

# Directions for Basic Research on Adult Second Language Acquisition: A Cognitive Science Perspective

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*Opportunities for Basic Research in the Behavioral and Social Sciences for the U.S. Military*  
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There are many reasons to learn a second language...

QuickTime™ and a  
YUV420 codec decompressor  
are needed to see this picture.

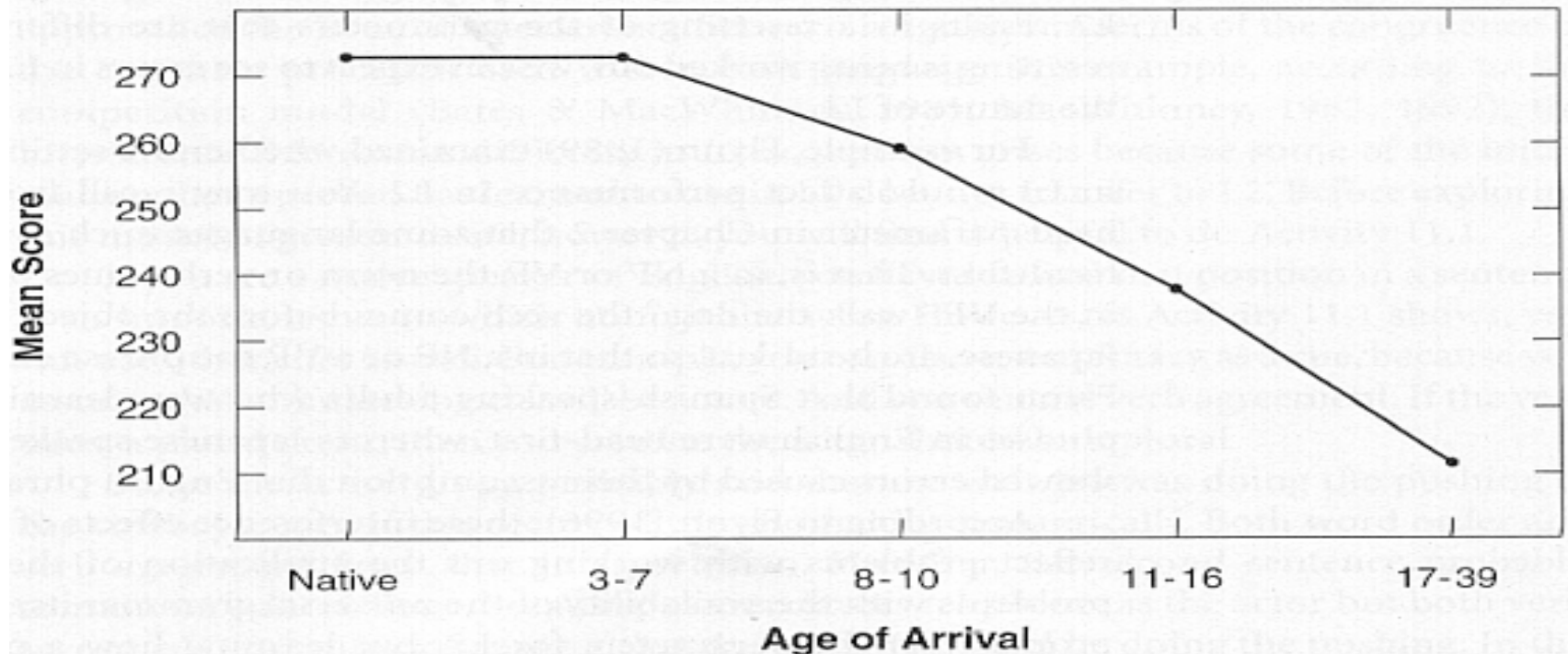
## Learning a second language (L2) after early childhood:

- ❖ Difficult task
- ❖ Mixed outcomes
- ❖ Even highly successful late L2 learners speak with an accent and fail to acquire subtle aspects of the L2 grammar

# Johnson & Newport (1989): A critical period for learning L2?

## Age and Second-Language Acquisition

Shown here are scores on a test of English grammar (maximum score = 276) as a function of age of arrival in the United States. All of the participants in this study had about ten years of exposure to English prior to testing.



Is L2 learning possible at all after childhood?

