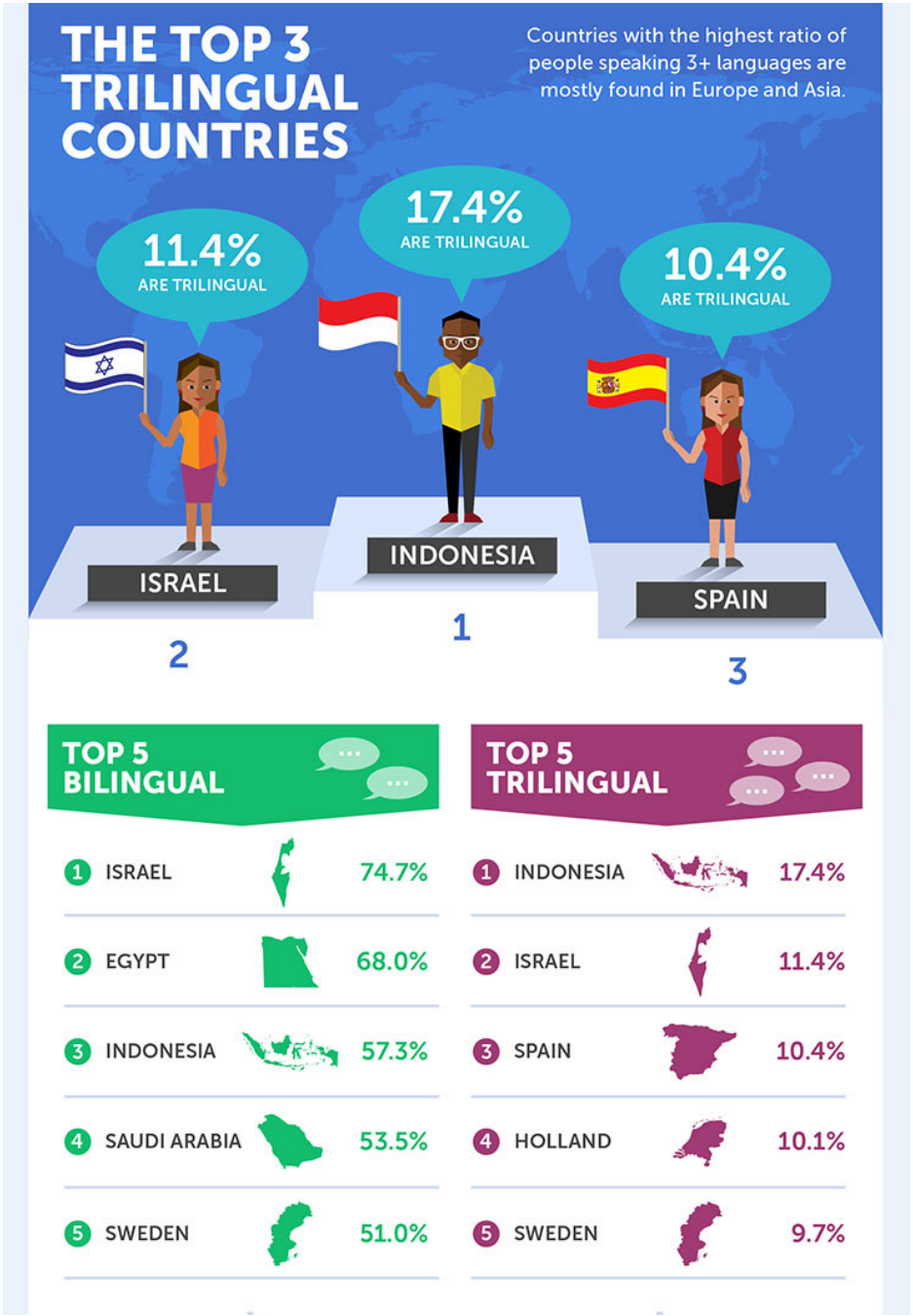
Lecture 9: Bilingualism

COGS 153

Bilingualism Worldwide

- “It is generally believed that more than half of the world's population is bilingual”
  - – Bialystok et al. 2012



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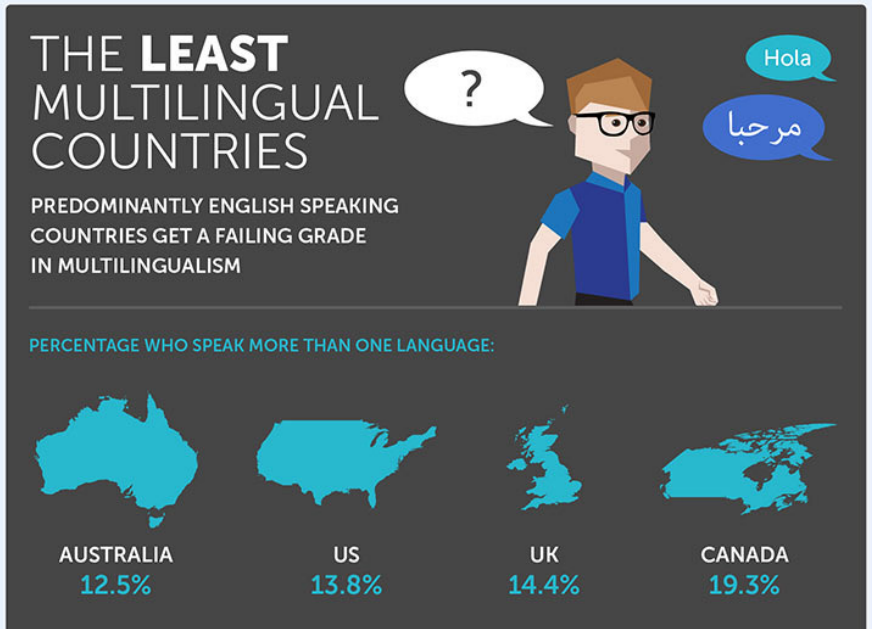

