

The wild side of language sciences : Some examples of research and applications

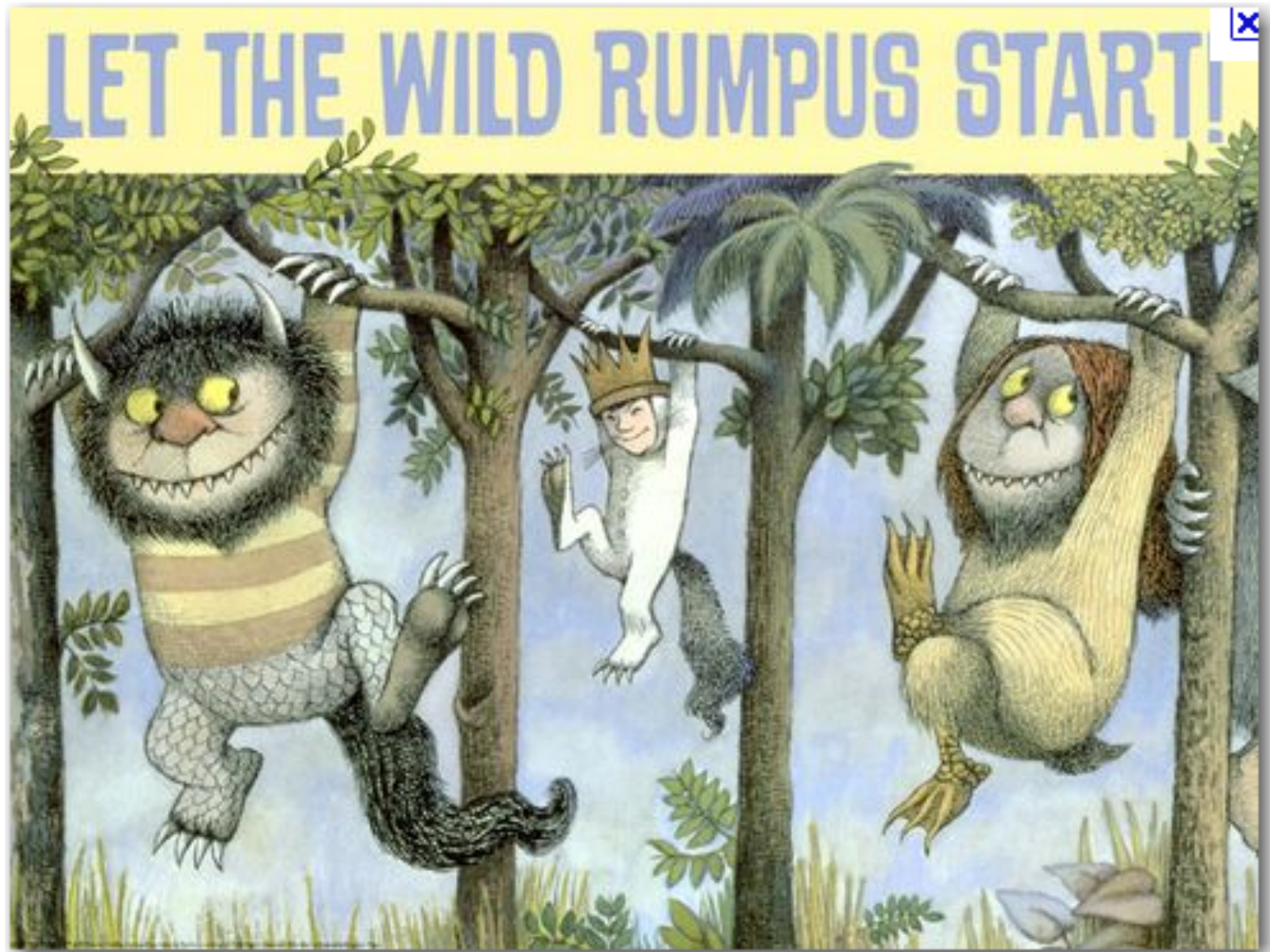
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Postdocs in the Wilderness?

Wege zur wissenschaftlichen Karriere in den Geistes-, Kultur- und Sozialwissenschaften

December 8-10, 2011



Outline of presentation

1. Introduction
 - a. Personal
 - b. Scientific
2. Scientific landscape
3. Research methods in psycholinguistics
4. Some examples of research
5. Some applications of research
6. Future opportunities in language sciences

1a. Introduction : Personal

Who am I?



lingual

Full professor at University of Geneva
In Psychology department at
Faculty of Psychology and Education Sciences

Areas of expertise : Psycholinguistics & Cognitive psychology
Logopédie

1a. Introduction : Personal

Where did I come from?

- BS & MA - Chemistry & romance linguistics (U. of W., Seattle, USA)
- Ph.D - Experimental psychology, E.H.E.S.S, Paris
- Postdoc - Centre for Cognitive Science, MIT, USA
- Researcher - Max-Planck Institut fur Psycholinguistik, NL
- Professor – Psycholinguistics - Université de Genève
- Lecturer/Dean – Psychology – UniDistance, Sierre

1a. Introduction : Personal

What do I do?

