ABRALIN
Associação Brasileira de Lingüística
17 March 2021

Cognitive Neuroscience & sociolinguistics of multilingualism: A tale of two rivers?

Thomas H. Bak
University of Edinburgh, Edinburgh, Scotland
& Ashoka University, Haryana, India
@thbaketal

St Patrick's Day

WHAT LANGUAGE DID ST PATRICK SWEAR IN?

SIMON RODWAY
University of Aberystwyth

Aneirin: Y Gododdin (ca 600)

1328 Treaty of Edinburgh

*1473 * James IV*

Roots & Routes

- From Cracow, Poland:
  - Polish-speaking father
  - German-speaking mother
  - **BUT** raised monolingually

- Study of Medicine in Germany

- Doctorate on Aphasia
- Psychiatry/Neurology:
  - Berne, Berlin, Cambridge

- Since 2006 in Edinburgh

“Linguist auf dem zweiten Bildungsweg”

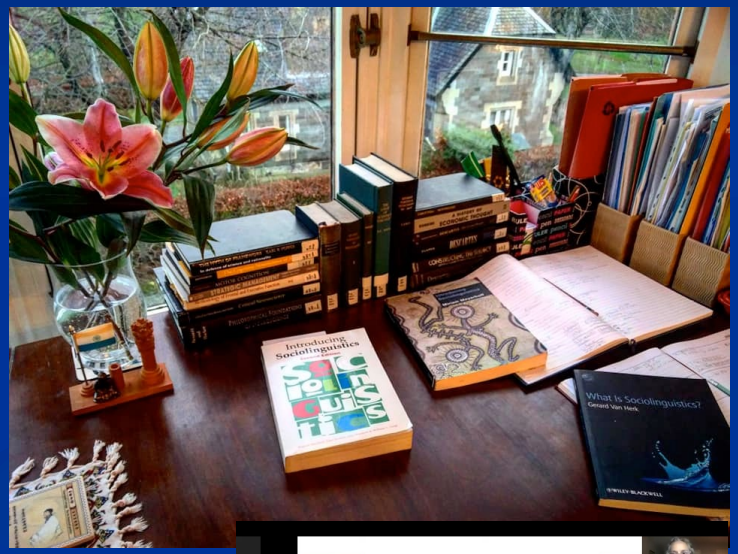
- Doctorate in Freiburg im Breisgau
  - Neurologists, Psychologists, Linguists

- Encounters with linguists & linguistics:
  - Books, Lectures, Summer schools (Cornell & Cagliari)
- Encounters with linguistic questions:
  - Schizophasia: language or thought disorders *(revisited in Edinburgh)*
  - Embodied Cognition *(noun & verb dissociations)*
  - President of WFN RG ADCD 2010-*2018 (cognitive clinics worldwide)*
  - Multilingualism in cognitive ageing, stroke & dementia

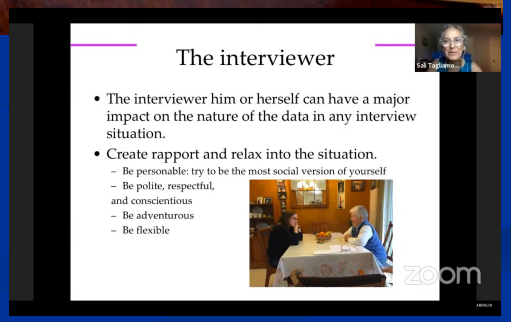
ABRALIN: Martin Haspelmath

The pleasures of interdisciplinarity

- **Exciting mental travel** in the times of lockdown:
  - A tour of new places/landscapes
  - Meeting new people
  - (ABRALIN: Sali Tagliamonte)
  - Learning new languages