*An alternative to the critical period explanation:*

Late L2 learning may be difficult because there is competition between the native language and the new L2

If so, then methods that reduce competition may enable successful L2 learning

# Talk Outline

## ❖ *What recent cognitive research tells about cross-language competition in L2 learners and bilinguals*

How competition is manifest in understanding and speaking the L2

Cognitive consequences of competition

## ❖ *Implications for adult L2 learners*

Characteristics of the learner: Individual differences in cognitive resources and L2 success -- the role of inhibitory control

Characteristics of the learning environment: Lessons from immersion

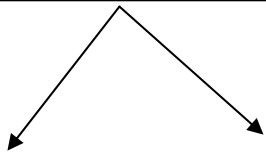
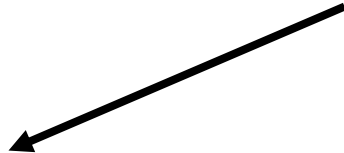
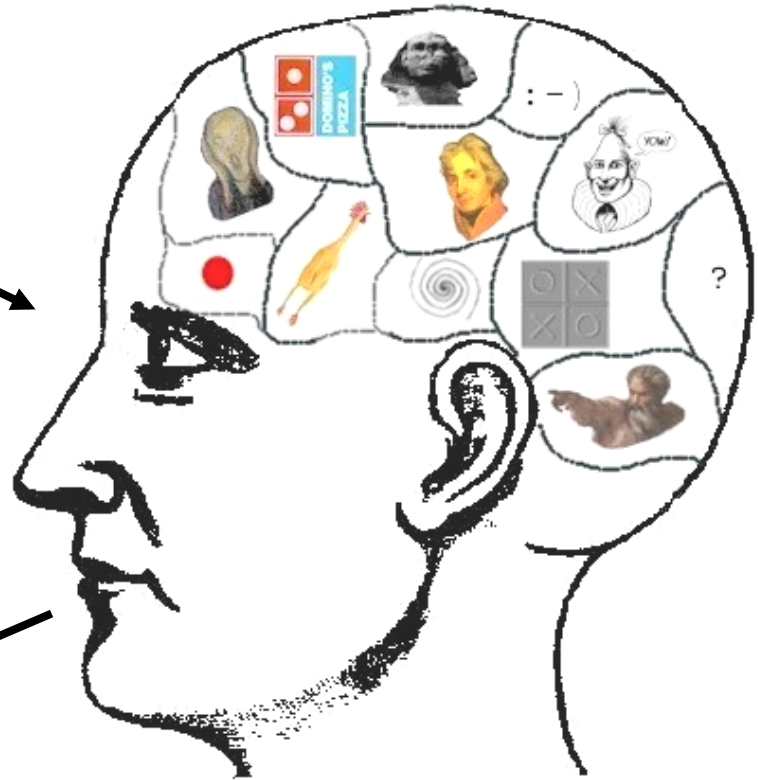
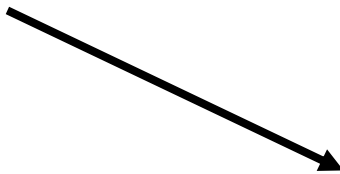
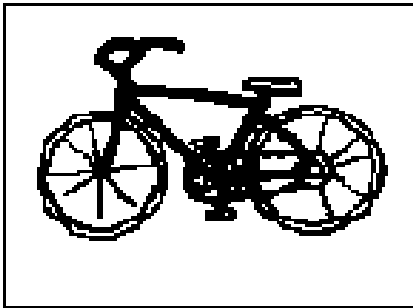
Characteristics of the languages

## ❖ *Other promising directions*

## ❖ *Unresolved issues and obstacles*

Current research suggests that a bilingual's two languages are active regardless of the intention or requirement to use one language alone.

The bilingual is a mental juggler!



“bike”

“fiets”

Dutch-English speaker

Exploit the presence of cross-language ambiguity:

**Interlingual cognates:**

**hotel** (English)- **hotel** (means *hotel* in Dutch)

**Interlingual homographs (false friends):**

**room** (English)- **room** (means *cream* in Dutch)

If a bilingual can function as two monolinguals in one, then performance in one language alone should be independent of the sense of meaning of the word in the other language.

Many studies demonstrate persistent activity of the L1 in using the L2 and show further that the L1 becomes sensitive to the influence of the L2

An example from the domain of sentence comprehension:

Dussias (2003): How do the structural commitments of one language influence the processing of the other language?

