Does Critical Period Play a Role in Second language acquisition ?

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Critical Period Hypothesis

- Notion of critical period in learning
  - “Maturational time period during which some crucial experience will have its peak effect on development or learning, resulting in normal behavior attuned to the particular environment to which the organism has been exposed.”[5]
  - Examples—[1,5]
    - The identification of a species member as an attachment object (‘imprinting’) in ducks and birds. Professor Konrad being followed by a flock of geese.

Critical Period Hypothesis Contd.

- White crowned sparrows when brought up in isolation from a few days after birth would sing crude songs having some basic structures to the original white-crowned sparrows' songs.
  - However, when trained using a tape recorder within a specific time period(10-50 days after birth), the sparrows even if brought up in isolation learnt to sing the original songs properly.
  - But if they were exposed to the tape recorded songs after this specific time period, there was little or no effect at all in the quality of the songs sung.
- There is a concept of Critical Period among other species.

Critical Period in Language Acquisition

- Concept of critical period among human beings developed by analogy with the learning mechanisms in other species; proposed by Penfield and Roberts (1959).

- Eric Lenneberg [1,3,4,5] supported and hypothesized in his book Biological Foundations of Language(1967)-
  - Language acquisition is a Biologically constrained learning
  - Normally acquired during a critical period(early in life and puberty)
  - Outside this period, language acquired through a different learning process or with difficulty.

Critical Period in Language Acquisition Contd.

- Evidence from[1,3,4,5]:
  - Language processing of people with brain damage is dependent on the age of the person at the time of the accident or disease onset.
    - The loss of language functions was irreversible past the age of puberty (clinical analysis by Lenneberg).
  - Children with Down's Syndrome, whose language development is slower.
  - Isolated children who have not been spoken to during the crucial period of childhood; referred to as **"wild children"**.

Critical Period in Language Acquisition Contd.

- Lenneberg's citation[3,5]:
  - An isolated 13 yrs old child Genie(isolated since she was a few months old). She was tethered to her bed and not spoken to at all.
  - After rescue received intensive speech therapy.
  - But, she was not able to construct grammatical sentences.
  - Critical period had passed or the brain damage that resulted from the physical and mental abuse endured by Genie (??).

- Pinker's citation[3,5]:
  - A woman known in the literature as "Chelsea" whose deafness was only discovered at the age of 31. She had not been abused unlike Genie.
  - Language acquisition after hearing aids were fitted was quite similar to Genie's pattern of significant vocabulary acquisition but little grasp of syntax.
  - Critical period during which acquisition of grammatical structure can occur had passed. But, why wasn't her deafness revealed before ?

Evidence to the hypothesis Contd:

- Lenneberg's hypothesis was also supported by
  - Language development of children with Down's Syndrome halted at puberty.

- Abused children isolated from exposure to first language showed deficits in phonology, morphology, and syntax. [1,5]
  - General physical and cognitive status may be a concern for isolated and deficit children.

- For normal children and adults, it is not:[1,5]
  - Adults during the first few months of learning have an advantage over children in case of higher acquisition of vocabulary and speed of learning,
  - but people who start early produce lesser grammatical mistakes than those who start late.
  - Flawless control over the accent and rhythm of language. Full productive control over syntax and morphology.

Evidence to the hypothesis Contd:

- With increasing ages of exposure, beginning from 4-6 yrs, there is a gradual decline in language proficiency until it plateaus for adult learners (Johnson and Newport,1989;Newport 1990)[5]

- Learners exposed to the language in adulthood show lower performance than those who are exposed in early childhood. [Johnson and Newport,1989] [5]
  - Effects seen in degree of accent, morphology and syntax.
  - Critical periods affect phonology, morphology and syntax not the vocabulary and semantic processing (occurs relatively normally in late learners).