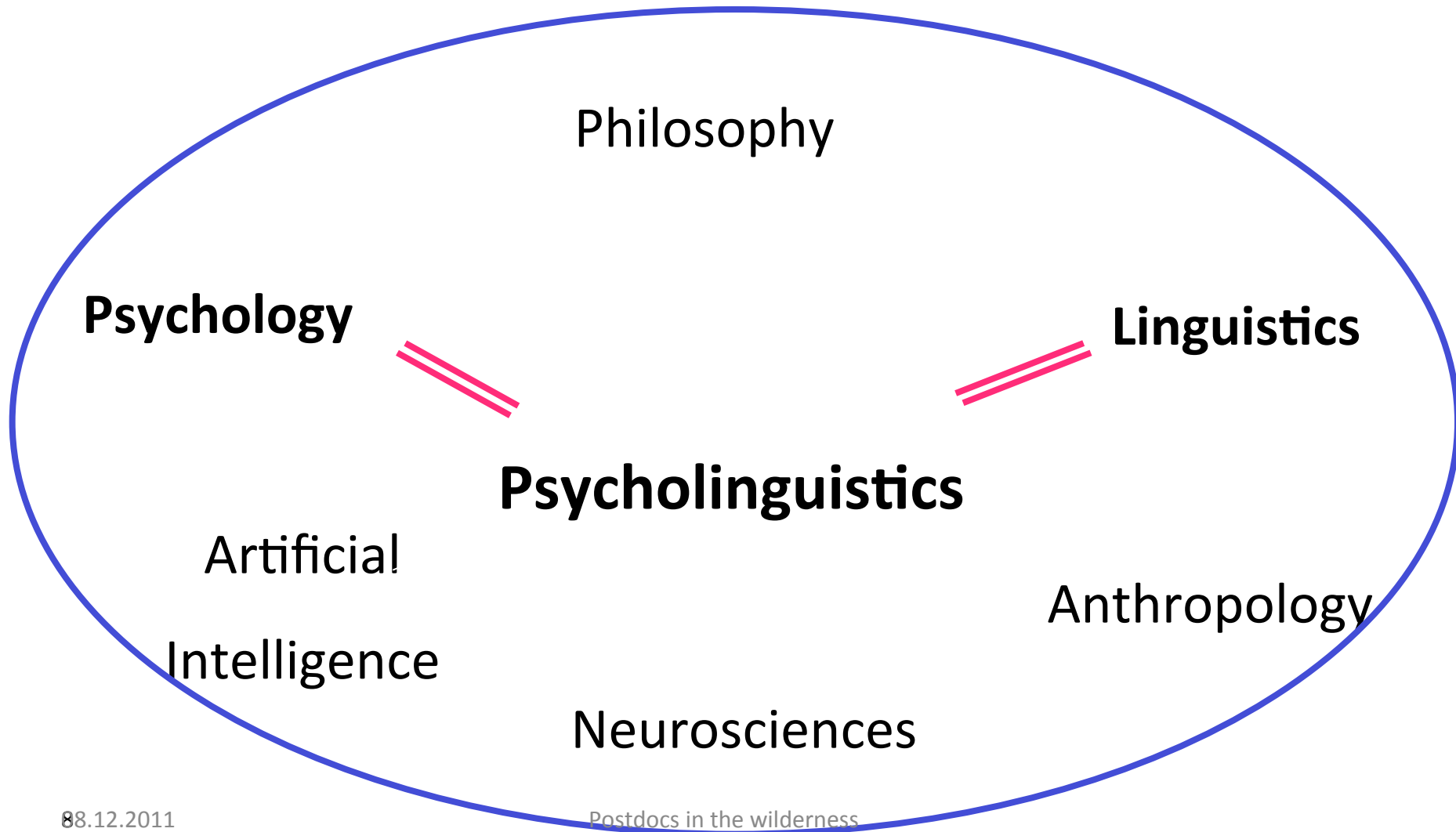
- Teaching (30%)
 - 4 to 6 hours per week at Bachelor and Masters level
 - Other presentation (doctoral schools, continuing education)
- Administration (25 %)
 - Direction of programs, nomination commissions, curricula design
 - meetings, meetings and more meetings
- Research & Supervision (40%)
 - 6-10 Master students
 - 4-6 PhD students
 - 1-2 Postdocs
 - SNF grants, European grants. Writing proposals, reports
- Service to the community (15%)
 - Promotion of university, psychology, logopedie
 - Contact with professionals (logopedistes, professional psychologists)
 - Organisation of scientific conferences

1b. Introduction : Scientific Central questions in psycholinguistics

1. How can the linguistic knowledge of a native speaker be characterized?
2. How is linguistic knowledge acquired (and lost) by children and adults?
3. How does an individual produce and understand his language?
4. How is this knowledge represented and used in the brain?