Bilingualism Worldwide

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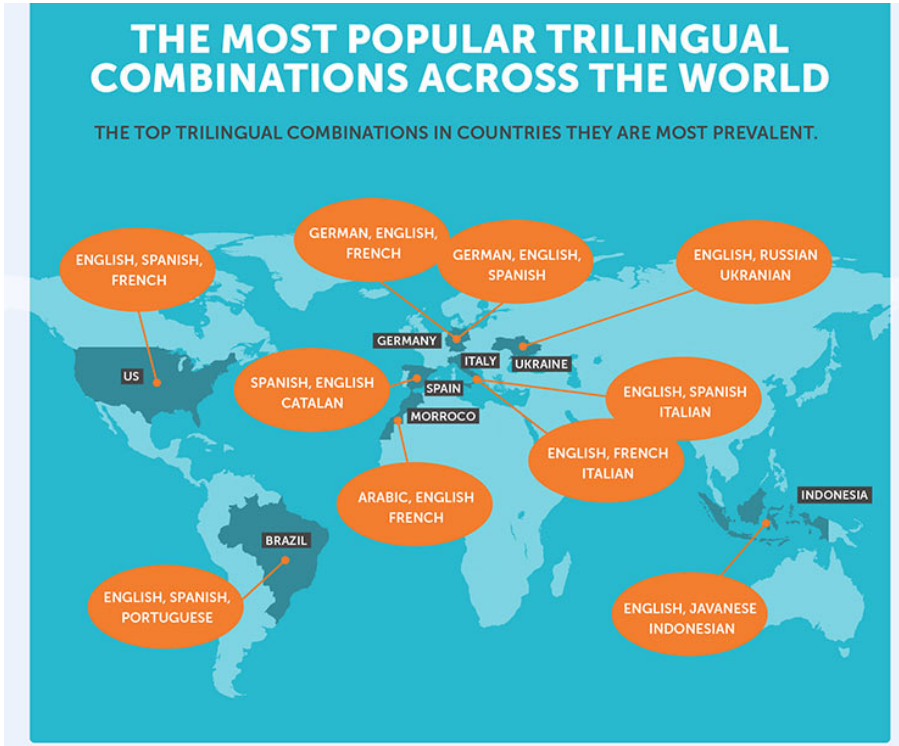
- Note that this is NOT the best source for these infographics

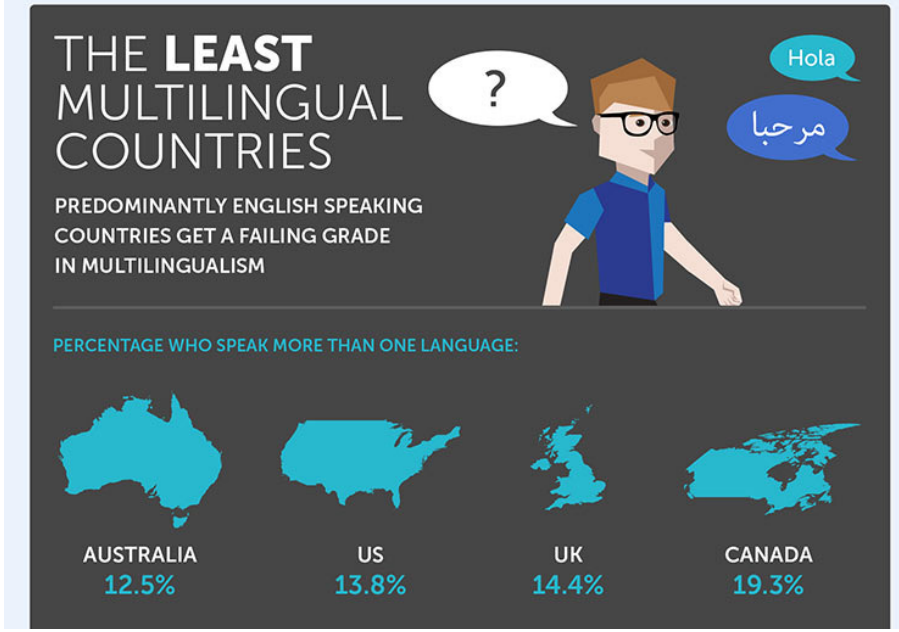
SwiftKey.

Type in all of your languages with the keyboard that learns from you.

www.swiftkey.com

This graphic is based upon SwiftKey data, and therefore is limited to information from smartphone owners with the SwiftKey Keyboard app. Data from countries without a statistically relevant number of users are also omitted. This data may not be representative of how people use languages on a global scale.





Challenges in defining bilingualism

- Bilinguals are individuals who “use two or more languages in everyday activities” (Grosjean, 1989)
  - **L1**: first language
  - **L2**: second language
- Bilingualism, “rather than being an absolute condition is a relative one. Bilingual individuals can be both *slightly* bilingual or *very* bilingual.” (Valdes, 1988)

Challenges in defining bilingualism

There's different types of bilingualism!

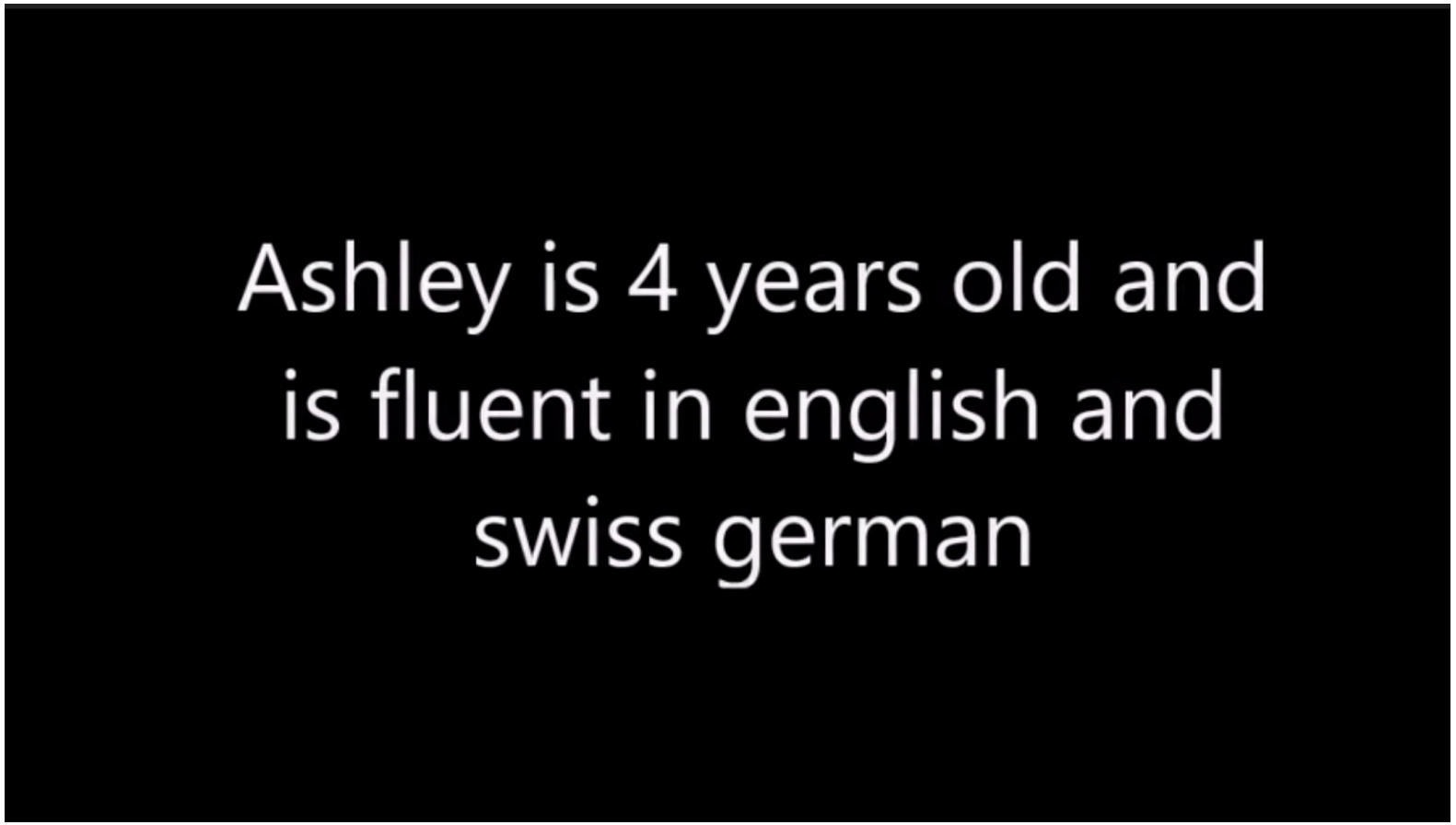
- Simultaneous vs. Sequential
  - Did you learn them at the same time, or one after the other?
- Early vs. Late
  - When did you acquire the language?
  - Late is considered after 7 years of age
- Language Acquisition vs. Language Learning
  - This is another way of thinking about age of acquisition
  - Acquisition = early
  - Learning = later, more explicit learning
- Balanced vs. Dominant/Non-dominant vs. Passive
  - Balanced = equally proficient in both languages
  - Dominant language = the language you are more proficient in
  - Non-dominant = the language you are less proficient in
  - Passive = being able to understand a second language without being able to speak it