Johnson and Newport's Study

- Sample consisted of native speakers of Korean and Chinese who had immigrated to the US at different ages. [1,3,4,5]
- subjects asked to make grammaticality judgments about 276 English sentences.
  - Half the sentences were rendered ungrammatical by violating rules about articles, gender agreement and verb structures.
- The seven subjects who had arrived between ages 3 and 7 performed indistinguishably from native speakers of English.
  - Strongly negative correlation between age of arrival (esp before 15) and ability to judge grammaticality,
- For the adult learners there was no significant correlation between age of arrival and grammaticality judgment ability.

Johnson and Newport's Study Contd.

- Johnson and Newport concluded that [1,3,4,5]
  - A critical period does exist for the acquisition of grammar.
  - Effects seen for both first and 2nd languages.
  - They reported that prior to age 15, there was a very strong negative correlation with age but after age 15, there was no correlation with age
- Pinker supported this conclusion heavily and summed it up as [3]
  - "acquisition of a normal language is guaranteed for children up to the age of six, is steadily compromised from then until shortly after puberty, and is rare thereafter"

Controversies

- Questions-- [5]
  - Does the L1 acquisition affect the L2 acquisition ?
  - Does it reduce the effects of later stage learning ?
  - Late first language acquisition results in lower performance than does the 2nd language acquisition, regardless of signed or spoken languages. [Newport]
- Two challenging evidence
  - The identification of older learners who achieve native- like competence in the second language (Birdsong, 1992)
  - Behavioral evidence that fails to reveal a qualitative change in learning outcomes at the close of a critical period (Bialystok & Hakuta, 1999).

Two Hypothesis on L2 acquisition

- Does L2 acquisition recapitulate the L1 acquisition ? [3]
  - Is L2=L1 Hypothesis correct ?
  - If yes, critical period of L1 acquisition relevant to L2 acquisition.

- Is L2 acquisition a cumulative process that builds on the competence already developed in L1 ?[3]
  - If yes, then critical period of L1 acquisition irrelevant to L2 acquisition.

Which one is correct ?

- A native speaker of Spanish will acquire English more rapidly than would a native speaker of Chinese, all other things being equal, because of the linguistic similarity between Spanish and English.
  - This evidence would imply that the cumulative model is correct.
- There is a remarkable similarity across speakers of different languages learning a given L2, indicating that there is much more than simple transfer from L1 to L2 going on (Bialystok & Hakuta, 1994).
  - and that indeed there is some sort of reenactment of the L1 acquisition process at work.

- Lenneberg, the originator of the critical period hypothesis, said [3]
  - “we may assume that the cerebral organization for language learning as such has taken place during childhood, and since natural languages tend to resemble one another in many fundamental aspects, the matrix of language skills is present” (p. 176).
  - He favored the cumulative model.
  - This implies “critical period of L1 acquisition irrelevant to L2 acquisition” according to the cumulative model hypothesis.

Characteristics of a Critical Period

- A critical period must have two characteristics (Bornstein, 1989; Columbo, 1982). [5]
  - “high level of preparedness for learning within a specified developmental period to assure the domain is mastered by the species”, and
  - “lack of preparedness outside of this period”.

- Condition 1 [3]: There should be clearly specified beginning and end points for the period.
  - Lenneberg suggested puberty, Johnson and Newport suggested age 15, Pinker suggested between age 6 and end of puberty.
  - True if specific end points are there.

Key elements of Critical Period

- Condition 2 [3]: There should be a well-defined decline in L2 acquisition at the end of the period, not a monotonic decline with age.
  - True if a rapid decline could be found around the end of the critical period, rather than a general monotonic decline with age that continues throughout the life span.