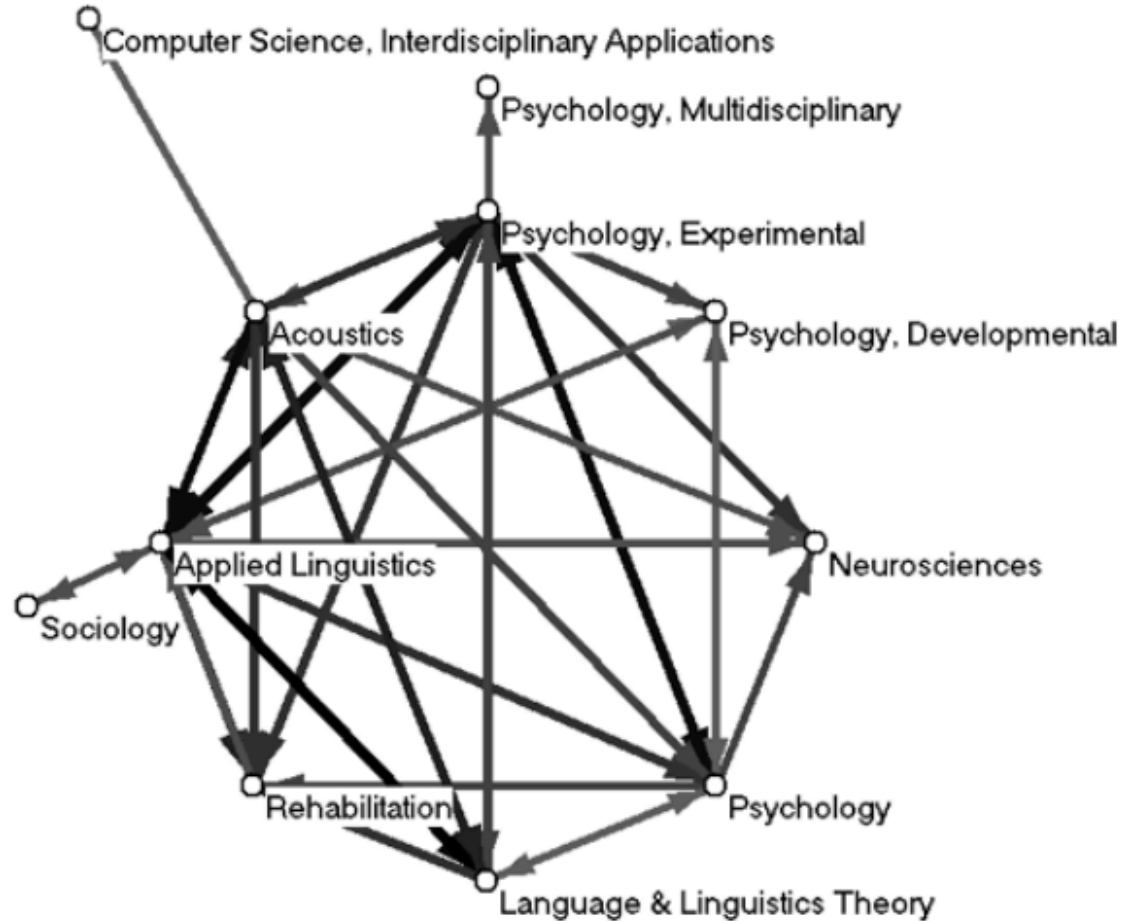
2. Scientific landscape

Interdisciplinary approach



2. Scientific landscape

Citation networks

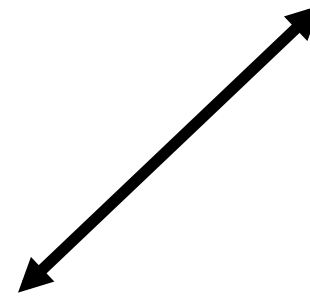
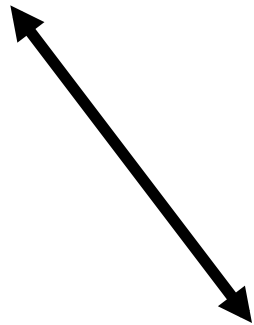
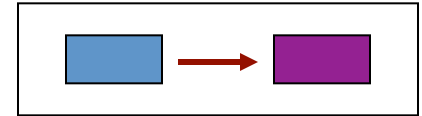