*Peter fell in love with the daughter of the psychologist who studied in California.*

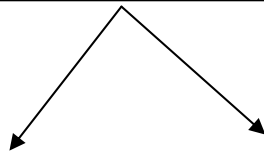
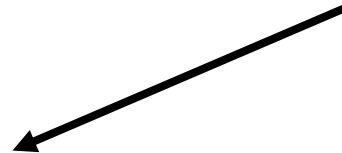
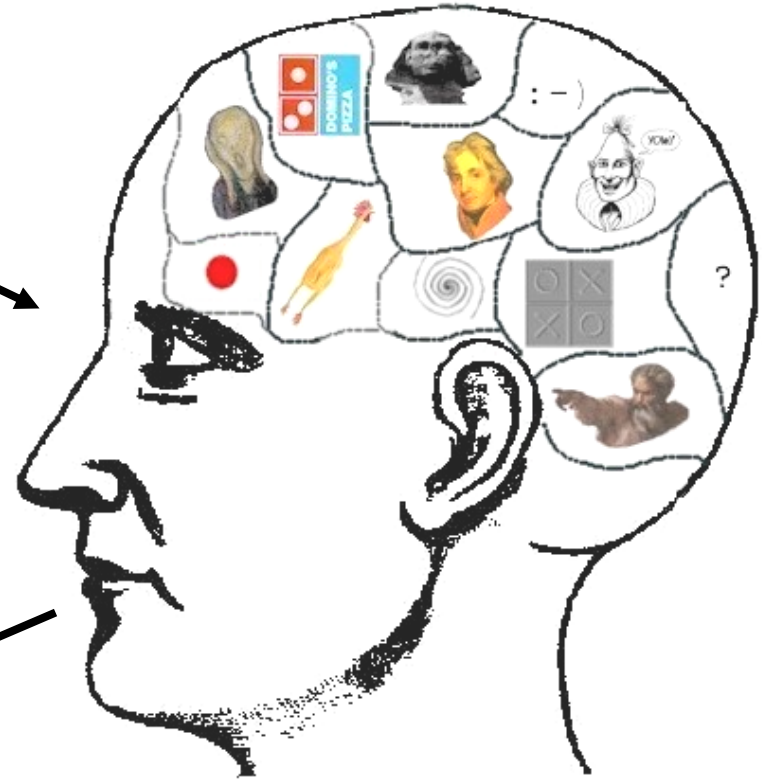
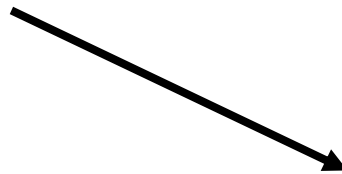
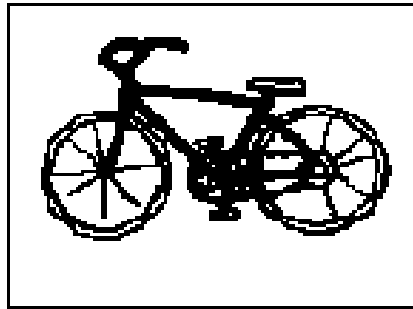
Who studied in California?

*Native English speakers: the psychologist*

*Native Spanish speakers: the daughter*

***Critical result: Native Spanish speakers immersed in an English dominant environment begin to parse sentences in Spanish, their native language, like English, their L2!***

In speaking, there is also brief activity of the unintended translation to the point where the bilingual has the alternative not to be spoken on the tip of the tongue!



“bike”

“fiets”

Dutch-English speaker

*Do language-specific attributes reduce cross-language activity?*

Not in a simple way: There is evidence for activation of the other language even when the two languages are structurally distinct

dance



baile

A Flamenco Dancer

dance



踊り

A Japanese Dancer

What is the consequence of parallel activity and competition across the bilingual's two languages?

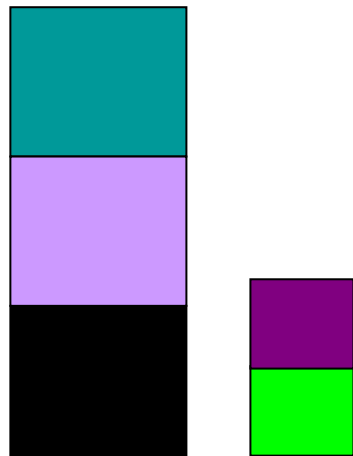
*Bilingualism may confer a specific set of cognitive benefits to executive function and to attention:*

- Ignore irrelevant information
- Understand the arbitrariness of symbolic representation
- Develop metalinguistic and metacognitive knowledge

## An example in the domain of childhood bilingualism

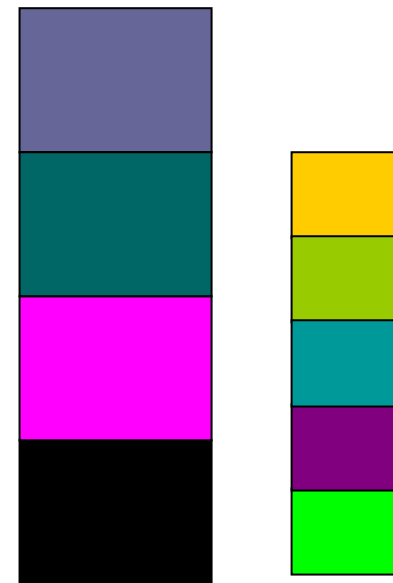
### Bialystok & Codd (1997): Towers Task