- Reflecting on our own approach



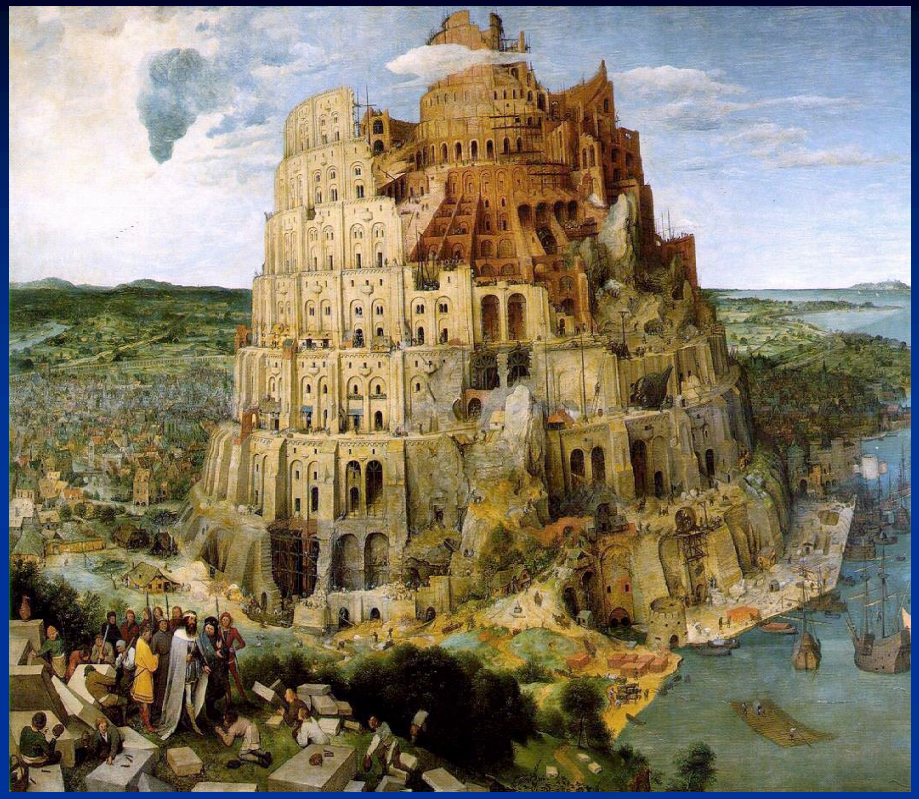
- Neurology as the art of the Narrative(s)

"Narrative in Science"

Studies in History & Philosophy of Science, Vol 62 (2017)

STORY I

Multilingualism as
DIVISION & CoNFuSiOn



"And the whole earth was of one language and one speech"

Genesis 11, 1-9 (Kings James Bible)


EDWARDVS
III

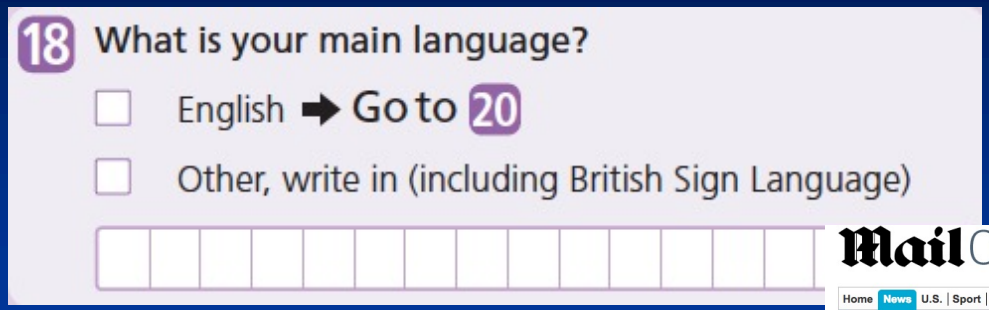
SAER, D. J., *The Effect of Bilingualism on Intelligence* , British Journal of Psychology, 14 (1923/1924) p.25

D. J. Saer
The effects of bilingualism on intelligence
British Journal of Psychology, 1923

- "***confusion*** *is carried over from* ***the brain area*** *connected with language to those connected with other functions*"

- "*Under British rule, there are many people who speak other tongues and, consciously or unconsciously, the English language is coming gradually to prevail in the subject states of Britain, the natives during this process passing through various stages of bilingualism*"

The monolingual default in 21st Century



"The human brain can only contain a finite amount of information and as English speakers we are fortunate not to need a secondary language. That space is much better utilised for science, history and our rich culture."