2. Scientific landscape : Relation between the disciplines

Linguistics



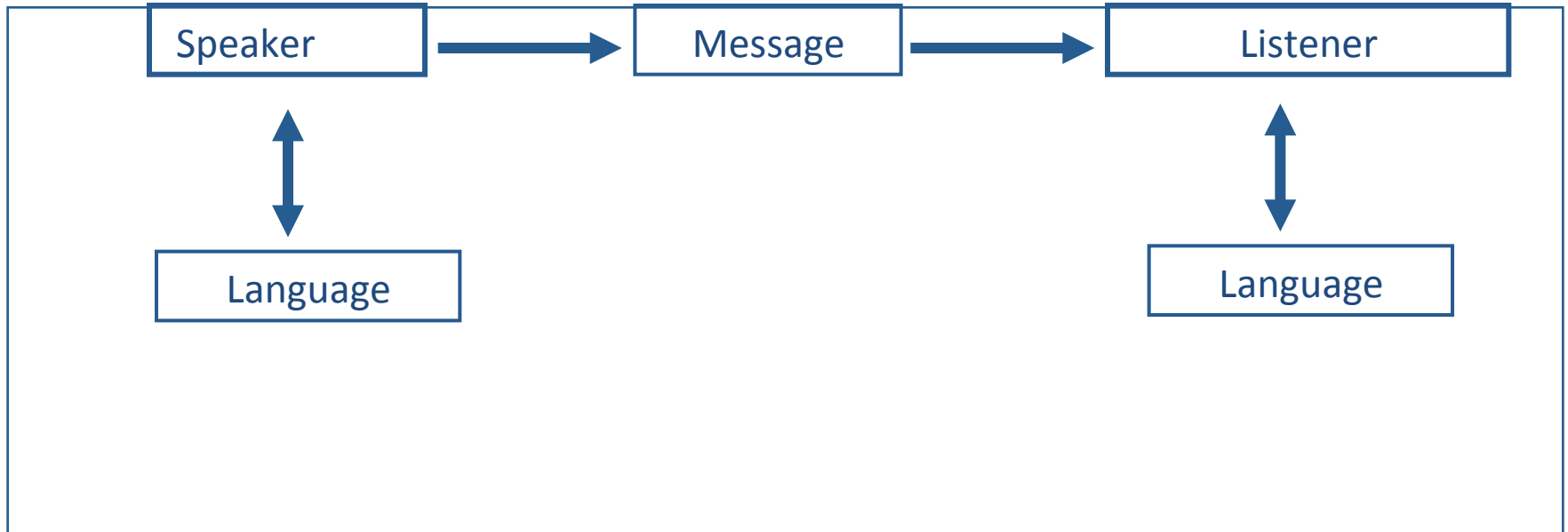
Psycholinguistics



Neurosciences



2. Scientific landscape : Studying the speech chain

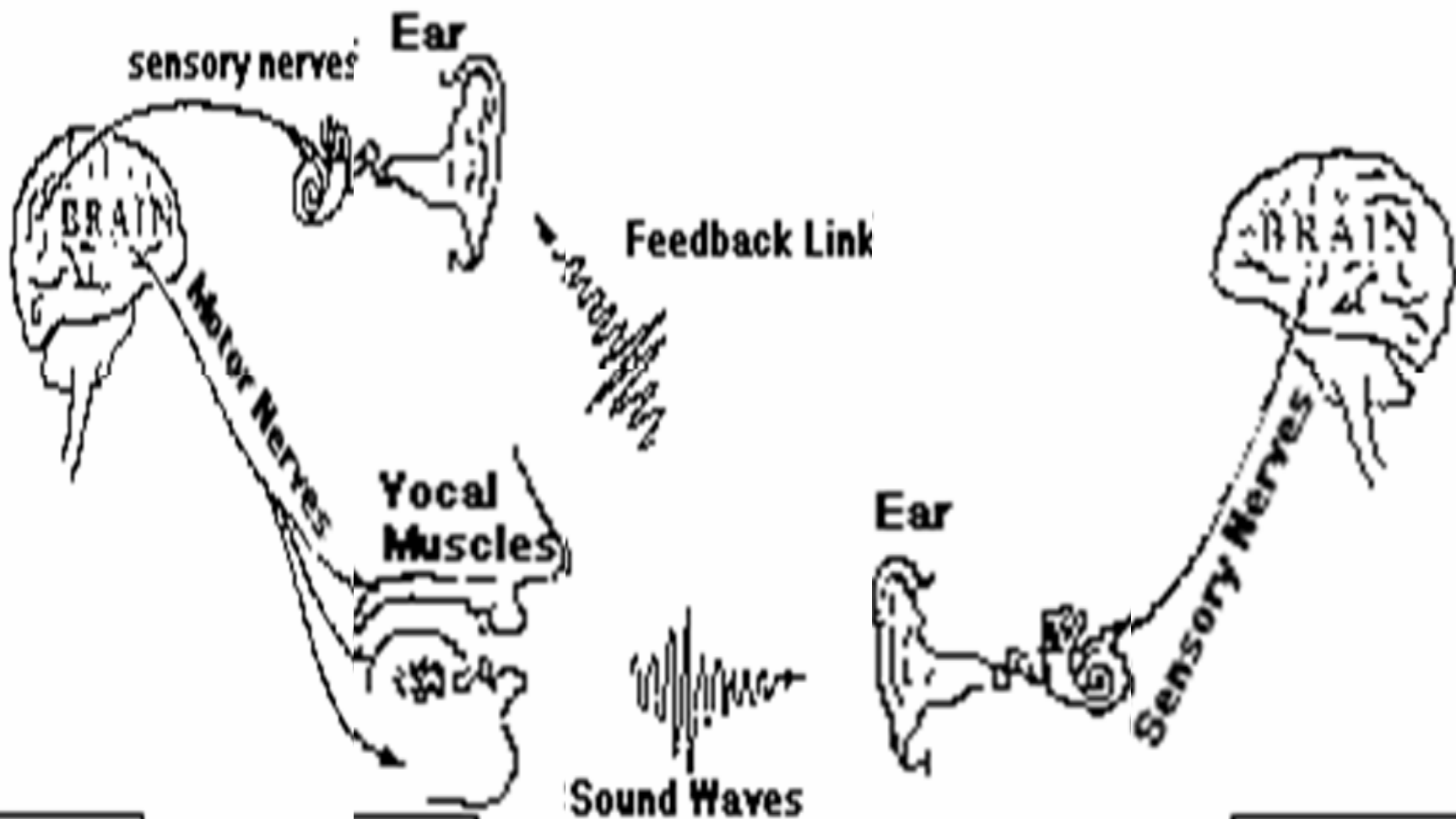


2. Scientific landscape :

The speech chain

SPEAKER

LISTENER



Psycholinguistics
Neuroscience

Phonetics

Physics
Phonetics

Phonetics
Psycholinguistics
Neuroscience

3. Research methods in psycholinguistics



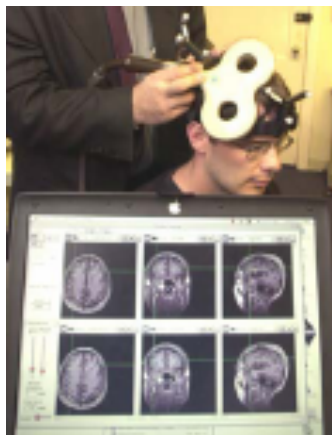
**Mental
chronometry**

Observation

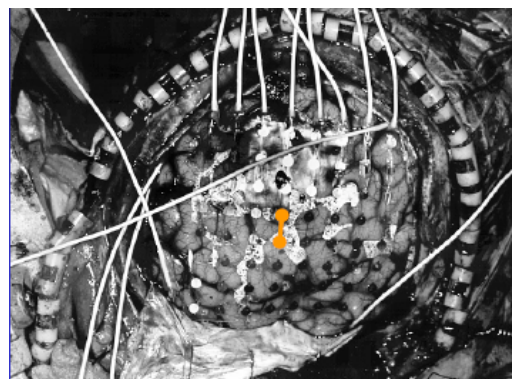
**Computer
Simulations**

**Language
statistics**

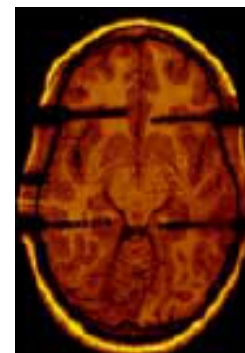
**Brain imaging &
physiological measures**



TMS



ECS



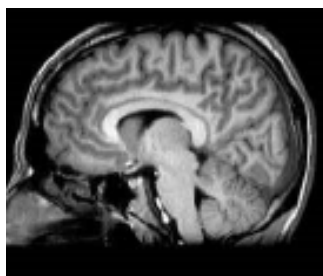
iEEG

Devoir 3 



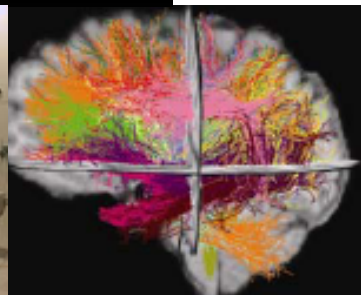
EEG

3. Research methods in psycholinguistics: Brain imaging



08.12.2011

MRI



Postdocs in the wilderness

PET

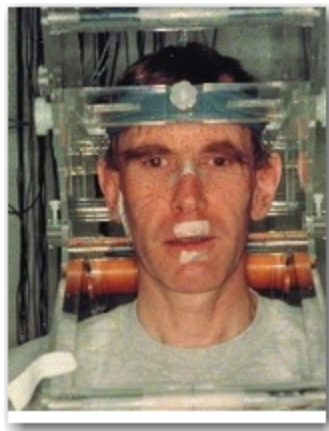


MEG

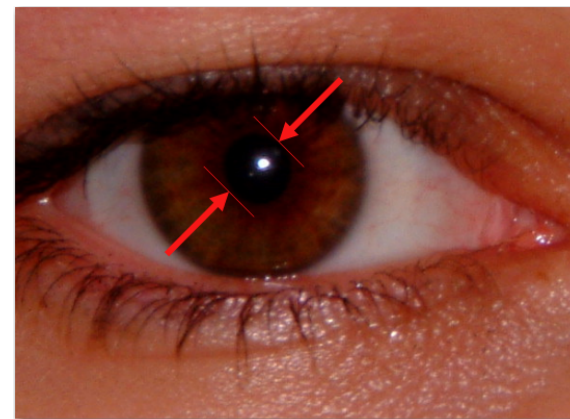
3. Research methods in psycholinguistics: Other measures



Eye movements



Articulatory
movements



Pupil diameter



Preferential
Looking

4. Some examples of research Dimensions defining problem space

1. Language capacity (production, comprehension, acquisition)
2. Linguistic level (phonetic, phonology, lexical, syntax, pragmatics)
3. Population (foetus, babies, bilinguals, adults, elderly, pathologies)
4. Modality (oral, written, gestual)
5. Language studied (French, English, Chinese, etc.)