- ❖ Each block is one apartment; each apartment has one family
- ❖ Count the blocks in each tower
- ❖ Which apartment tower has more families living in it?
- ❖ *Young bilingual children outperform monolingual children on this task*



Duplo    Lego

Consistent



Duplo    Lego

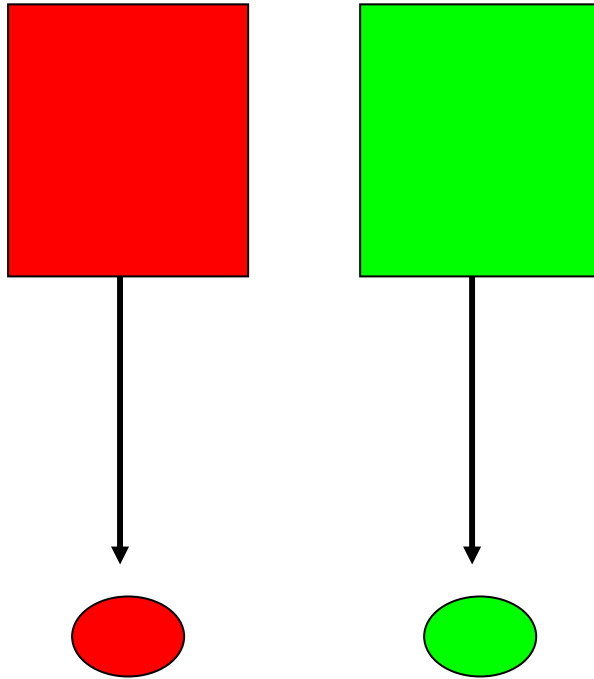
Inconsistent

**Bilingualism may also protect older individuals against the normal declines associated with cognitive aging**

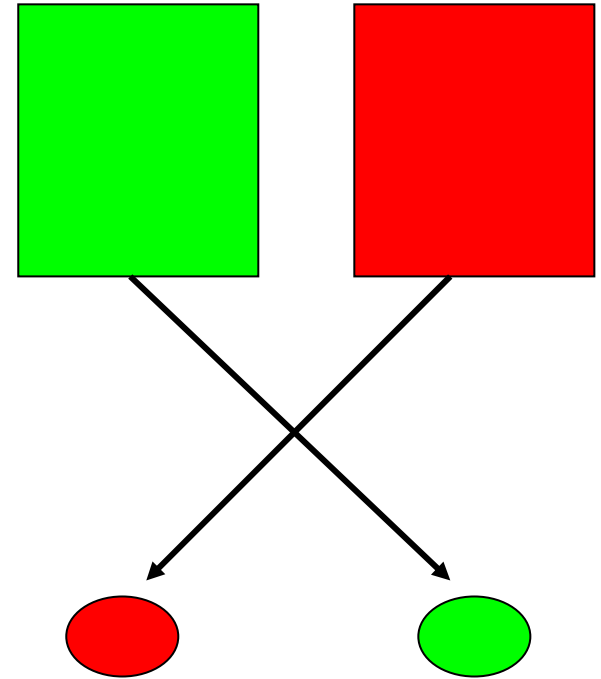
*Recent work of Bialystok and colleagues suggests that elderly bilinguals appear to decline more slowly on attentional tasks that reflect executive control than their monolingual age-matched counterparts*