Daily Mail, 02/06/2014

STORY I – "Limited resources models"

- Monolingualism is the natural state of human brain/mind
- The brain/mind/society has a limited storage capacity
- => additional languages "take away" something
  - Confusion at the level of individuals
  - Division, strife & conflict at the level of societies
- Effort =/= burden

ABRALIN Judy Kroll: "desirable difficulties"

STORY II

Paradise lost
(and the fountain of youth)

Multilingual creation myths

The travels of **Warramurrungunji**

Recreated in a multilingual song cycle

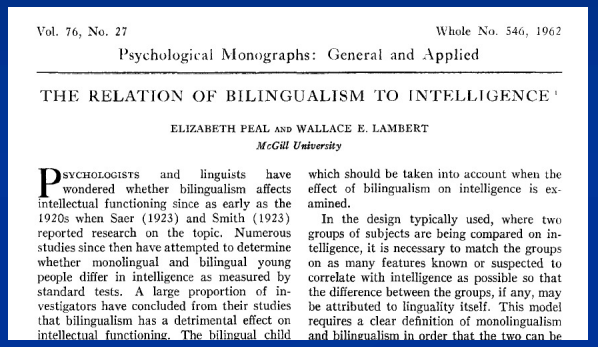
Complementarily distributed knowledge

ABRALIN & ILARA Nick Evans,

(Friederike Lüpke, Alexandra Aikhenvald)

From handicap to benefit

- Peal & Lambert 1962
- 1980-90's: Bilingualism in children:
  - Metalinguistic skills
  - Social cognition
  - Executive functions
- 2004 Older participants
- 2007 Dementia



Vol. 76, No. 27 — Whole No. 546, 1962

Psychological Monographs: General and Applied

THE RELATION OF BILINGUALISM TO INTELLIGENCE[1]

ELIZABETH PEAL AND WALLACE E. LAMBERT
McGill University

PSYCHOLOGISTS and linguists have wondered whether bilingualism affects intellectual functioning since as early as the 1920s when Saer (1923) and Smith (1923) reported research on the topic. Numerous studies since then have attempted to determine whether monolingual and bilingual young people differ in intelligence as measured by standard tests. A large proportion of investigators have concluded from their studies that bilingualism has a detrimental effect on intellectual functioning. The bilingual child

which should be taken into account when the effect of bilingualism on intelligence is examined.

In the design typically used, where two groups of subjects are being compared on intelligence, it is necessary to match the groups on as many features known or suspected to correlate with intelligence as possible so that the difference between the groups, if any, may be attributed to linguality itself. This model requires a clear definition of monolingualism and bilingualism in order that the two can be

ABRALIN: Ellen Bialystok

Edinburgh Neuroscience Christmas Lecture

"Executive Brain": youtu.be/BKxuEYT_nWY

Alladi, Bak et al 2013, *Neurology*

- Bilingualism in Hyderabad:
  - Frequent (c. 60%) for centuries
  - **Not** associated with immigration

- Excellent clinical services:
  - Cambridge-style cognitive clinic
  - Multilingual tests & multilingual staff

- Results in 648 patients (60% bilingual)
  - 4 years delay (6y. in illiterates)
  - FTD > AD/VascularDementia > DLB


Dr Suvarna Alladi

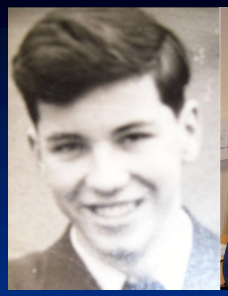
Alladi et al, *Stroke* 2016
Paplikar et al, *Aphasiology* 2018

- 608 stroke patients (58% bilingual)
- Results: age at stroke: 56 vs. 56.5 years
- **Outcome:**

	Monolingual:	Bilingual:
Normal cognition	19.6%	40.4%
Vasc Dementia/MCI	68.7%	49.0%
Aphasia	11.8%	10.5%