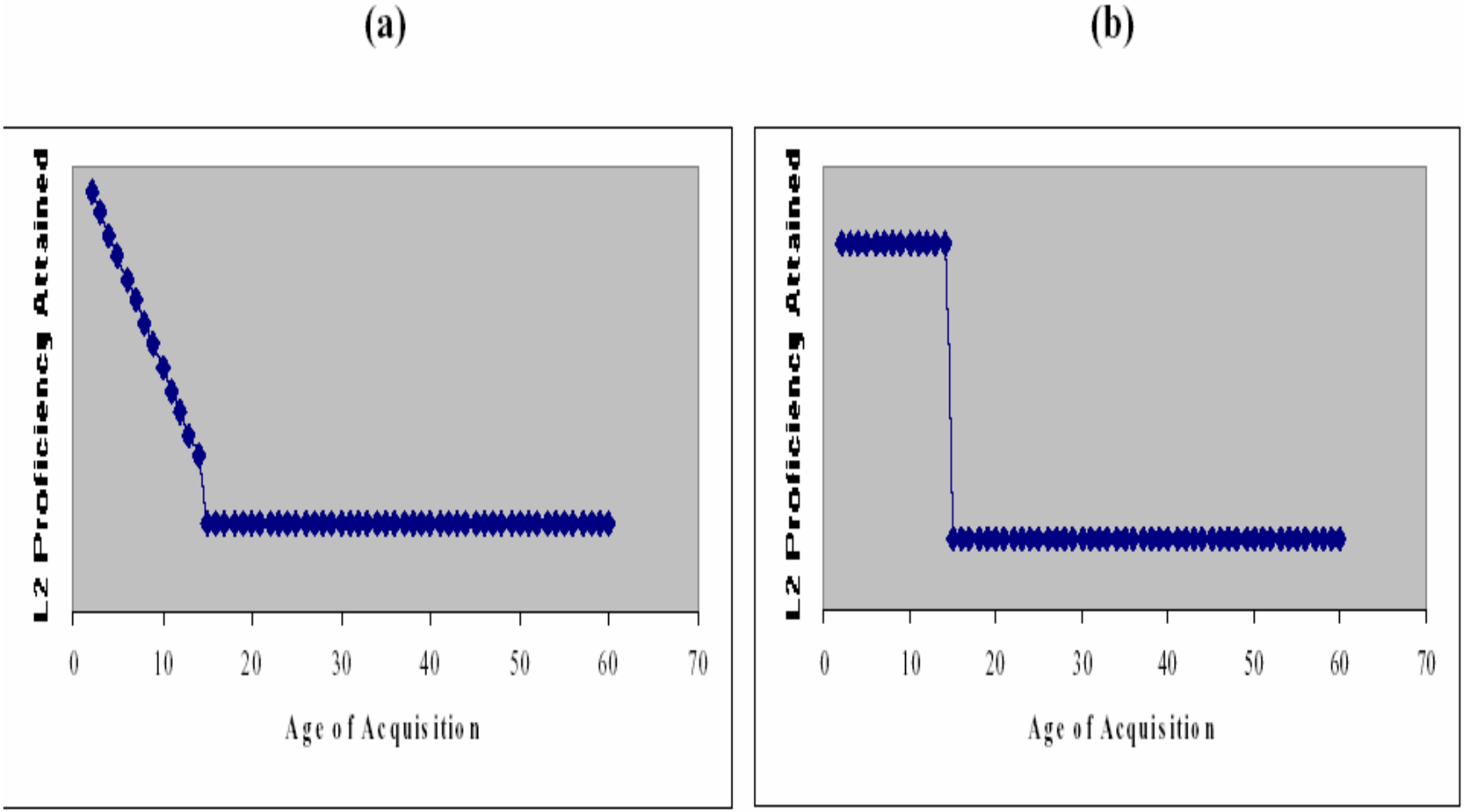
- Condition 3 [3]: There should be evidence of qualitative differences in learning between acquisition within and outside the critical period.
  - in the patterns of acquisition between child and adult second language learners.
  - True if certain grammatical errors could be found among adult learners, that are never found in child learners, or if child learners were able to learn specific aspects of the language that no adults could learn.

Key elements Contd.

- Condition 4[3]: There should be a robustness to environmental variation inside the critical period.
  - True if within the critical period, even with considerable environmental variation, the outcomes are uniform.
  - Beyond that period, the environment might play a larger role, and therefore the outcomes would become more variable.