# The Simon Task

Congruent Trials

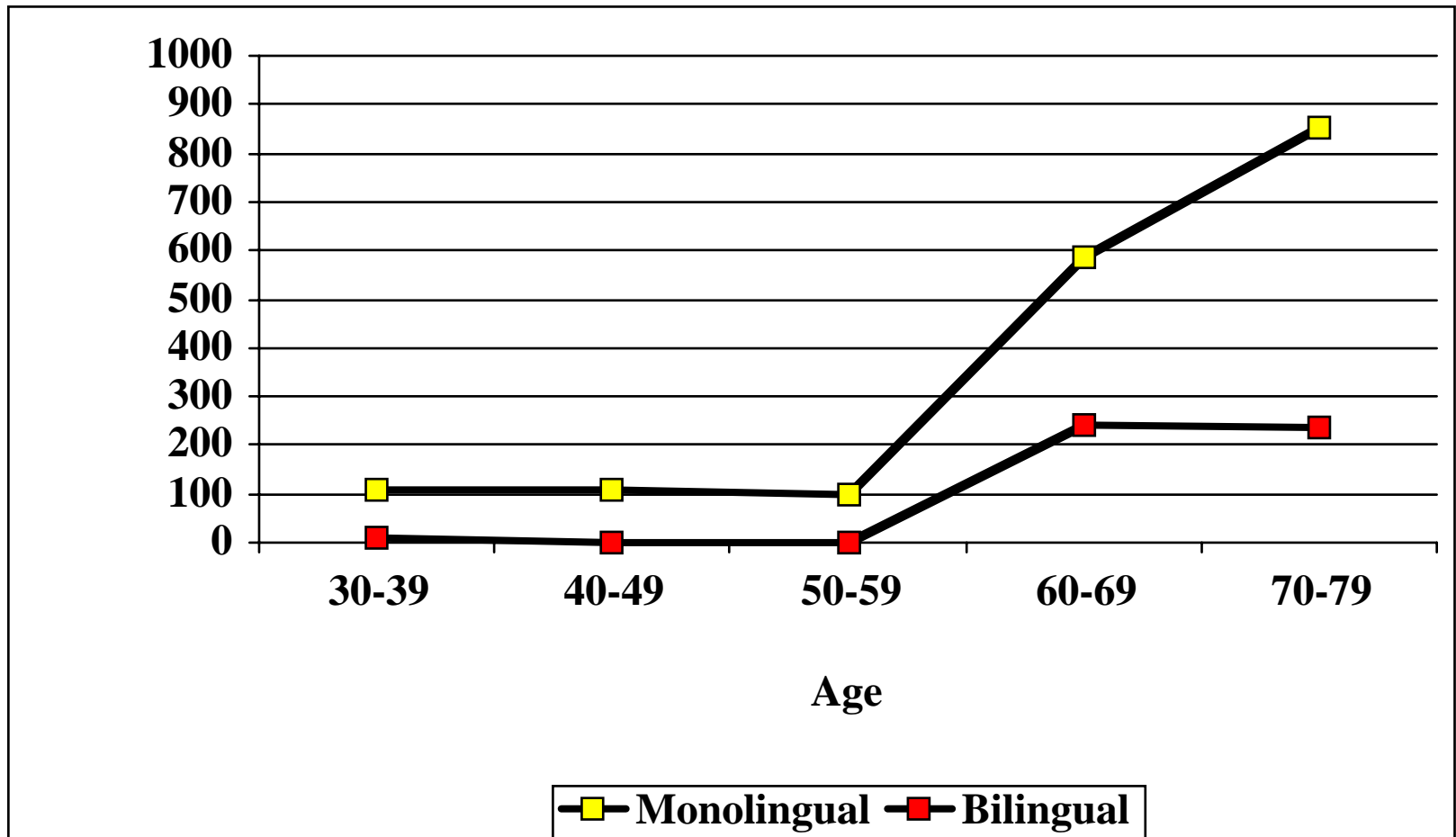


Incongruent Trials



“Press the button on the left for Red and button on the right for Green”

Bialystok et al. (2004):  
Magnitude of the Simon Effect by Decade: How much do  
individuals suffer the consequences of incongruity?



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Characteristics of the languages

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## ❖ *Unresolved issues and obstacles*

***Individual differences in L2 learning: Do cognitive resources and particularly skill in inhibitory control enable successful L2 learning in adults?***

Not all aspects of language processing may be sensitive to the same cognitive factors (e.g., musical ability is related to the acquisition of phonology but not lexical or grammatical information, Slevc & Miyake, 2006; phonological WM may be important in vocabulary acquisition, Papagno & Vallar, 1995)

Recent neuroimaging evidence suggests that L2 sentence comprehension places greater demands on working memory resources than L1 but the evidence on individual differences is mixed

Ironically, for some L2 tasks, reduced WM may be helpful in simulating more childlike learning for adults: “less is more”

Declarative/Procedural model (Ullman, 2001): Late L2 learning may rely more heavily on declarative memory systems

## Characteristics of the learning environment: Lessons from immersion

Two laboratory approaches to examine how inhibition may operate when L2 speakers are immersed in the L2

- ❖ Simulated immersion in the lab
- ❖ Actual immersion in an L2 environment during study abroad

## Simulated immersion in the laboratory

Kroll, Michael, & Sankaranarayanan (1998):

Attempted to simulate one aspect of an immersion environment in a training study in the laboratory by providing unique cues to the L2.

What's helpful about immersion?