Challenges in defining bilingualism

There's also many individual differences:

- Some people are exposed to two languages at birth (early bilinguals)
  - They may live in an environment where both languages are used equally, or one language is used more of the time
- Some people learn L2 after early childhood
  - Lots of different environments and contexts: immersive, self-study, classroom settings
- Differences in proficiency
- Differences in relative dominance of the languages

Bilingualism in children



https://youtu.be/D-5-1yFF4Xk

Factors relevant to bilingual language development

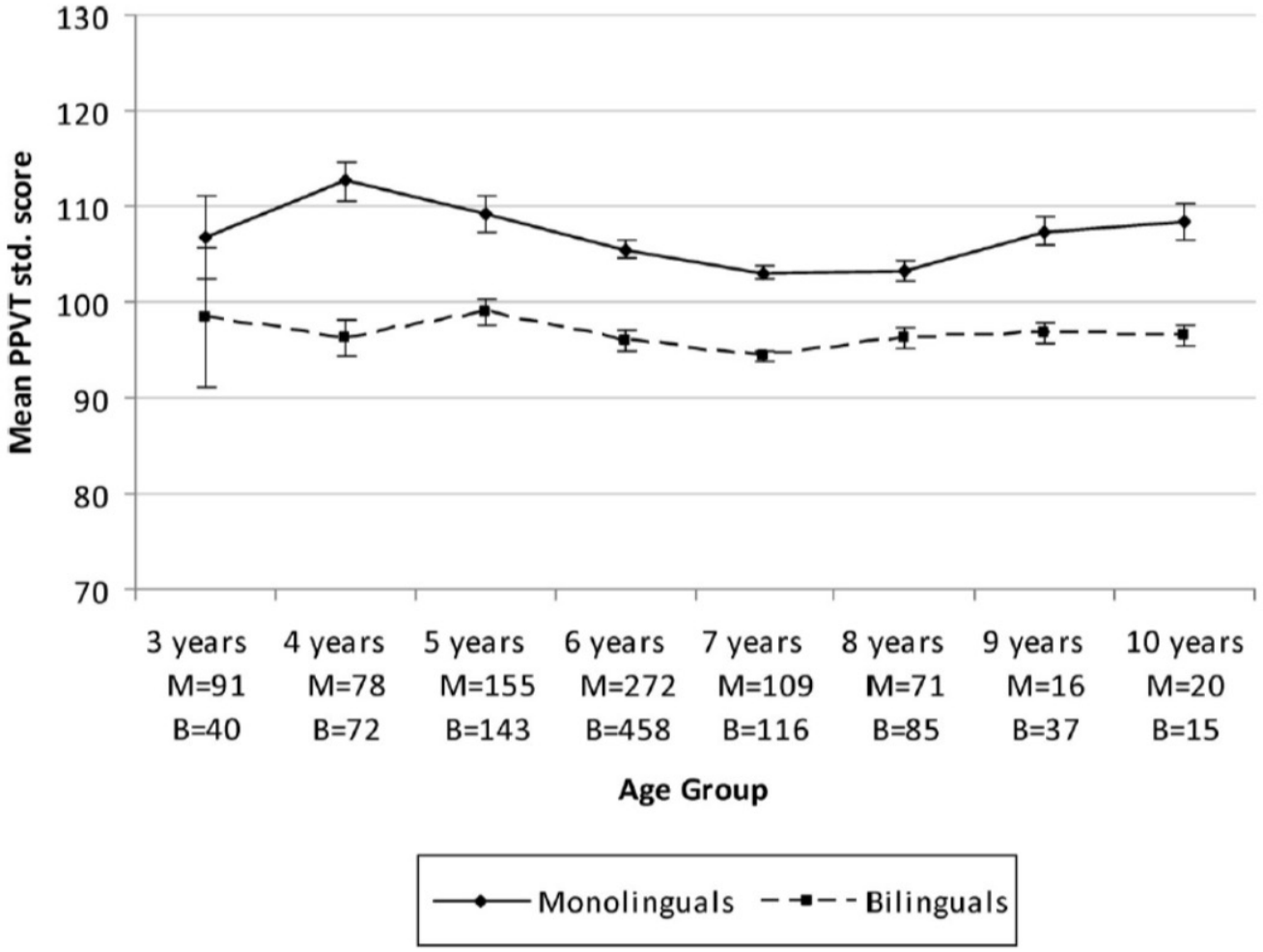
External Factors

- Context for each language
  - Family use
  - # of communication partners
- Social attitudes/policies
  - Language used in school system
- Majority/Minority language

Internal Factors

- Age of acquisition
- Method of acquisition
- Personal attitude towards L1/L2
  - Motivation
- Language aptitude

The *Limited Capacity Hypothesis*: A pessimistic view of bilingualism



Studies often report that bilingual participants possess a smaller vocabulary than monolinguals...

Do bilingual children really have *lower* vocabularies compared to monolingual English children?