- Global aphasia: 58.6% 17.9%

Bak et al 2014, *Annals of Neurology*
Cox et al 2016, *Neuropsychologia*



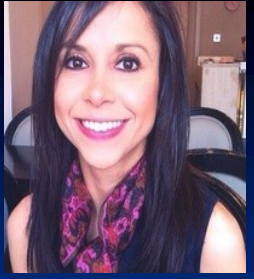

- Addressing the issue of **reverse causality**…

- …through the Lothian Birth Cohort 1936

(real-time panel study)

- Comparing performance age 11y. vs. age 70+y.
- 262/853 "able to communicate in L2"

- Bilingualism effects independent of childhood IQ

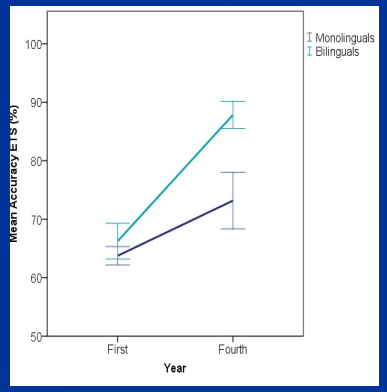


Language Learning & Cognition

- Test of Everyday Attention (TEA):
  - Clinically valid, auditory, non-verbal, no ceiling/practice effects

- Attention switching in Edinburgh students:
  - Languages vs humanities
  - Year 1 (initial) vs. Year 4 (final)

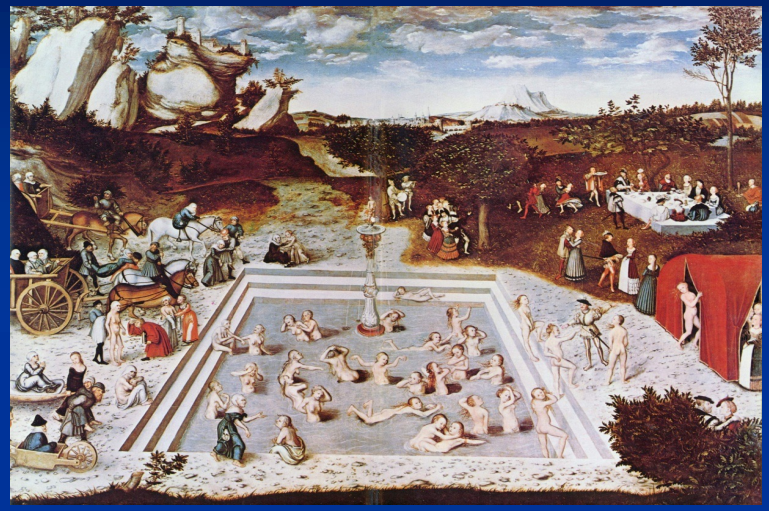
  Vega-Mendoza et al, *Cognition*, 2015



- Intensive Gaelic Course (one week), Sabhal Mor Ostaig:
  - Improvement in attention switching in all age groups (18-85y.)
  - Persisting in those who practice >5 hrs/week

  Bak et al, *PLoS* 2016, Long et al, *Bilingualism: Lang&Cogn*, 2019

Tolerance, eternal youth, freedom & love



Simple vs. complex messages

Alladi et al 2013: *Bilingualism delays the age of onset of dementia, independent of education and immigration status*

428 citations

Alladi et al 2017: *Bilingualism delays the onset of the behavioural but not aphasic form of FTD*

28 citations

Bak et al 2014: *Does bilingualism influence cognitive ageing*

296 citations

Cox et al 2016: *Bilingualism, social cognition & executive functions: a tale of chickens & eggs*

48 citations

STORY III

The baby & the bathwater

"The bilingual advantage debate"

- Paap et al 2013 does not replicate results of other groups
- Since then, increasing amount of conflicting evidence
- "Bilingual advantage debates" 2016/17
  - Bialystok vs. Carreiras, Bak vs. Paap, Bak vs. Carreiras

- Framed in the terminology of the "replication crisis":
  - "*failure to replicate*", "*reproducibility*", "*confirmation bias*"

- Underlying assumptions:
  - An either/or dichotomy (two camps: one right, one wrong)
  - Studies should replicate independently of time, place & method

Why do studies produce different results?