↓ Suppression of L1

↓ Unique cues to L2

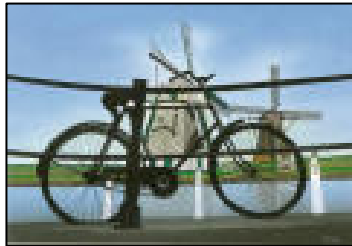
Teach American college students who know no Dutch or German 40 new Dutch words by associating them to their English translations or to pictures of the objects to which they refer.

Immersion in the L2 affects not only the degree of exposure but also cues to the target language

*Can bilinguals exploit language cues to minimize cross-language influences?*



More likely to be a  
a fiets than a bike?



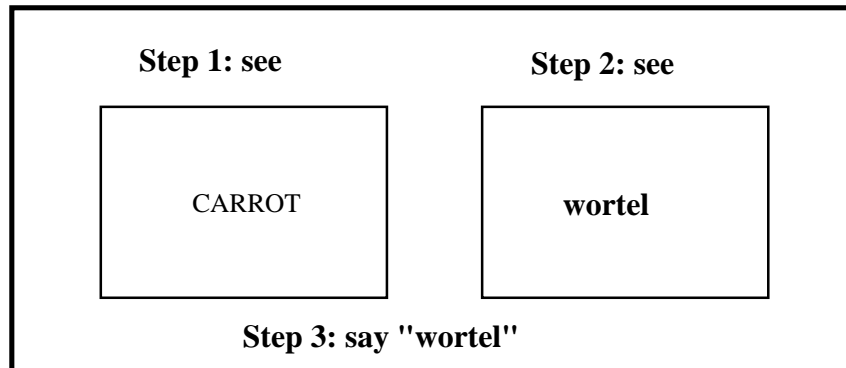
Even more likely to be  
a fiets?



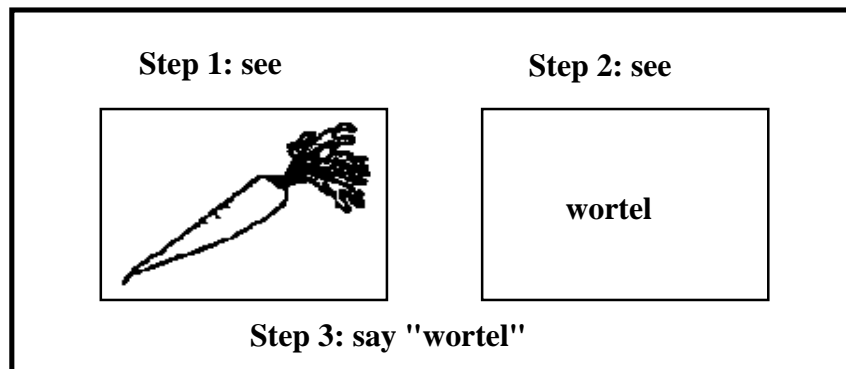
Definitely Dutch!