Bialystok et al. (2010)

- Do bilingual children really have *lower* vocabularies compared to monolingual English children?
  - No, bilingual children have vocabularies that are split across two languages!
  - The difference comes into play with words relevant to a *home* context, rather than a school context.

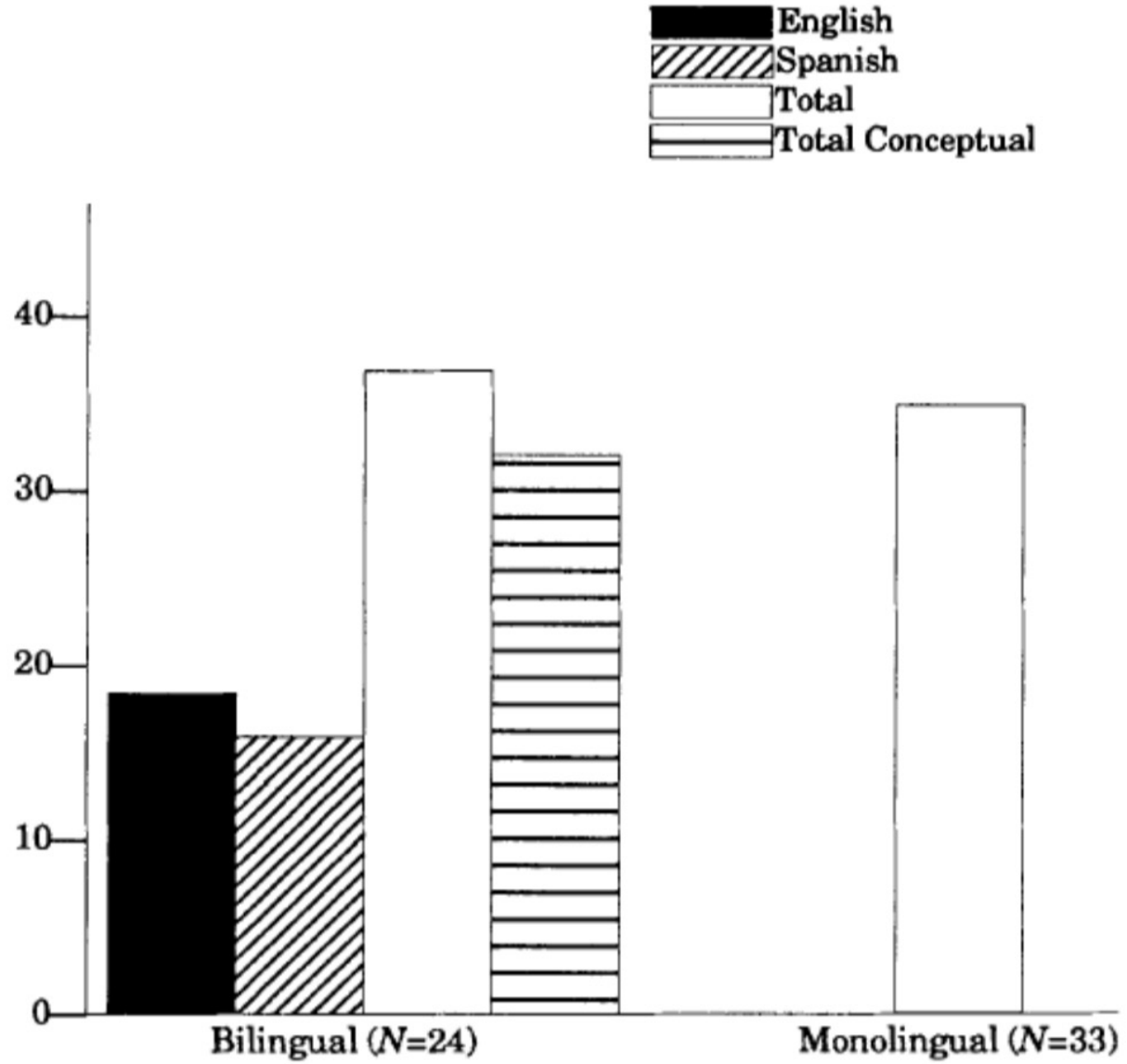


Figure 1. Bilingual and monolingual percentiles averaged across ages (Production)

Bialystok et al. (2010)

Three key discoveries in bilingualism research

1. **Parallel activation**: Both languages are always active when engaging with either language (Kroll & Dussias, 2013)
    - The language that is not currently being used influences the one that is
    - Both languages compete for resources, so bilinguals develop a way to regulate the competition
2. L1 influences L2, but **L2 also influences L1**
    - The two languages are not represented separately (not like two monolinguals in one brain)
    - The neural support for both languages is largely shared
3. Bilingualism influences domain general cognition: **bilingual advantage** (Bialystok et al, 2007)
    - Ability to ignore irrelevant information, task switching, resolve conflict between alternatives
    - Most beneficial when cognitively vulnerable, such as in old age
    - *The bilingual advantage is a topic of debate*

Kroll et al., 2015

1. Parallel Activation

Parallel Activation

- **Parallel activation**: L1 is active when using L2, and L2 is active when using L1
  - Also called 'joint activation'
  - Current research demonstrates that both of a bilingual's languages are active regardless of the intention or requirement to use one language alone

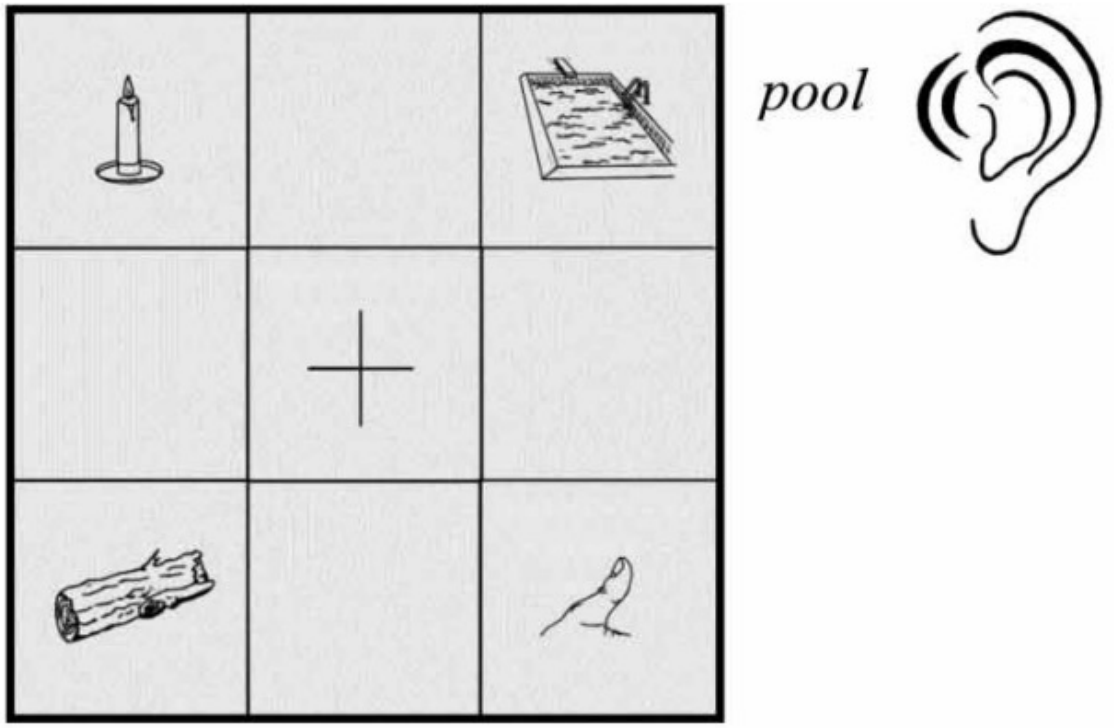
- Parallel activation is present in bilinguals, regardless of the languages
  - Occurs when the languages use different written scripts, e.g., Chinese and English (Thierry & Wu, 2007)
  - Occurs when the languages use different modalities, e.g., ASL and English (Morford et al., 2011)