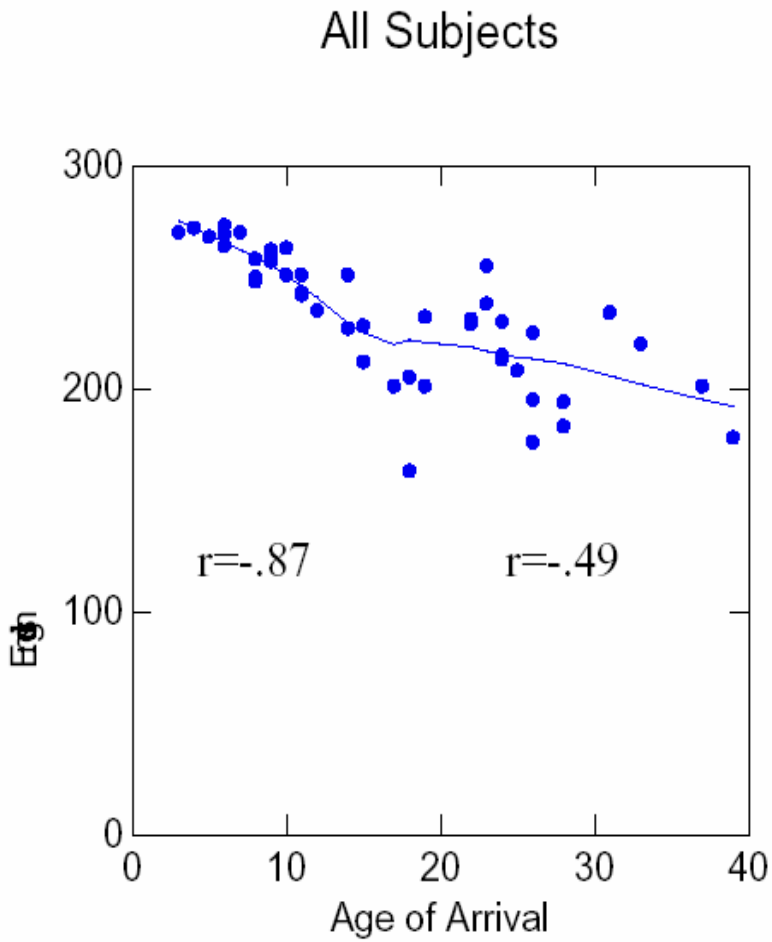
- Johnson's and Newport’s conclusion was
  - A critical period does exist for the acquisition of grammar.
  - Effects seen for both first and 2nd languages.
  - Age 15 was the end point of the critical period.

Theoretical Predictions[3]



