Week 12.
The Critical Period Hypothesis

What makes us think this?
- Concerning L1A, there are (traumatic) cases of delayed language exposure which together seem to show that only if recovered before age 10 would normal L1 language development occur. This includes Genie (started at 13;7, learned some but stopped short of native-like attainment in morphology and syntax).

How early is early enough?
- Isabelle, starting at 6, rapidly caught up to normal age-levels.
- Jim, hearing child of deaf parents, brought into speech contact around 3;6, rapidly caught up in spoken language, reaching age-norms by 6.

Seems clear enough
- There is some kind of advantage to L1A within the “sensitive period”.
- Is it language specific? Or is there something about overall cognitive development that can explain this?
- Once you get L1 within the sensitive period, is that good enough (does that “get it started”) for L2A even after the sensitive period?

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GRS LX 700
Language Acquisition and Linguistic Theory

Child L1A: fast, easy, successful.
Adult L2A: slow, hard, failure-prone.

- Suggests that kids are “built to learn language” in a way that adults are not.
- Perhaps there is a “sensitive period” early in life where one absorbs languages. This sensitive period ends at some point.
To reiterate…

• Is there a critical period for L1A?
  – Evidence just reviewed suggests probably.

• Does this critical period affect L2A?
  – Is it easier to learn an L2 inside the critical period?
  – It is possible to learn an L2 outside the critical period?
  – Does it just depend on having learned an L1 inside the critical period?

About critical periods

• Just a note: It’s pretty uncontroversial that there is some decline in the ability to learn language that happens with age. Nobody disputes the fact that it’s harder to learn a second language later in life.

• The question is: Is this caused by an irreversible neurological change? (A critical period) Is it impossible to “learn an L2” after the end of the critical period? Or does it just get harder to learn stuff as you get older?

About knowledge

• To borrow a bit from next week’s reading, Schwartz (1993) calls our attention to two kinds of linguistic knowledge:
  – language competence
  – learned linguistic knowledge (LLK)

• The first is generally unavailable to conscious reflection. The second is quite often conscious.
  – An L1 example of LLK is Don’t end your sentences with a preposition, resulting in travesties like: These are the demands of the union into which the management has given. (Or This is the sort of pedantry up with which I will not put!)

L2A and age of initial exposure

• Adults proceed through early stages of morphological and syntactic development faster than children (time and exposure constant).

• Older children acquire faster than younger children (morphology and syntax; time and exposure constant)

• Child starters outperform adult starters in the end.

• So, age improves rate, at least initially, but negatively affects ultimate level of attainment.

About knowledge

• The critical period hypothesis is about obtaining competence (not learned linguistic knowledge) and it makes a claim about whether an L2 speaker can obtain a native-like competence of an L2.

• People can always gain LLK in an L2 as well, learn rules, apply them, maybe get so practiced at it that it becomes second nature, but this still wouldn’t rise to the level of competence.

• This is all fairly conceptual—testing this in a meaningful way is going to be harder. Schwartz (1993) has some suggestions for what such a test might look like.

Phonology—6

• Studies of phonological acquisition suggest that 6 years old is a critical one for attainment of native-like phonology.

• Generally tested by having native speaker judges listening (to accent, presumably) and guessing which were native speakers and which weren’t.
Morphology, syntax, semantics—15

- A few studies (including Johnson & Newport 1989) show that L2 speakers with an initial exposure prior to 15 did significantly better than L2 speakers with an initial exposure after 15 in the domain of syntax and morphology.

Comprehension—10

- A small set of results (Oyama 1978, Scovel 1981) suggest that ability to comprehend “masked” speech and recognize foreign accents has a discontinuity at around age 10.

Several “critical periods”

- So it seems that there is an age-sensitivity, but it is not even language specific, it is subpart-of-language specific.
  - Phonology—6
  - Morphology, syntax, semantics—15
  - Comprehension—10
  - …?

Why isn’t it strange that there should be (a) critical period(s)?

- Vision studies replicated in cats.
- In fact, vision studies “replicated” in humans as well; there seems to be a visual critical period at around age 6, after which providing previously delayed visual stimuli is of no use. (Congenital opacities of the cornea; surgery performed on juveniles or adults does not restore sight)
- Imprinting in birds; just after birth, they “become attached” to a prominent moving object in their environment (typically, the mother). This attachment persists. But it can only be done sometimes in the first few hours, for some species.

Why isn’t it strange that there should be (a) critical period(s)?

- There are critical periods attested all over the biological world.
- The visual system is a favorite example. In experiments done on macaque monkeys, it was determined that there is a critical period for development of binocular vision cells in the visual cortex (tested by monocular deprivation)
- Recovery after CNS damage: disappointingly limited in the adult brain, but can be nearly 100% in the immature nervous system.

…The development of form perception and the binocular vision necessary for depth perception proceed in stages after birth. Each stage culminates in one or more developmental decisions, many of which are irreversible. In each stage, appropriate sensory experiences are necessary to validate, shape, and update normal developmental processes. Consequently, the effects of sensory deprivation are most severe during a restricted and well-defined period early in postnatal life when these developmental decisions are still being made. (Kandel, Schwartz, Jessell 3d ed. 1991, p. 956)
Why isn’t it strange that there should be (a) critical period(s)?

…Critical periods of development generally do not have sharp time boundaries. Different layers within one region of the brain may have different critical periods of development, so that even after the critical period for one layer has passed, rearrangement of the layer may still be possible because the entire region has not yet fully developed. For example, 8 weeks after birth layer 4c in the visual cortex of the monkey is no longer affected by monocular deprivation, whereas the upper and lower layers continue to be susceptible for almost the entire first year. (Kandel, Schwartz, Jessell 3d ed. 1991, p. 957)

What might cause a critical period?