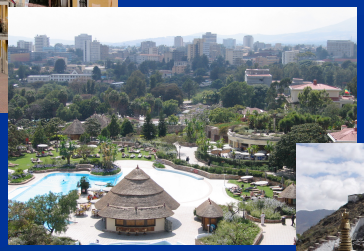
- Populations: *from genetics to environment*
- Interacting variables: *immigration, education, SES etc*
- Measures: *tasks, clinical measures etc*
- Reverse causality
- Interpretation: *selection, focus, understanding*

Bak (2016) Finding a path through a forest of confounding variables. Linguistic Approaches to Bilingualism

When does water boil?

Conflicting Evidence

Bak 2016 Cooking Pasta in La Paz



Cooking Pasta in La Paz
(Bak, 2016, Linguistic Approaches to Bilingualism)

- A large n =/= universal
- An exception =/= an error

- Systematic reviews & meta-analyses:
  - what counts is not only the number of studies & participants, but their **diversity**

- So why the hostility towards bilingualism *(vs. education)?*
  - Normative monoglot ideology/egocentric universalism
  - The nostalgia for modularism?

STORY IV

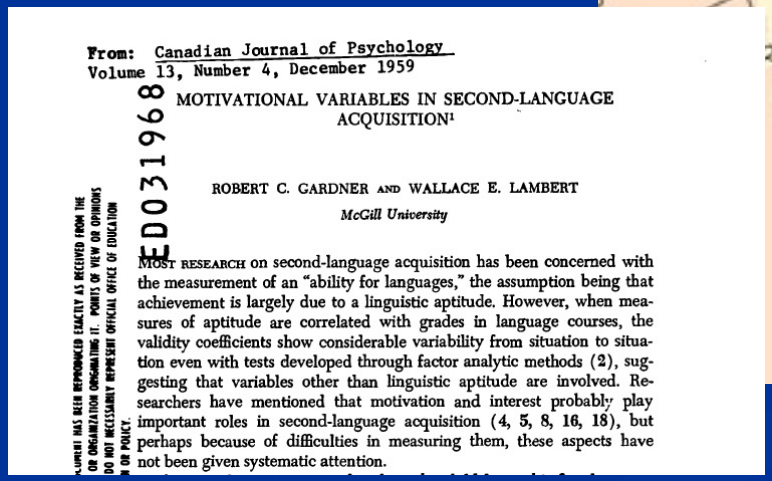
The tale of two rivers:
two encounters, one lost chance
& an opportunity for future

Wallace Lambert (1922 – 2009)

Cognitive Psychology

Sociolinguistics

SLA

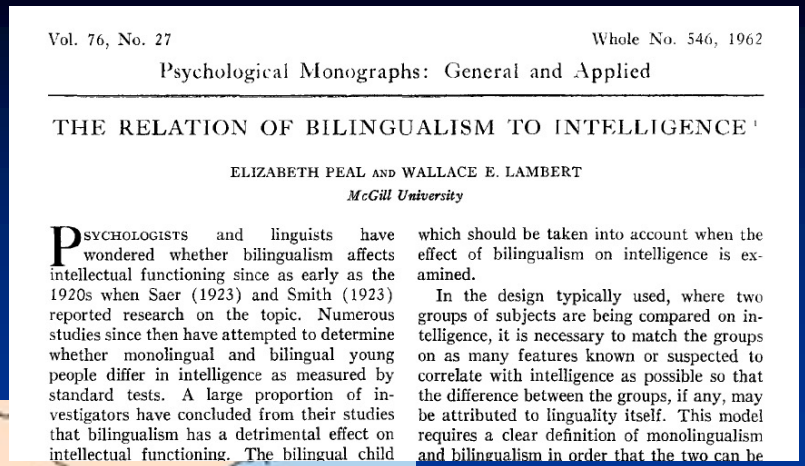


From: Canadian Journal of Psychology
Volume 13, Number 4, December 1959

MOTIVATIONAL VARIABLES IN SECOND-LANGUAGE ACQUISITION[1]

ROBERT C. GARDNER AND WALLACE E. LAMBERT
McGill University

MOST RESEARCH on second-language acquisition has been concerned with the measurement of an "ability for languages," the assumption being that achievement is largely due to a linguistic aptitude. However, when measures of aptitude are correlated with grades in language courses, the validity coefficients show considerable variability from situation to situation even with tests developed through factor analytic methods (2), suggesting that variables other than linguistic aptitude are involved. Researchers have mentioned that motivation and interest probably play important roles in second-language acquisition (4, 5, 8, 16, 18), but perhaps because of difficulties in measuring them, these aspects have not been given systematic attention.