Cross-language interactions: cognates & homographs

- Common method for testing parallel activation
- These types of cross-linguistic studies compare the processing of language-ambiguous homographs / cognates to words that unambiguously belong to only one of the languages
- **Cognates**
  - Similar form and meaning (e.g., *piano* means the same thing in English and Spanish)
  - Cognates **facilitate** recognition and production (Costa et al., 2000)
  - Cognate facilitation studies have shown that the non-target language is **active** in multiple tasks, even when that task only requires *one language to be used*
- **Homographs**
  - Similar orthographic form but different meaning
    - e.g., *pie* in English vs *pie* in Spanish
  - Homographs **interfere** with processing

Parallel activation impacts language processing

- **Method**: eye tracking + visual world paradigm
- **Participants**
  - High proficiency English-Spanish adult bilinguals
  - English monolinguals
- **Procedure**
  - Look at the picture that matches auditory stimulus (in English)

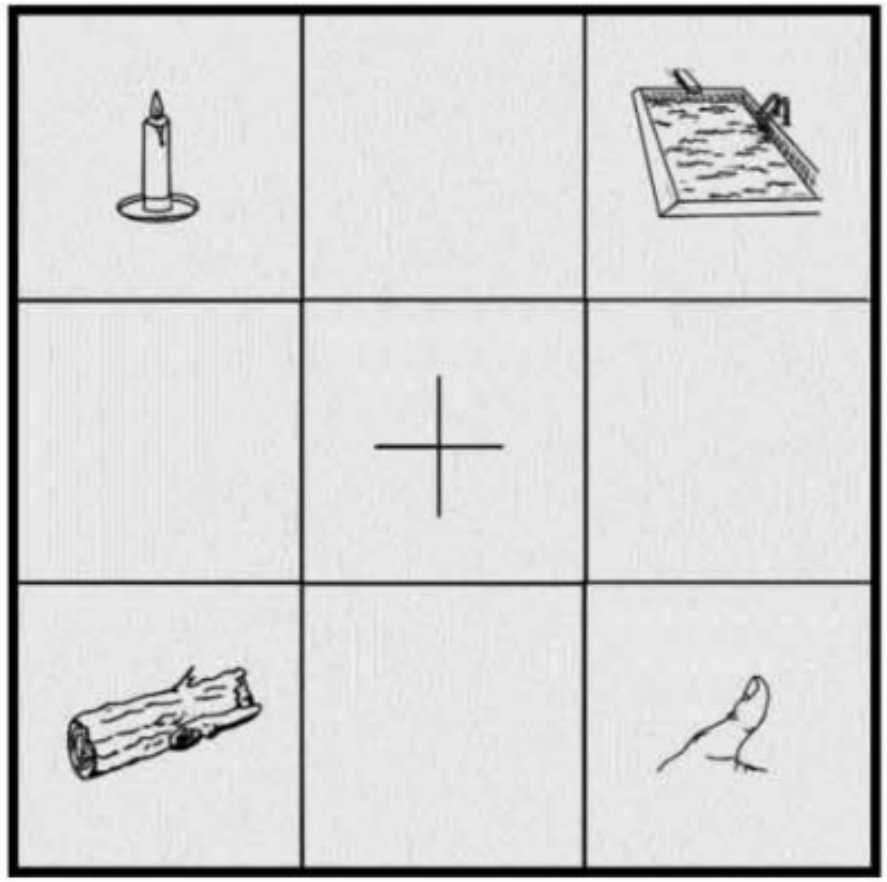


Blumenfeld & Marian, 2013

Parallel activation impacts language processing

- **Key manipulation**
  - One distractor item was *phonologically related* in the non-target language (Spanish)
    → *cross-language competitor*