# Training conditions for monolingual English speakers:

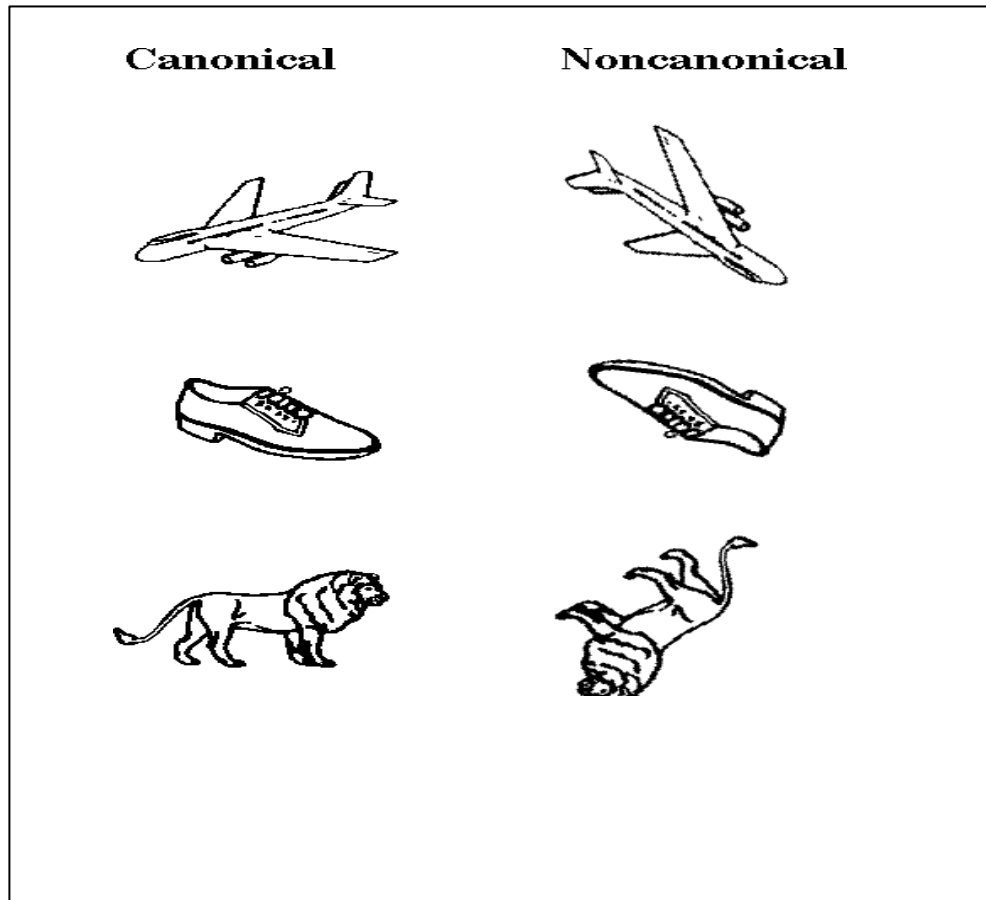
## Study Phase - Word Condition



## Study Phase - Picture Condition



*The twist: The pictures were sometimes shown in a noncanonical orientation*



The noncanonical orientation may:

1. Provide a unique cue to the L2 word

and/or

2. Inhibit the process of retrieving the L1 name

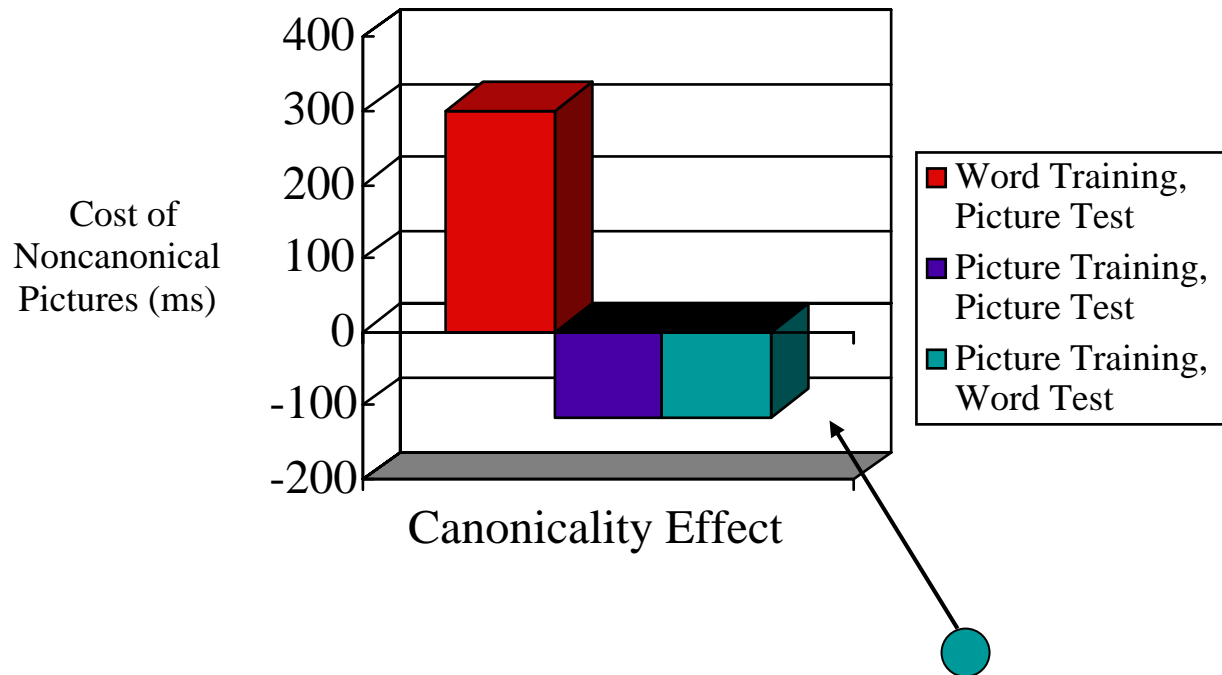


?

At test: Translate words from English to Dutch or name pictures in Dutch. There is typically a cost to naming pictures of noncanonical objects. The question here is whether that cost will be observed for learners who acquired the new L2 concepts by associating them to the noncanonical objects.

# What is the cost of noncanonicity at test?

[noncanonical-normal orientation]



This is the remarkable result: Faster to later translate from English to Dutch if trained on the noncanonical pictures!