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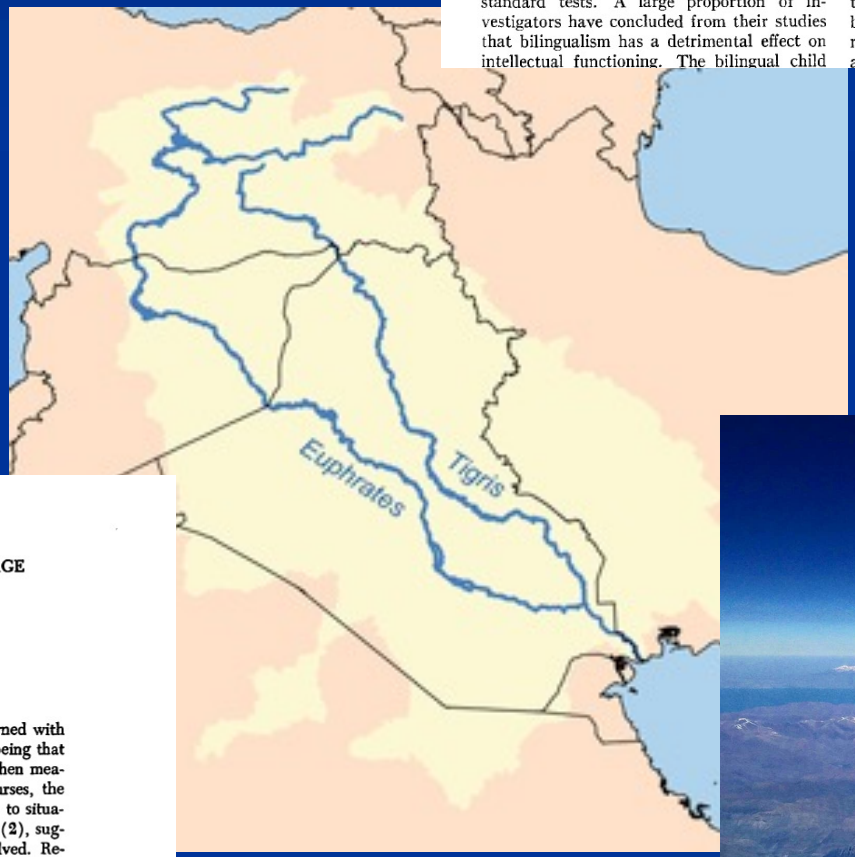
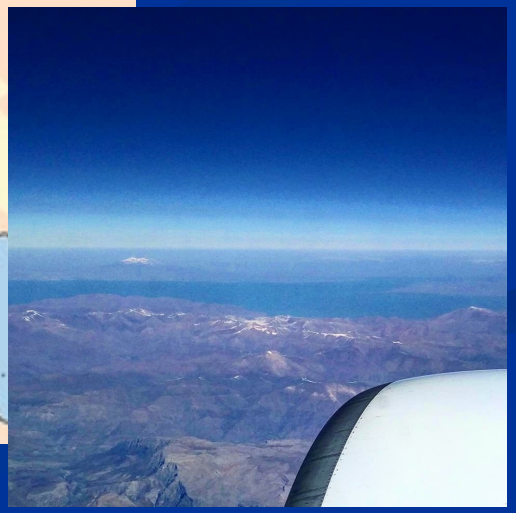
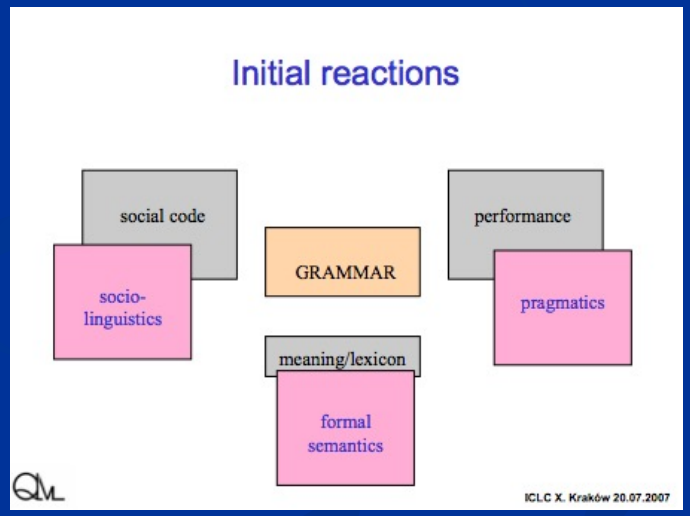