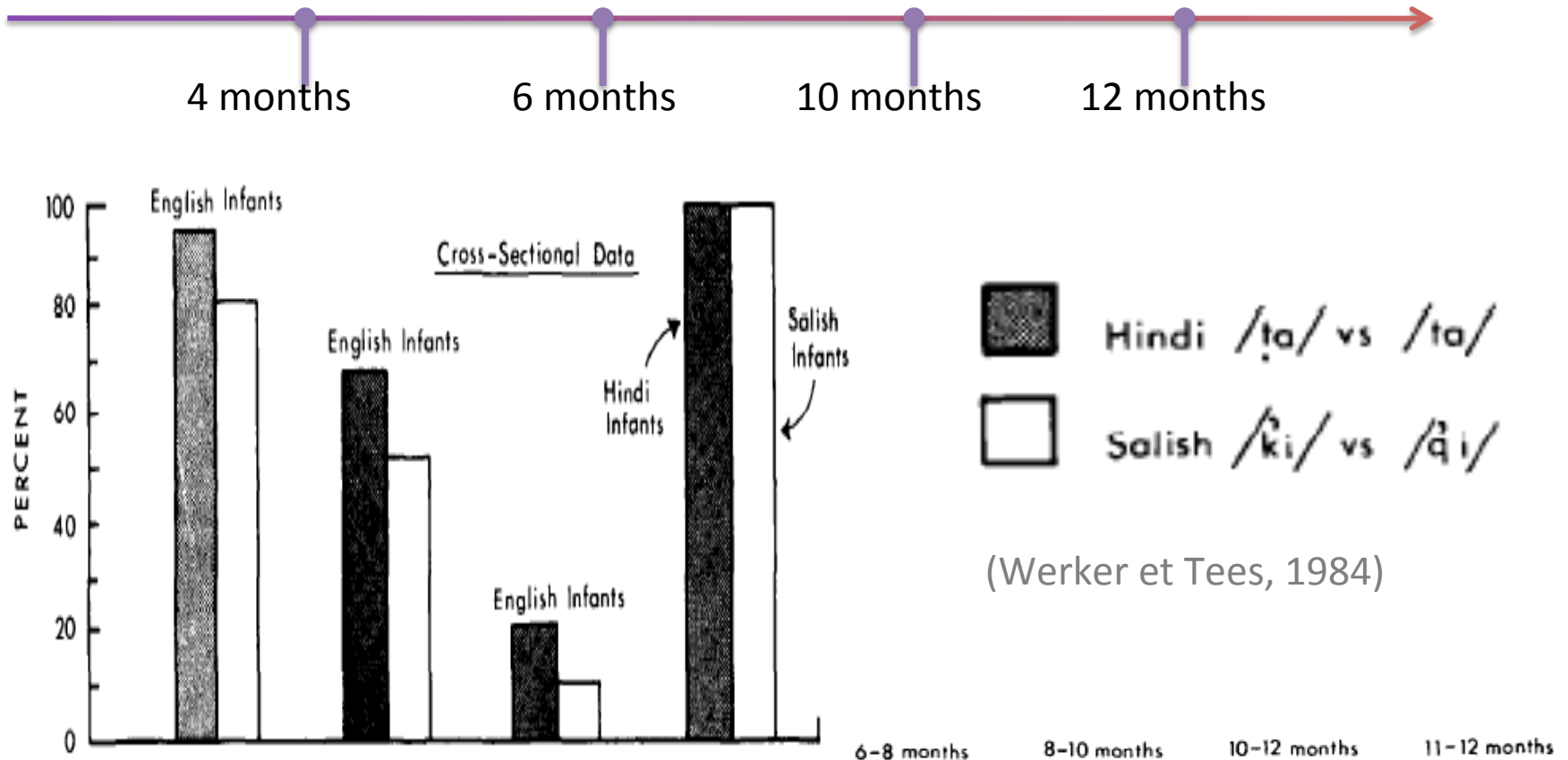
4. Some examples of research

DEVELOPMENT OF PERCEPTION

Fact: Progressive loss of sensitivity to foreign contrasts

Universal phonetic perception

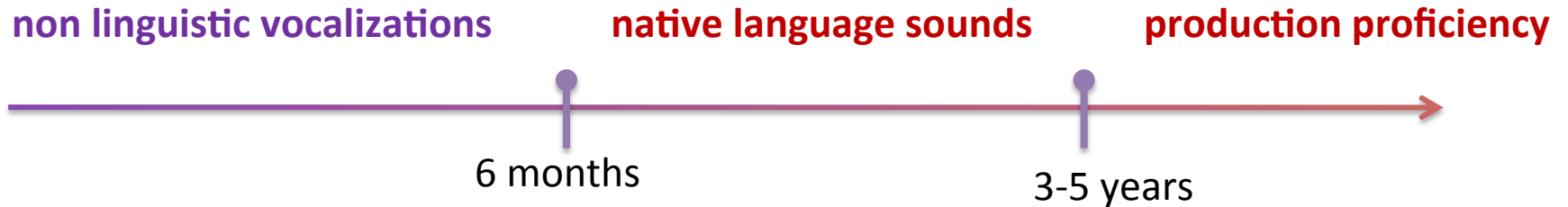
Language specialised phonetic perception



4. Some examples of research

DEVELOPMENT OF PRODUCTION

Fact: Attunement to native phoneme production (Oller, 2000)



Conclusions: Both speech perception and production become attuned to L1 in the first year

Research ?: Why are there such difficulties for L2 acquisition
Can it be overcome?
Can PROD training improve/impede L2 PERC?