- English Target: POOL
- Cross-language competitor: PULGAR



POOL

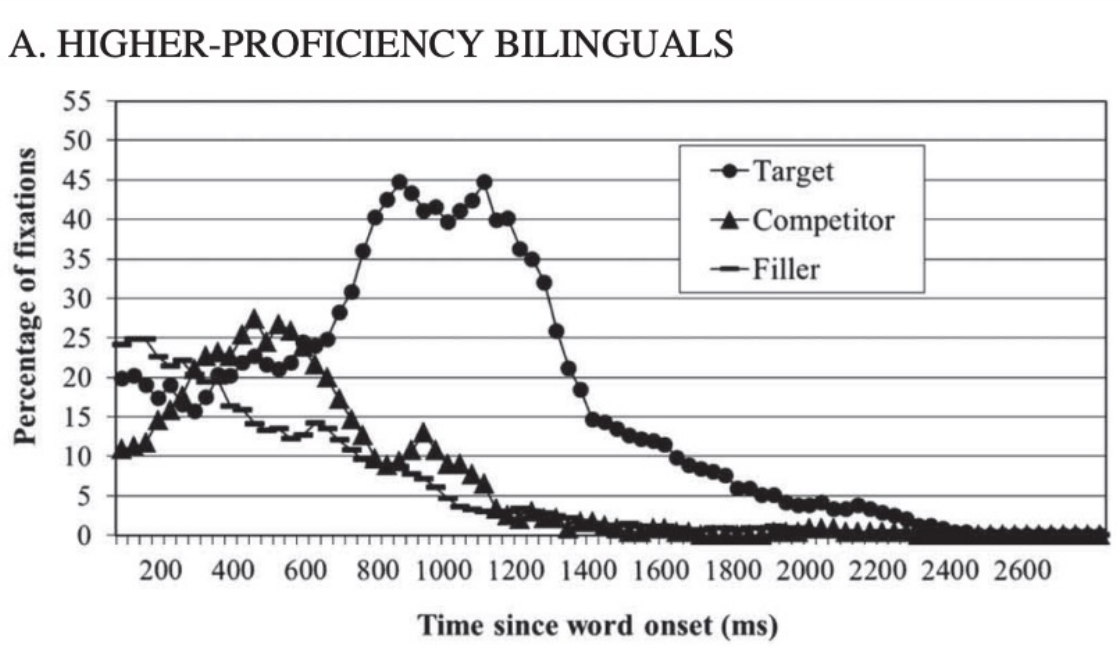
PULGAR

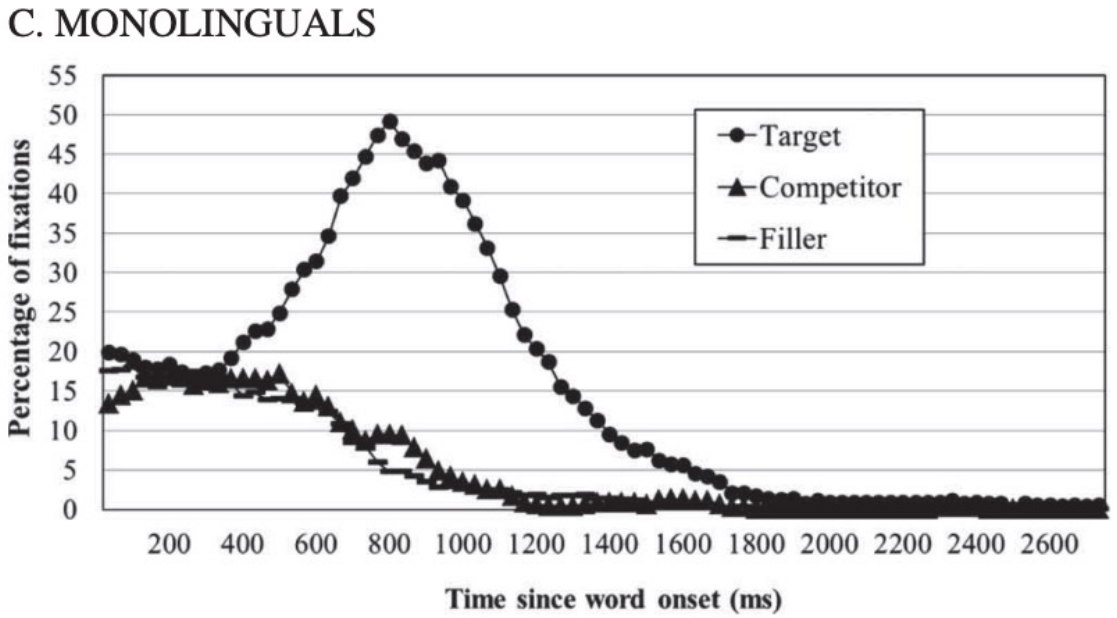
Blumenfeld & Marian, 2013

Results

- Bilinguals look to the competitor early on!
  - Bilinguals are sensitive to the cross-language competitor
  - (even though the task is in English)
- Suggests that there is *parallel language activation*

→ cross-language interactions





Blumenfeld & Marian, 2013

2. L2 can influence L1

L2 Learning and its effects on L1

- Age of acquisition seems to affect syntax more than semantics (Hahne & Friederici, 2001) or pragmatics (Felix-Brasdefer & Koike, 2012)
  - A *critical period* for syntax: "Linguistic system stabilizes with L1, and impairs learning of L2"
    - *If L2 can influence L1 syntactic knowledge in adults*, it argues against this stability and suggests that the linguistic system is more permeable and dynamic than thought
- Language immersion and prolonged naturalistic exposure can have a profound influence on L2 and L1
  - Reduces access to L1, can impair L1 naming (Malt & Sloman, 2003) and phonology (Flege, 1987)
  - And what about syntax?

L2 immersion and syntax

- **Question**: Do Native English and Spanish speakers differ in how they interpret temporarily ambiguous relative clauses? Yes!

"An armed robber shot **the sister** of **the actor** who was on the balcony."

"Un ladron armado le disparó a **la hermana del actor** que estaba en el balcón."

- **English**: preference to interpret it as ***the actor was on the balcony***
- **Spanish**: preference to interpret it as ***the sister was on the balcony***

(Dussias & Sagarra, 2007)

L2 immersion and syntax

- **Question**:
  - Does L2 immersion affect how bilinguals interpret temporarily ambiguous relative clauses?
  - Will Spanish-English bilinguals perform differently compared to monolingual Spanish speakers, as a function of exposure to English?
- **Procedure**: Ask participants… So, who was on the balcony?
  - "An armed robber shot the sister of the actor who was on the balcony."
  - "Un ladron armado le disparó a la hermana del actor que estaba en el balcón."
- **Results**:
  - Monolingual Spanish speakers asked in Spanish: **the sister**
  - Monolingual English asked in English: **the actor**
  - Spanish-English bilinguals *asked in Spanish*
    - Limited exposure to English: **the sister**
    - **Extensive exposure to English: the actor**
- **Finding:** Spanish-English bilinguals with extensive exposure to English perform more like English speakers! Using online measures of ambiguity resolution, the immersion environment influenced the interpretations of Spanish-English bilinguals, even when everything was presented in Spanish.

Dussias & Sagarra (2007)

L2 Learning and its effects on L1

- A *critical period* for syntax: "Linguistic system stabilizes with L1, and impairs learning of L2"
  - **If L2 can influence L1 syntactic knowledge in adults, it argues against this stability and suggests that the linguistic system is more permeable and dynamic than thought**
    - **found some evidence of this!**

Critical period for L2 learning?