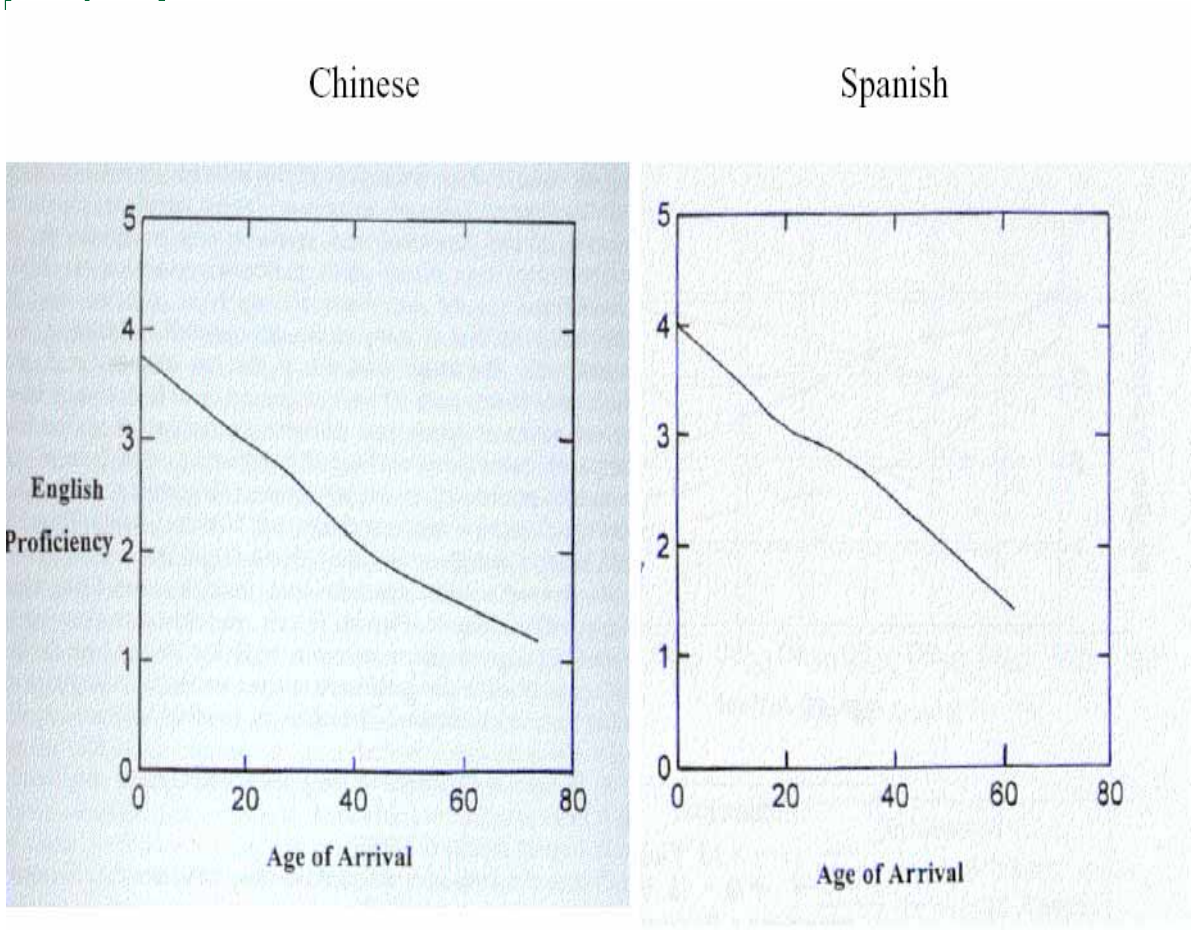
Re-analysis of Johnson's and Newport's Study by Bialystok and Hakuta in 1994[3,4]

- Bialystok and Hakuta claimed the breakpoint to be at age 20 and not at 15 or puberty.
- the data showed a discontinuity not at puberty but rather at 20.
- and that there was statistically significant evidence for a continued decline in L2 acquisition well into adulthood.



Re-analysis of Johnson's and Newport's Study Contd.[3,4]

- From the 1990 Census Analysis of the same by Bialystok and Hakuta in 1999, the following two graphs were obtained which contradicted their previous claim.



How Conditions 1 and 2 fail[3]

- Conditions 1 and 2: End Point for the Critical Period and Discontinuity at that Point
- The study looked at Chinese and Spanish speaking immigrants, who had immigrated to the U. S. at ages ranging from just after birth up to 70 years old.
- The Census Bureau asked for a self-report of their English ability, which was converted to a 4-point scale.
- continuous decline with age, and no evidence of a discontinuity or sharp break at puberty, as would be expected by Conditions 1 and 2.
- Essentially a straight line, and no evidence of conditions 1 and 2:
  - There should be clearly specified beginning and end points for the period.
  - There should be a well-defined decline in L2 acquisition at the end of the period, not a monotonic decline with age.

How Condition 3 fails[3]

- Condition 3:There should be evidence of qualitative differences in learning between acquisition within and outside the critical period.
  - in the patterns of acquisition between child and adult second language learners.
  - True if certain grammatical errors could be found among adult learners, that are never found in child learners, or if child learners were able to learn specific aspects of the language that no adults could learn.
- Supported by Language Transfer view :
  - Extent of Influence by the native language on the second language acquisition.
- “The points of contrast between the native language and the target language can determine the course of learning”.
  - positive transfer happened where the two languages are similar, and negative transfer where they are different.