The amazing 1960's

- **Neurology:**
  - Description of new diseases: *PSP, MSA, CBD*
  - New drugs: *antiparkinsonian drugs, neuroleptics, antidepressants*
- **Psychology:**
  - Cognition as computation



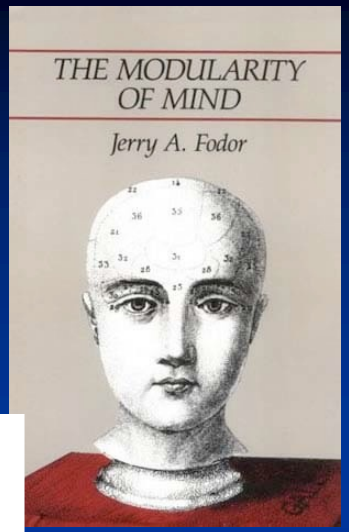
- **Linguistics:**
  - Generativism: ABRALIN Chomsky
  - Sociolinguistics: ABRALIN Labov
  - *De- & Recontextualising language* ABRALIN: Dirk Geeraerts
  - *Variationist Approach* ABRALIN: Sali Tagliamonte

Generativists & sociolinguists studying alcohol

- Sociolinguistic approach

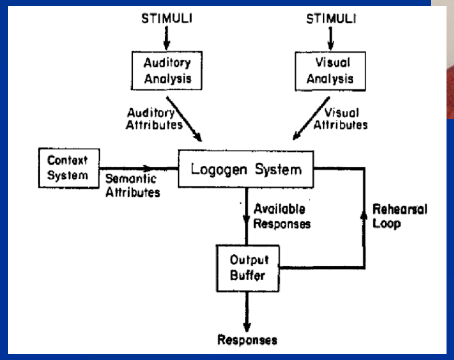
- Generativist approach: C_2H_5OH

Aphasiology: From modular…



- Fodor 1983: "*informationally encapsulated*" modules

- The autonomy of language



<u>Aphasiology:</u>

- The search for a selective & stable impairment of the "grammar module"

- Assessment & treatment focused on passive

…to variationist aphasiology

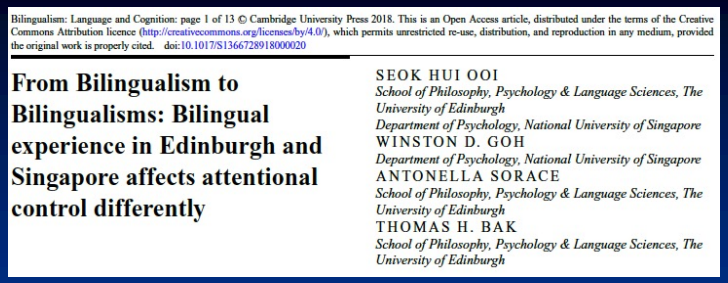
- The variation (between/ within) as an object of study:
  - Different degrees of agrammatism depending on context
  - => Aphasia syndromes as products of compensation

- Patient as agent:
  - "*When I am at my place it's only me & the place*"

- The variation between languages as an object of study:

Beveridge & Bak, *Aphasiology*, 2011

Multilingualism
From modules to networks


Bilingualism: Language and Cognition: page 1 of 13 © Cambridge University Press 2018. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited. doi:10.1017/S1366728918000020

From Bilingualism to Bilingualisms: Bilingual experience in Edinburgh and Singapore affects attentional control differently

SEOK HUI OOI
School of Philosophy, Psychology & Language Sciences, The University of Edinburgh
Department of Psychology, National University of Singapore
WINSTON D. GOH
Department of Psychology, National University of Singapore
ANTONELLA SORACE
School of Philosophy, Psychology & Language Sciences, The University of Edinburgh
THOMAS H. BAK
School of Philosophy, Psychology & Language Sciences, The University of Edinburgh

- Technology:
  - Machine learning, pathology & neuroimaging
- The rise of social cognition
- Re-contextualising Linguistics
- Increasing role of linguistic environment
  - => Sociolinguistic variables relevant for cognition:
  - Proficiency, AoA, **changing patterns of use, code-switching**

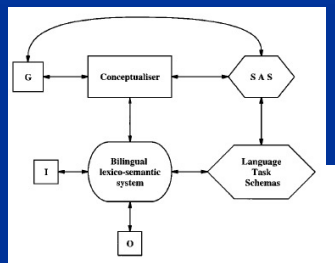


Figure 1. The regulation of the bilingual lexico-semantic system displaying multiple levels of control.

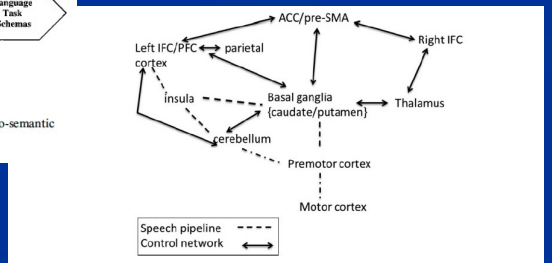
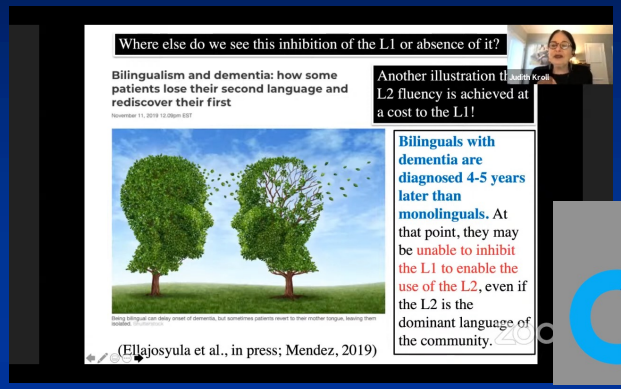


Figure 2. Simplified language control network and speech production regions (see main text for explanation).

Language changes in ageing & dementia

- Multilingual Aphasia:
  - Ribot's Law: L1 advantage
  - Pittre's Law: Ln advantage



Guardian Carers

- Anecdotal evidence: Reversion to L1 in ageing & dementia

	Proxy (N=52)	Self-report (N=131)
No change	21	40
Reversion	14	13
Attrition	0	19
Mixing	8	28
Other Negative Changes	11	26
Other Positive Changes	3	9

LANGUAGE MIXING	Proxy (N=52)	Self-report (N=131)
No	17	29
Less than before	0	9
Same amount	22	38
More than before	11	54
Intentional Mixing	12	31
Non-intentional Mixing	15	46

https://edinburgh.eu.qualtrics.com/jfe/form/SV_6ySpqYdw2yyH1s1

Multilingualism across the lifespan: different perspectives

- Biological: *hippocampus, the temporal gradient*
- Cognitive: *L1 inhibition, cognitive control*
- Emotional: *Nostalgia, withdrawal from active life*
- Social: *chronological, biological & social age*
- Sociolinguistic: *age gradient, middle-age bias, "linguistic marketplace"*
- Linguistic anthropology: *increased status, autonomy & multilingualism*

27 March: International Day of Multilingualism **@thbaketal**