- Adult L2 learners vary in their mastery, particularly for non-native sounds and grammatical structures
  - L2 learning involves more than memorization of sounds, words etc.
- What causes L2 learning challenges in adults?
  - That 'critical period': the available linguistic structures become unavailable after puberty (Eubank, 1993)
    - Easier to learn L2 that shares more features of L1 (Zobl, 1982)
- L2 can be learned fully (Schwarz & White, 1994)
  - L2 errors modulated by many variables
    - Proficiency, immersion of L2 experience, speed of lexical access, availability of cognitive and computational resources

3. The bilingual advantage

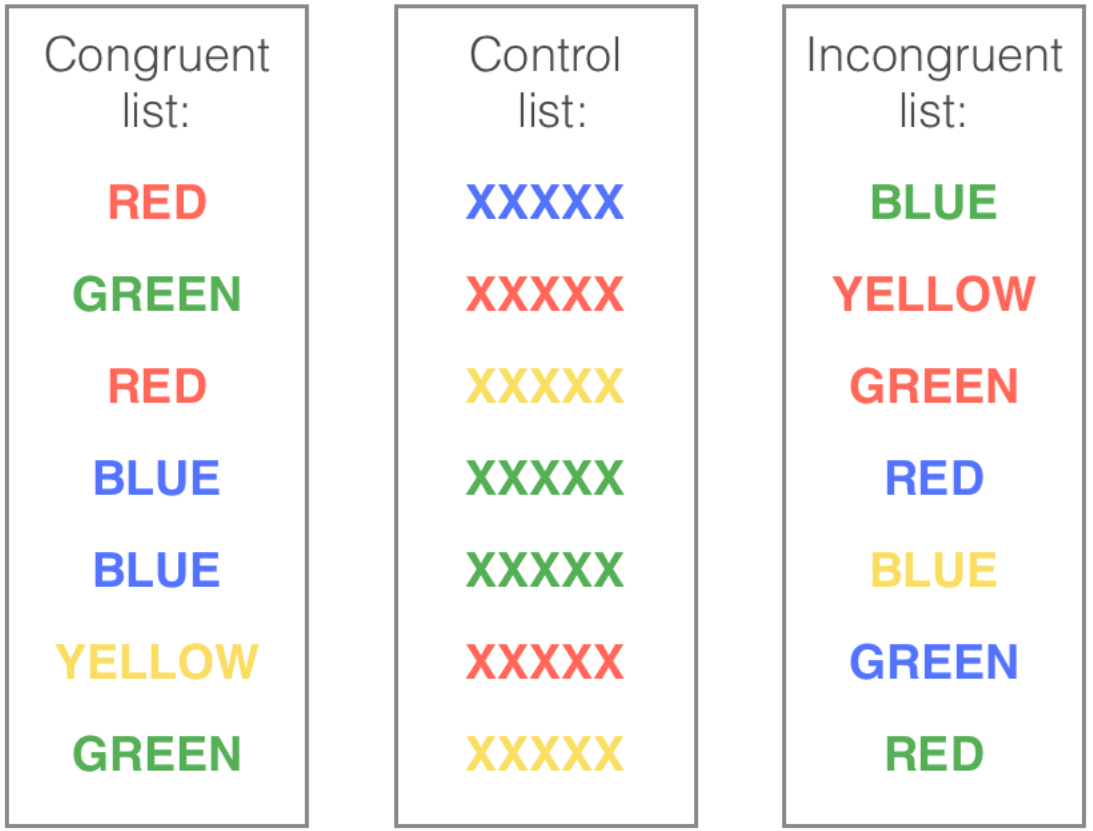
BLUE

RED

YELLOW

Conflict Monitoring: Stroop Task

- **Method**: Stroop Task
- **Procedure**:
  - "Name the font color of the word"
  - Try to avoid reading the word!
  - **Congruent** = word meaning matches font color
  - **Incongruent** = word meaning does not match font color
- The Conflict: participants must focus on color naming & ignore the automatic/irrelevant word reading



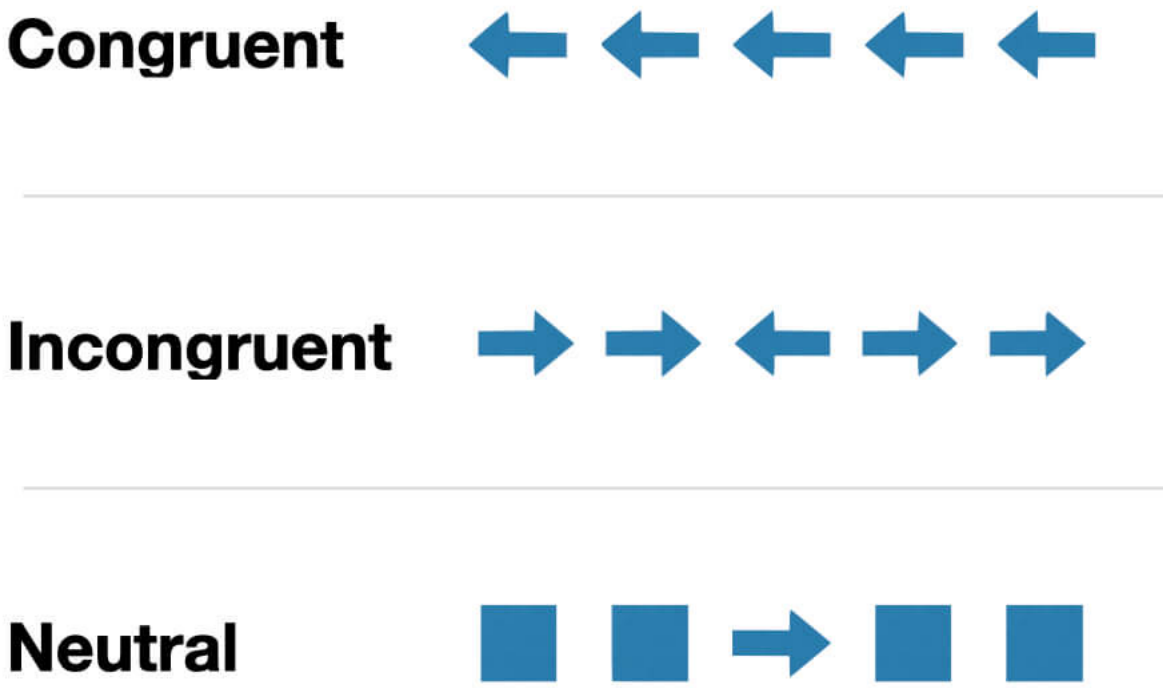
Conflict Monitoring: Stroop Task

- **Results**:
  - People tend to be slower to respond when the meaning of the word *conflicts* with the font color…
  - But bilinguals appear to be a little faster at this
  - Suggests that bilinguals are better at conflict monitoring and resolution
- Implications:
  - Maybe being bilingual provides more experience with suppressing irrelevant information, and lead to better cognitive control / executive function skills

Congruent list:	Control list:	Incongruent list:
RED	XXXXX	BLUE
GREEN	XXXXX	YELLOW
RED	XXXXX	GREEN
BLUE	XXXXX	RED
BLUE	XXXXX	BLUE
YELLOW	XXXXX	GREEN
GREEN	XXXXX	RED