Condition 3 Contd.

- Examples—
  - Japanese people having difficulty with the English determiner system (e.g., a, the, some)
  - Spanish language has a similar determiner system.
- adult learners show more evidence of transfer errors than do children
  - because, according to the critical period hypothesis, children directly access the target language whereas adults must go through their native language.
- Not correct.

Condition 3 Contd.[2,3]

- White and Genesee's test (1996):
  - They provided adults who had learnt english at various stages of life with some grammatically correct and incorrect sentences along with some abstract concepts.
  - Sentences—
    - Who do you want to see?(1)
    - Who do you want to feed the dog?(2)
    - Who do you wanna see?(3)
    - *Who do you wanna feed the dog? (4) (incorrect sentence)
  - The underlying structure for the sentences can be hypothesized as:
    - You want to see who?(5)
    - You want who to feed the dog?(6)

Condition 3 Contd.

- Abstract concepts provided—
  - According to the theoretical model of Universal Grammar, these underlying forms of who are moved to the front of the sentence, leaving behind a trace, t in the original location:
  - Who_i do you want to see t_i?(7)
  - Who_i do you want t_i to feed the dog?(8)
  - The rule that reduces “want to” to “wanna” for (8) is blocked by the trace between “want” and “to”.
  - Makes the sentence Who do you wanna feed the dog? (4) to be incorrect.

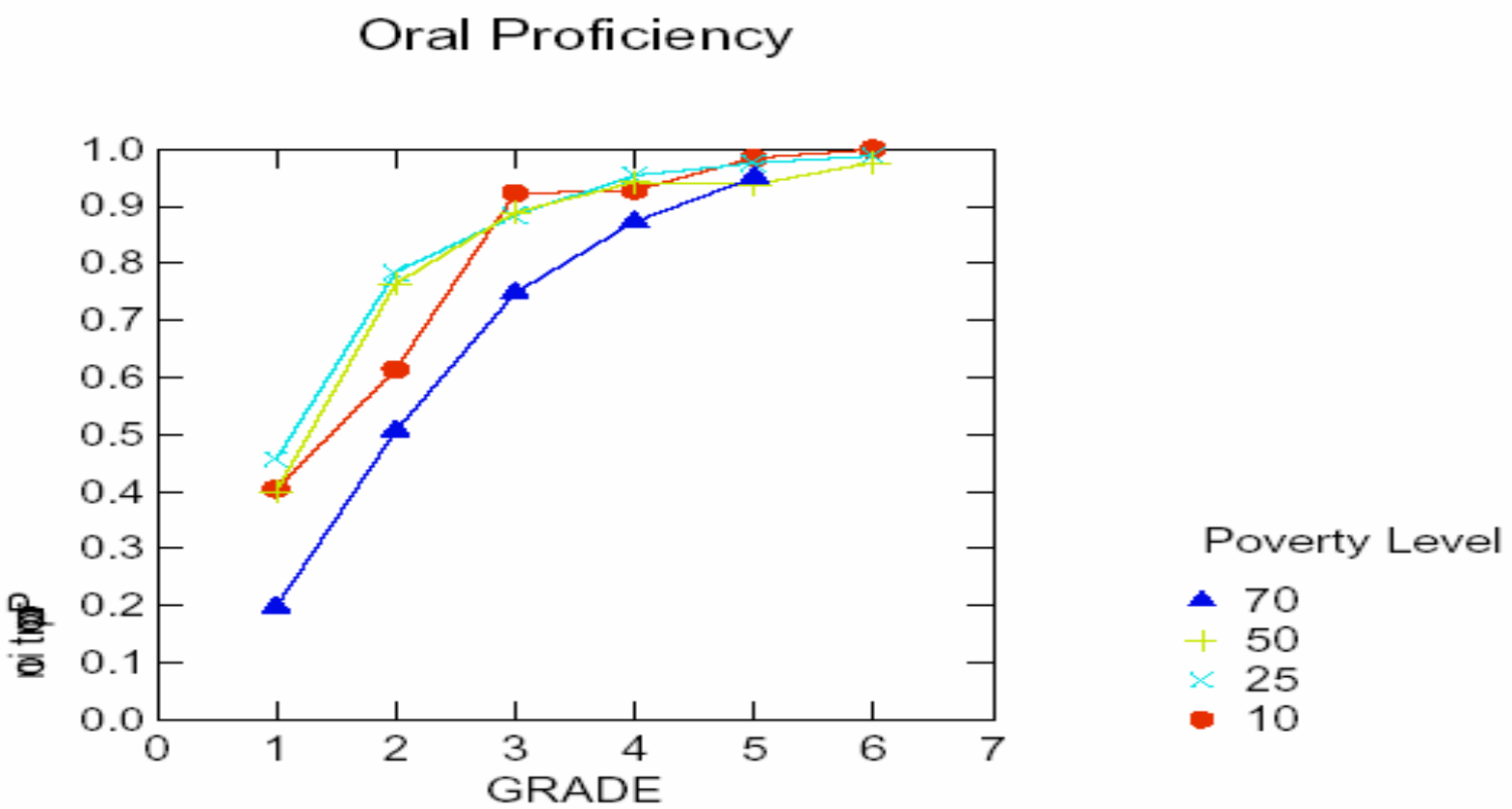
White and Genesee's test results (Condition 3)