## Real L2 immersion during study abroad: Linck & Kroll (2005)

Native English speakers at intermediate levels of Spanish spending a semester abroad in Salamanca compared to a control group of classroom learners with comparable L2 study

Performed a translation recognition task in which they had to decide whether a word in English was the correct translation of a word in Spanish.

**hombre**  
**man**

?

“yes”

Using materials from Sunderman (2002), the critical distractors in the experiment consisted of word pairs that were *not* the correct translation:

Critical items:

**mano-man:** lexical form related

**hambre-man:** translation related

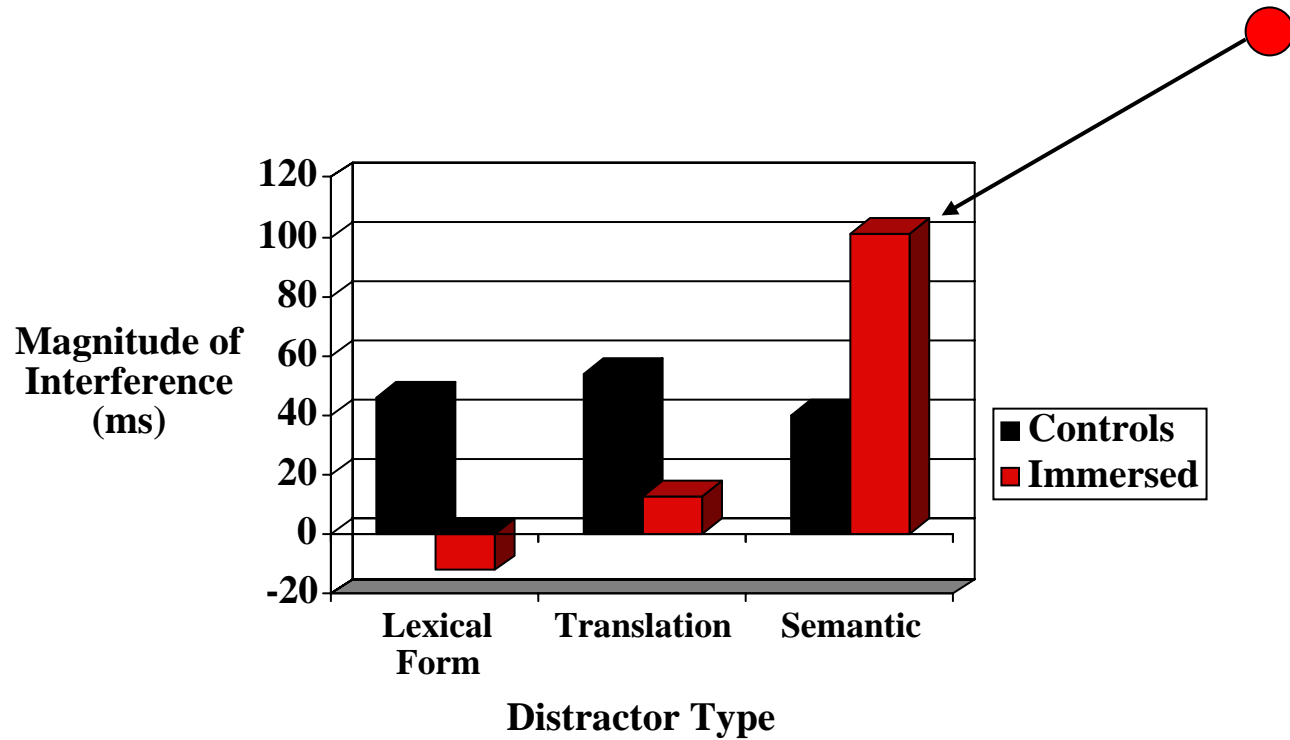
**mujer-man:** semantically related

Control items:

**casa-man:** unrelated

[Interference = Critical RT - Control RT]

# Immersed learners show only semantic interference



*In the immersion environment the L1 appears to be suppressed!*

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## *Promising directions*

Technology: Use of the chat room environment to develop L2 oral proficiency (e.g., Payne & Whitney, 2002)

Use neuroimaging methods to more sensitively assess learning outcomes (e.g., McLaughlin et al., 2004)

Exploit existing bilingualism: Bilinguals may be better able to acquire an L3 than monolinguals will be to acquire an L2 in part because they may have better inhibitory control skills

Exploit other skill learning that sharpens executive control functions, e.g., video game playing

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*Unresolved issues and obstacles:*

Cross-disciplinary cooperation: Different historical roots

Look to other domains with shared goals: The acquisition of English academic skills by non-native English speaking children

The role of emotion and acculturation in language acquisition and use

When languages  
compete ...



Thank you!