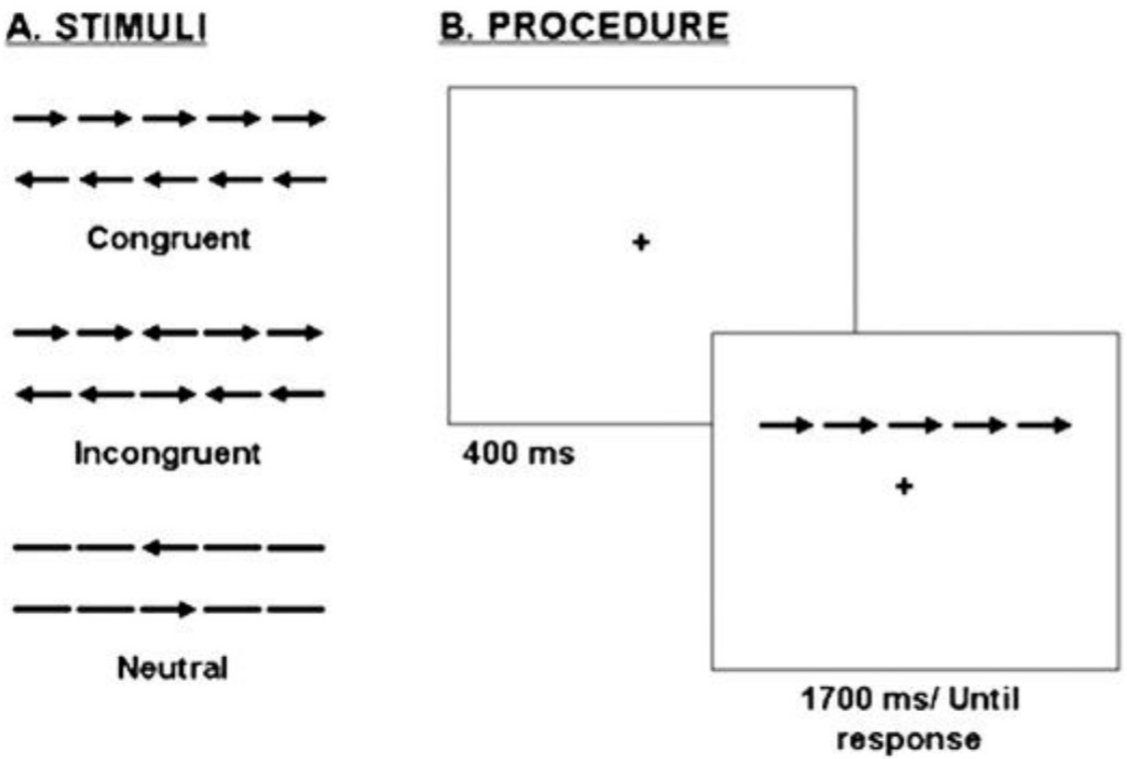
Conflict Monitoring: Flanker Task

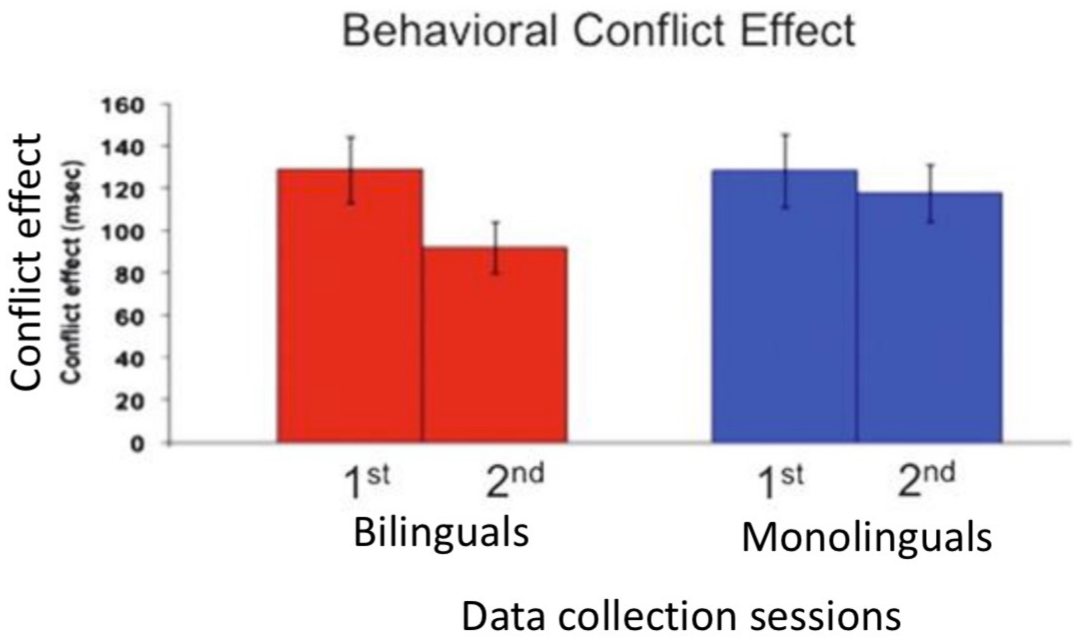
- **Method**: Flanker task
- **Procedure**:
  - Press the arrow key that corresponds to the direction of the middle arrow
  - **Congruent** = flanker arrows match target arrow
  - **Incongruent** = flanker arrows do not match target arrow
- **Results**:
  - People tend to be slower to respond when the direction of flanker arrows conflicts with direction of the target arrow, but bilinguals appear to be a little faster at this



Bilingualism and conflict monitoring

- Flanker task in monolinguals vs highly proficient early bilingual adults





Abutalebi et al, 2012

Code Switching

- **Code switching**: switching back and forth between languages when speaking
- Normal feature of bilingualism
  - May be a factor in better performance in cognitive control based tasks (Green & Abutalebi, 2013)
- When using L2, there is still pervasive L1 activation
  - If an L2 word (or syntactic structure) shares overlap with L1, the L1 may become selected and spoken
    - (but the other way around is less common)
- Can also be influenced by social context (Bailey, 1999)

- *Note*: Code switching is not just restricted to switching between different languages, but also dialects and levels of formality

Consequences of bilingualism?

- Bilinguals need to actively selectively attend to the language they are using throughout their lives, this can have cognitive consequences

- "*The bilingual advantage*"
  - Elderly bilinguals are better at task switching, ignoring irrelevant information, and resolving conflicting alternatives (Bialystok et al, 2009)
  - Bilinguals are diagnosed with Alzheimer's disease 4-5 years later than monolinguals (Bialystok, 2007)
  - In Alzheimer's patients matched on symptoms, bilinguals had more diseased brains than monolinguals (Schweizer et al, 2012)
    - Bilingualism doesn't prevent Alzheimer's disease, but it helps enable functional cognition for a longer period of time
  - Variability: not all bilinguals will experience the same benefits (Kroll & Bialystok, 2013)