4. Some examples of research

Bilingualism and critical period

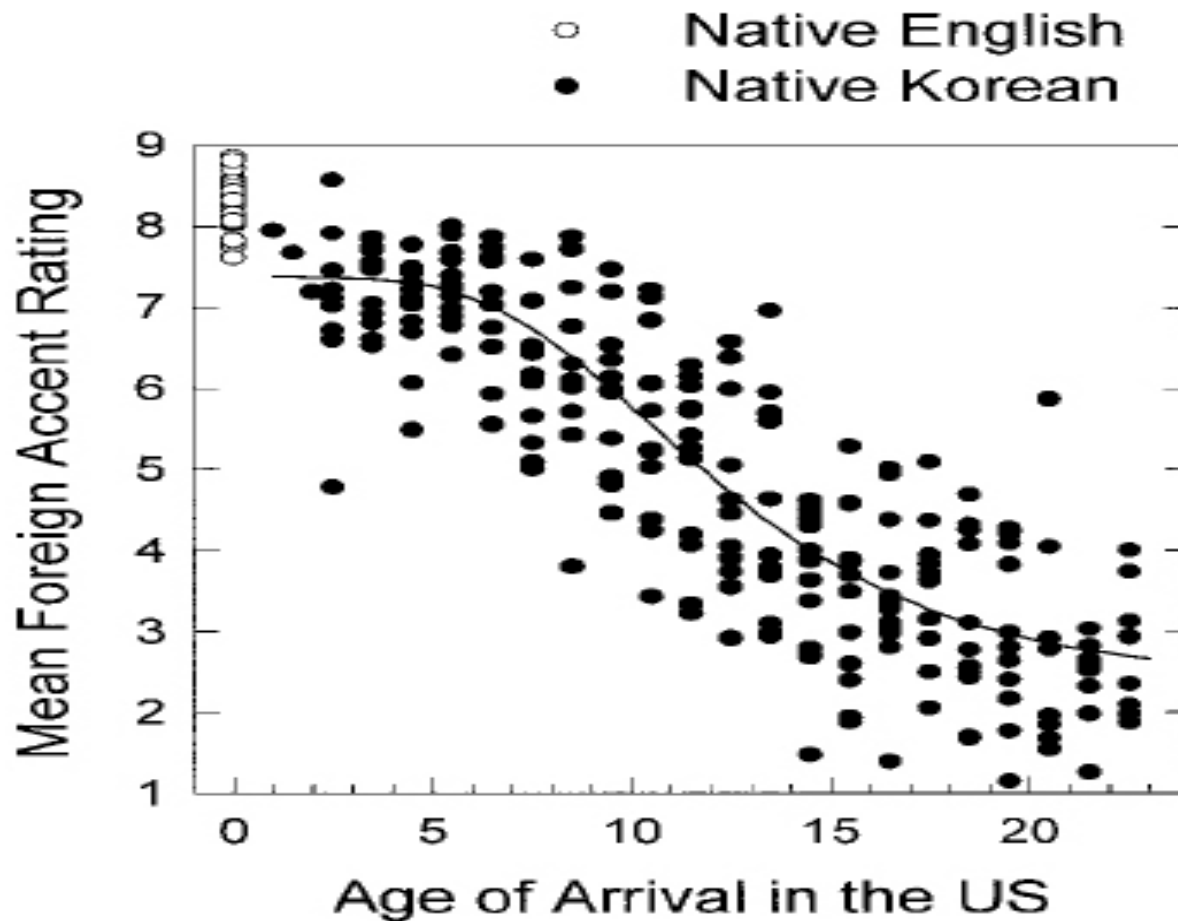


FIG. 1. The mean foreign accent ratings obtained for 24 native English and 240 native Korean participants. The data for the 240 Koreans have been fit to the Gompertz-Makehm distribution (solid line).

4. Some examples of research

OUR STUDY

Design:

1. Pre-training test: PERC + PROD
2. Articulatory Feedback Training:
 - Stimuli: 2 Non Native Vowel Contrasts;
 - Population: Native French Speakers;
 - 5 45-min sessions;
3. Post-training test: PERC+PROD

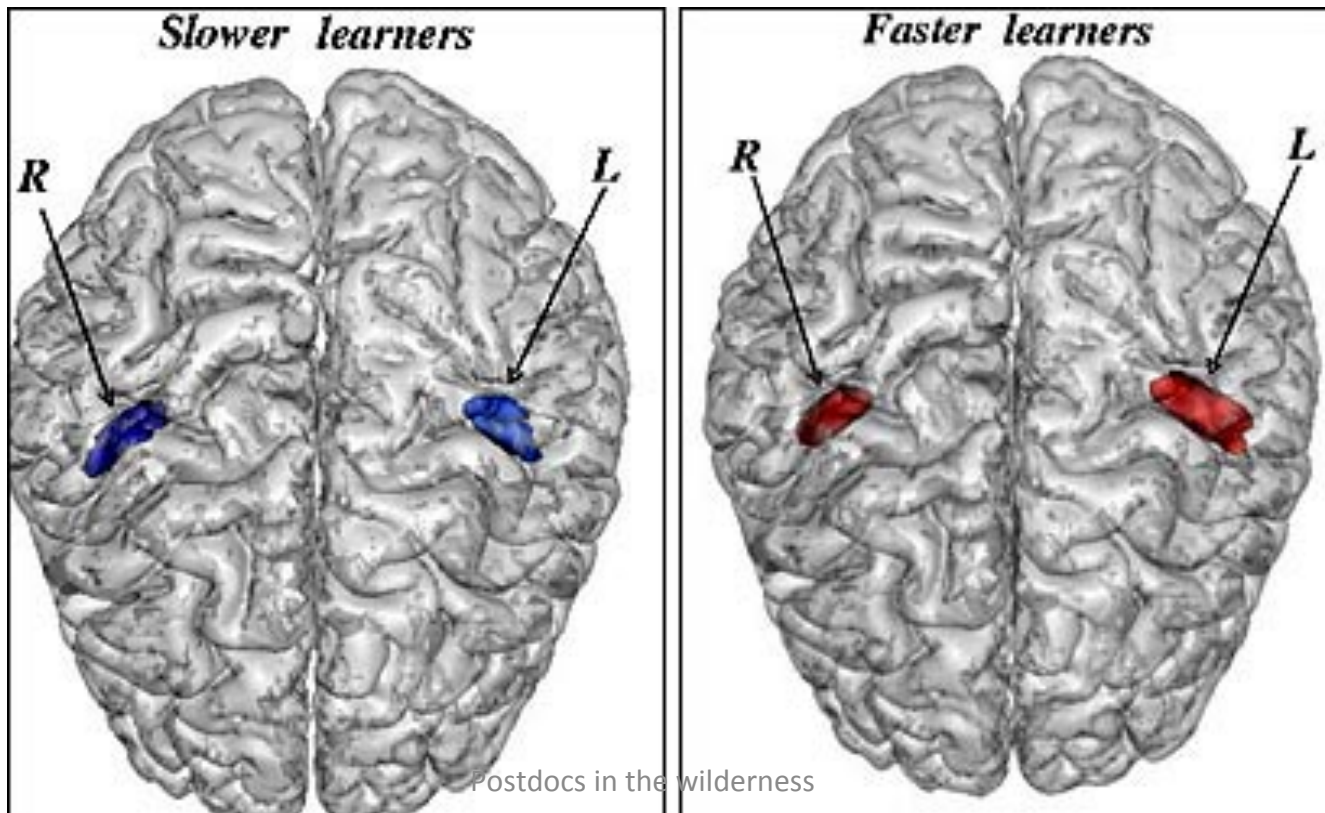
Predictions:

- L2 PROD training will have an impact on PERC of trained and non trained L2 phonemes;
- This behavioral improvement will lead to modification of the cerebral network involved in PERC & PROD of L2 sounds

Run by: *Kartushina, N., Adelman-Hervais, A., Golestani, N., Frauenfelder,*

4. Some examples of research

- Participants : 65 French participants trained to distinguish two Hindi consonants : dental and retroflex t's.
- 2 groups : fast vs slow learners



4. Some examples of research

- « ... left auditory cortex WM [*white matter*] anatomy ... partly predicts individual differences in an aspect of language learning that relies on rapid temporal processing”
- “We can start to make predictions regarding whether people will be good at something or not based on their brain structure or diagnose clinical problems.”