• People like to believe that anything is possible and so they tend not to like to believe in the critical period if they can help it. But what else might cause this effect?

• One possibility: social/cognitive factors that covary with age (an “intervening variable”); e.g., attitude, motivation, empathy, self-esteem, …

• Yet, this doesn’t seem to get at the uniformity of the phenomenon across situations. And why phonology at 6, morphology at 15?

What might cause a critical period?

• Difference in the input? Unlikely to cause this big of an effect, and also unlikely to be as consistent as the facts require.

• Cognitive development provides other learning mechanisms which overwhelm our LAD mechanisms? Plus, is this detectibly different? Is it even conceptually different?

What might cause a critical period?

• Brain development. Loss of plasticity that goes with lateralization of language processes? Interesting, but the timing’s off. Lateralization seems to be complete by around age 5, way before the syntax critical period. Maybe implicated in some way in the phonology critical period?

What might cause a critical period?

• We don’t really know.

• Neural development seems like a promising place to look, but there are very few things actually known about the connection between language and neurons, or even about neural development (beyond description).
Johnson and Newport (1991)

- Aiming to test the critical period hypothesis by looking at correlations between eventual performance and age of initial exposure to the target language.

- In particular, they were trying to focus on whether purportedly universal properties of language exhibited in L2 show an age effect.

Johnson and Newport (1991)

- J&N(1989): Tested 3-39 year old native Chinese and Korean speakers, average 10 years in US, on aurally presented grammaticality tasks. 3-7 year olds were like natives, after that, scores dropped rapidly as age of arrival increased.

J&N91 on Schachter 1989

- Schachter 1989 tested Indonesian, Chinese, and Korean speakers on subjacency. The test went like this:
  - 24 items were questions containing subjacency violations
  - 24 items were declarative sentences of similar complexity to show that they know the basic syntax to make testing for subjacency meaningful.

J&N91 on Schachter 1989

- S89 found that most subjects got the syntactic test items right, but did not properly reject the subjacency violations—concluding that L2ers “do not have full access to UG” (=subjacency).

- J&N91 point out that although S89 controlled for the complexity on a basic level (syntactic items vs. subjacency items), there are a couple other (probably fatal) confounds.

J&N91: Study 1

- Tested:
  - declarative controls
  - subjacency violations
  - wh-questions satisfying subjacency
  - SAI error (“English-specific”)  
  - simple wh-question controls (filter)

- Subjacency violations covered a number of possible settings for bounding nodes.
J&N91: Study 1 results

- Adult learners (Chinese->English) did much worse (accepted ungrammatical sentences) than native speakers.
- L2’ers did better on SAI than on subjacency; subjacency doesn’t seem “privileged”.
- Response bias was ruled out; there is a slightly better than chance influence of subjacency in L2’ers.
- L2’ers seem to accept sentences that exemplify violations of subjacency with bounding nodes that hold in all languages.
- They verified that subjacency violations were by asking for answers—so we could tell where wh-words moved from.

J&N91: Study 2

- What’s the effect of initial age of immersion?
- 21 speakers Chinese->English with initial ages between 4-16.
- 21 more with initial ages between 17-25.

J&N91: Study 2

- This is incompatible with the view that nothing’s different between late and early L2 acquisition.
- There seems to be a more rapid drop-off of ability to use the putative universal principle Subjacency in one’s L2 if initial immersion is after 14 years old.

J&N91: Study 2

- So, the adult learners didn’t do well at all on Subjacency tests—and not even better on Subjacency than SAI. And the actual responses didn’t seem to follow from a missetting of the bounding node parameters either.

White & Genesee (1996)

- W&G are among the non-believers in a critical period. They don’t believe the results of previous studies are really representative of what level of competence is achievable.
- Instead, let’s find people who are likely candidates (near-natives) and test them (and compare their initial ages of immersion)
White & Genesee (1996)

- Their subjects seem to distribute as you’d expect, though—the young learners are the near-natives, the old learners are the non-natives.

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Group</th>
<th>0-7</th>
<th>8-11</th>
<th>12-15</th>
<th>16+</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near-native</td>
<td></td>
<td>22</td>
<td>7</td>
<td>7</td>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>Non-native</td>
<td></td>
<td>6</td>
<td>5</td>
<td>11</td>
<td>22</td>
<td>44</td>
</tr>
</tbody>
</table>

White & Genesee (1996)

- Their tests were grammaticality judgments and question formation tasks testing subjacency and also measuring reaction time.
- Their results from the GJ task showed that their categorizations of the subjects were right—the near-natives performed like native speaker controls, and often significantly different from the non-native speakers. The QF task showed the same thing.

White & Genesee (1996)

- Conclusion: It is possible for ultimate attainment to be native-like (to the point where you can’t experimentally tell a near-native from a native speaker). And there seems to be no particular effect among the near-natives of initial age of immersion.
- The age effect must be due to something else other than a “loss of UG”.

White & Genesee (1996)

- Of course, English and French are a lot alike—is this an artifact of that? Did these L2’ers do so well because they could carry their parameter set over from French almost wholesale? Alluding to another study (White & Juffs 1996), they suggest no—Chinese not-quite-near-natives caught about the same number of ungrammatical sentences as native English speakers.

So where are we?

- There is lots of evidence from neuroscience that some aspects of brain development are subject to critical periods.
- The evidence seems to show that people who start learning a second language relatively late are much less likely to approximate native speaker competence.
- The evidence may not quite manage to show that late learners cannot reach near-native levels.
- So is this inconsistent with a biological explanation?
- Are the “near-natives” just really good with LLK?
For next time:

- Read White (1991)
- Read Schwartz (1993)
- Read Doughty (1991)

- Do a summary on White (1991), same rules as with earlier summaries.