- "Although more adult learners had difficulty in distinguishing between with these sentences than did child learners, about one-third of the adults had acquired these rules showed equivalently high performance to child learners and native speakers of English".
- Adults are capable of learning even these highly abstract rules that theory would say are accessible only with specialized language acquisition mechanisms.
- no demonstrated differences between the process of second language acquisition in child and adults.

How Condition 4 fails:[3]

- Condition 4: There should be a robustness to environmental variation inside the critical period.
  - True if within the critical period, even with considerable environmental variation, the outcomes are uniform.
  - Beyond that period, the environment might play a larger role, and therefore the outcomes would become more variable.
- An important variant in the environment is socioeconomic status of the learner.
- Experiment on oral proficiency data for immigrant students from a school district in Northern California, varying by the socioeconomic environment of the school.
- data show students who are socio-economically poorer schools (>50% free lunch) to be attaining English proficiency at a rate of about a full year slower than those in less poor schools.

The Effects of Environmental Variation [3]

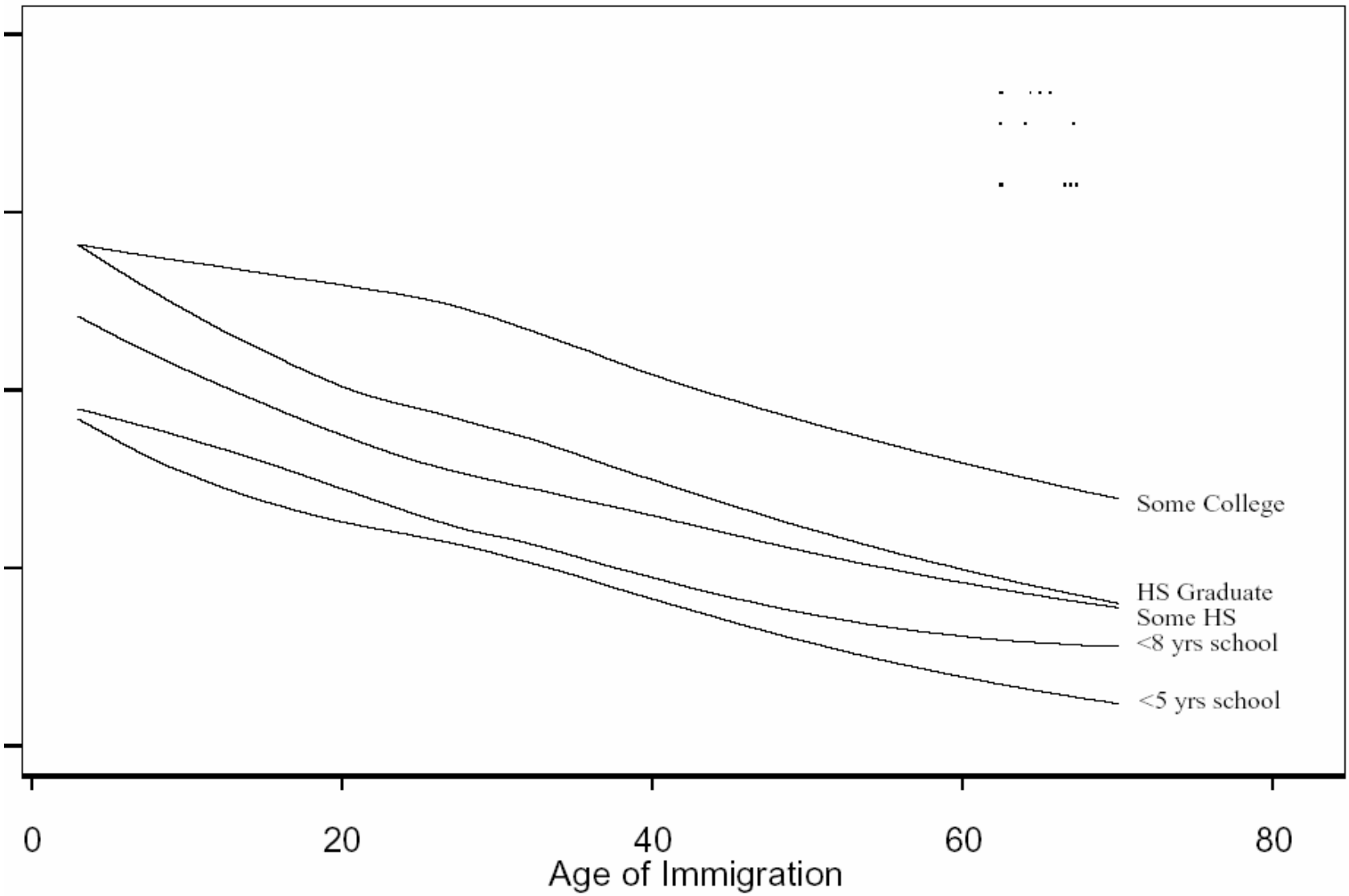


Condition 4 Contd.

- Strong socioeconomic effects can be found in the Census data as well.
- Figure shows the same data as the previous one, but disaggregated by years of education attained as a proxy for socioeconomic status.
- Enormous effects for years of education.