[Brain Structure Predicts the Learning of Foreign Speech Sounds](#) Golestani et al. *Cerebral Cortex* (2006)

5. Some applications of research: Bilingualism and Alzheimer disease (AD)

- AD is becoming one of the most expensive diseases
- It costs 160 billions dollars worldwide (source : Wikipedia)
- Delay of onset of AD of 2 years would represent tremendous economic savings

5. Some applications of research:

Bilingualism and Alzheimer disease (AD)

Based on 184 patients at the Memory clinic in Montreal ,Canada diagnosed with AD

Group	Number	Age at onset of AD
Monolingual	91	75.2
Fluent Bilingual	93	71.1

Variables: Education, Employment, Gender, Culture, Age, Immigrant status

Results: Bilinguals = a delay of 4.1 years with respect to monolinguals

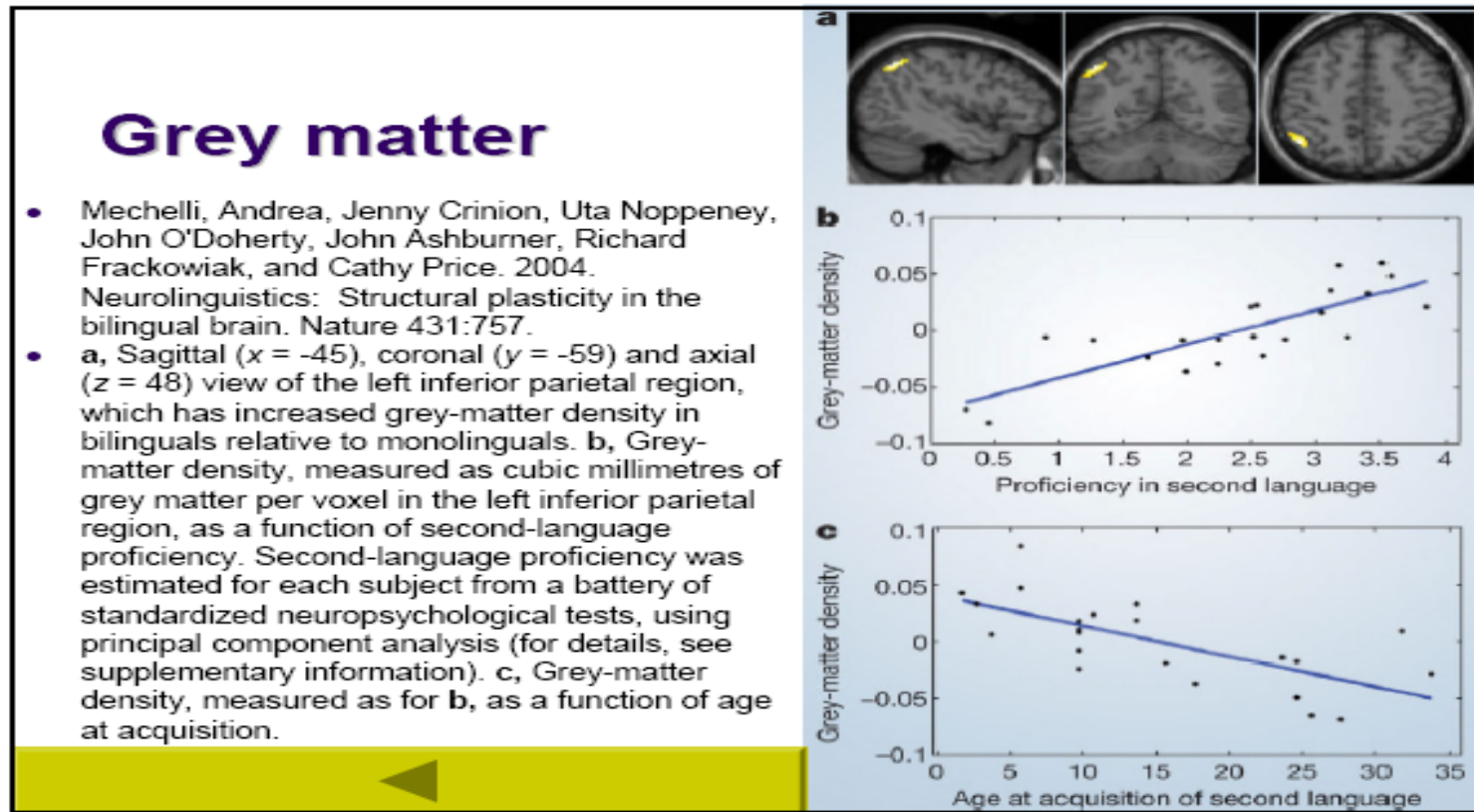
Conclusion: Mental activity (language switching?) across lifespan makes it possible to delay by about 4 years ,the onset of AD

Bialystok, E. Craik, FIM & Freedman, M. 2007. Bilingualism as a protection against the onset of symptoms of dementia. *Neuropsychologia*, 45,2,459-464.

4. Some examples of research

Grey matter of bilinguals

- Participants - 3 groups (monolinguals, early B, late B)
- Grey matter density in inferior parietal regions



Neurolinguistics: Structural plasticity in the bilingual brain Mechelli et al. Nature (2004)

5. Some applications of research:

Bilingualism and Alzheimer disease (AD)

Observation: There are individuals with considerable brain atrophy but spared cognitive capacities (30% exceeding AD criteria show no sign of cognitive impairment)

Table 1 – Demographic and behavioral characteristics of monolingual and bilingual patients.

	Monolingual (n = 20)		Bilingual (n = 20)		p-value
	Mean	SD	Mean	SD	
Age at CT scan	77.2	7	78.9	7.6	.45
Age at diagnosis	77.3 ^a	6.8	78.9	7.7	.5
Education (years)	13.6	3.5	11.6	4.5	.12
Occupational status	3.2 ^b	1.2	2.1 ^b	1.2	.007
CDR	1.2	.4	1.2	.4	1.0
Katz ADL index (/6)	5.6	.8	5.6	.8	.91
Overall BNA (/114)	66.4	13.7	64.4 ^a	17.7	.7
MMSE (/30)	23.2 ^a	3	22.1 ^c	5.1	.43
Clock Drawing Test (/15)	10	4.2	10.3	4.8	.83

a n = 19.
b n = 18.
c n = 17.

Matched on demographic and behavioral variables

Table 2 – Brain ratios and scores of monolingual and bilingual patients.

