

viewed as a continuum

past tense, regular vs. irregular

AoA correlate regular

LP correlate irregular

CALP across language.

Academic vs. Everyday Grammar

early learners, N400

proficient learners, P600

implicit vs. explicit

procedural vs. declarative

Speech Learning Model

returning

comperative process

Superior temperal gyrus

readjustment process
8-11 yrs old, eventually
transit to superior
temporal gyrus as time
rolls on.

A.o.A & Proficiency interact

Language Learning as a building process

Generality

Controlled Adjustment

Control & Development

Nim Chimsky

Cognitive Control

Primates Study

Orangutans, solitary, tool use

Piaget

human has very basic reflexes.

grasp thing

statle reflex

walking reflex

face recognition

He was criticized for this idea.

sensorimoter earliest

symbolic operation

formal operation

object permanence
out of sight, out of mind

lights off, infant reaches
for the toy.
world as distracter

checklist & agenda

young children are egocentric
Conditionals
Three-Mountain Task

until 7 years old

theory of mind

what if you were you?

From control to flexibility

1927, Arthur Jersild

task switching effects

older and better at switch

prefrontal cortex degrades first

young and old adults process information differently

pro-active vs. reactive

Control in language behavior some, brain activity differ between adolescents and adults.

hippocampus activity in adolescents, forming memory.

immersion, inference
impossible to remember
everything all the time

language switch
nature of context

bypass meaning, just look
forms.

U-shape again
blocked vs mixed switch

dorsolateral cortex

Prefrontal Cortex

- Executive functions
- Decision-making
- Response selection
- Response inhibition
- Working memory

Anterior Cingulate Cortex

- Attention
- Conflict monitoring
- Error detection

Basal Ganglia, Caudate
Language selection
Set switching
Language planning
Lexical selection

Inferior Parietal Lobule
Maintenance of
representations
Working Memory

Bilingual Advantage

Controversial

flexibility in use of symbols

Call the moon spaghetti

dissociate between label

and item

Concept Shifting

Bilingual Disadvantage
name a picture, slower
than monolingual.

repetition priming
monolingual faster

tip of tongue effect
larger for bilingual

4 yrs later for bilinguals to
have symptoms of Alzheimers

Caveats: bimodal bilinguals don't show this advantage

Spoken vs. Sign Language

less inference

Montreal, no difference between monolingual and bilingual.

Immigrant advantage?

switchers vs. non-switchers

non-switchers did better at others

Asian & Musician advan-
tage

better control, less interfere

Control, early and late
bilingual

Beyond Control
bilinguals are better
word learners.
bilingualism precedes behavior
N400

preponderant response
most likely response

nonlinear dynamics of bilingual
bilinguatism
parallel processer
competitive process

lexical network
clear boundary for simul-
taneous

homologous activity
for complex sentence
right hemisphere

expert bypass frontal
lobe and use parietal
lobe

metaphor of mind
metaphor of brain