- No indication for whether it works differently in child and adult learners.

Census Data:[3]

Self-reported English proficiency for native Chinese immigrants as a function of age of arrival, separated by educational attainment. Data from 1990 Census. Analysis reported in



Conclusion:

- No definable end point (condition 1 fails).
- If there had been a critical period, points outside this period should have
  - Either a drop in English proficiency,
  - Or a change in slope between age of immigration and English proficiency,
  - Or both a mean drop and a slope change.
- No well defined decline found. All studies show a monotonic decline in second language acquisition.(Condition 2 fails)
- No demonstrated qualitative differences between the process of second language acquisition in child and adults. (Condition 3 fails).
- No robustness to environmental variation inside the critical period. (Condition 4 fails).

- No evidence of Critical Period in second language acquisition.
  - This implies, the view of “a biologically constrained and specialized language acquisition device that is turned off at puberty” is not correct for second language acquisition.
- The gradual decline over age can be attributed to multiple factors at work –
  - physiological, cognitive, and social.
  - Reduction in cognitive resources (working- memory limitations, cognitive slowing, or attentional deficits), mean that older learners will find 2nd language acquisition cognitively difficult than the young learners.
- It can be inferred that
  - Critical Period may exist for the first language acquisition
  - But, there is no evidence of it playing a role in second language acquisition.

References:

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