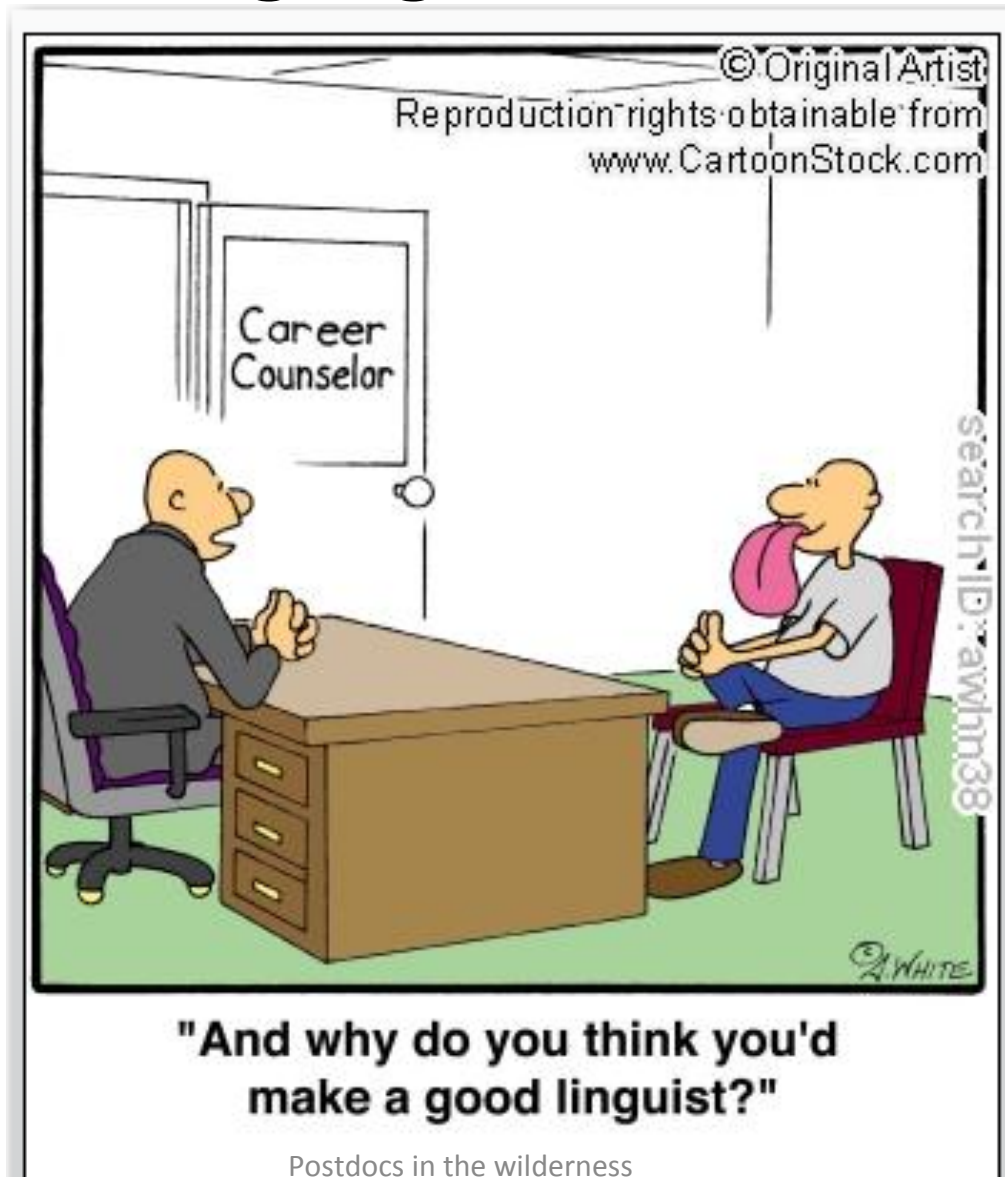
	Monolingual (n = 20)		Bilingual (n = 20)	
	Mean	SD	Mean	SD
Bicaudate ratio	.17	.03	.18	.05
Huckman's number	60.01	7.82	64.30	12.18
Evans ratio	.36	.05	.35	.07
Suprasellar cistern ratio	.20	.02	.20	.02
Temporal horn ratio	.03***	.01	.05***	.02
Third ventricle ratio	.06**	.02	.07**	.01
Radial width of the temporal horn (rWTH) ^a				
Left	4.16***	1.09	7.23***	3.21
Right	4.04*	1.56	6.48*	3.64
Largest	4.69***	1.31	7.87***	3.53

*p < .05.
**p < .01.
***p ≤ .001.
a n = 19/group.

More atrophy in bilinguals

Schweizer, T.A., Ware, J., Fischer, C.A., Craik, FIM, Bialystok, E. (2011) Bilingualism as a contributor to cognitive reserve: Evidence from brain atrophy in Alzheimer's disease. Cortex

6. Future opportunities (in wilderness) in language sciences



6. Future opportunities: What Can You Do With a Degree in Linguistics?

Qualified linguists have many marketable skills :

- Professionals with a degree in linguistics have a comprehensive understanding of language theory, are capable of language analysis, and are skilled in analysis of sound systems such as phonics.
- Experienced linguists can discern grammar patterns and application without actually knowing the actual language they hear.

6. Future opportunities : Linguistics Career Paths

- Anthropology
- Consulting
- Neuroscience
- Education / teaching
- Linguistics Professor
- Technology Development
- Dialect Coaching

6. Future opportunities :

Other interdisciplinary connections /related fields

- Applied linguistics
- Cognitive science
- Discourse analysis
- Forensic linguistics
- Genetic classification
- Historical classification
- Language acquisition
- Language documentation
- Lexicography
- Ling and Literature
- Morphology
- Neurolinguistics
- Philosophy of language
- Phonetics
- Phonology
- Pragmatics
- Psycholinguistics
- Semantics
- Sociolinguistics
- Syntax
- Text / corpus linguistics
- Translation
- Typology
- Writing systems

6. Future opportunities :

Useful Links

- **Swiss-linguistics.com** is a platform dedicated to sharing and providing information on linguistics in Switzerland.
NB : See their job portal for university posts in linguistics in Switzerland
- **Linguistic Society of America** website
- <http://linguistlist.org/internship/browse/index.cfm>
- <http://lsadc.org/info/jobs-interview.cfm>
- <http://linguistlist.org/internship/browse/index.cfm>
- <http://linguistlist.org/jobs/browse-jobs.cfm>
- <http://linguistlist.org/jobs/browse-jobs.cfm>
- <http://linguistlist.org/ask-ling/career.cfm>

6. Future opportunities : Post doc/research

- A safe haven in times of economic uncertainty
- Opportunity to produce more publications and become more competitive in the job market
- NB : submit applications well in advance
- See websites such as **myScience.ch** for advice on how to find a postdoc position in Switzerland

Thank you for your attention
Good luck to you, docs and postdocs!

