

INFI-CG 2015

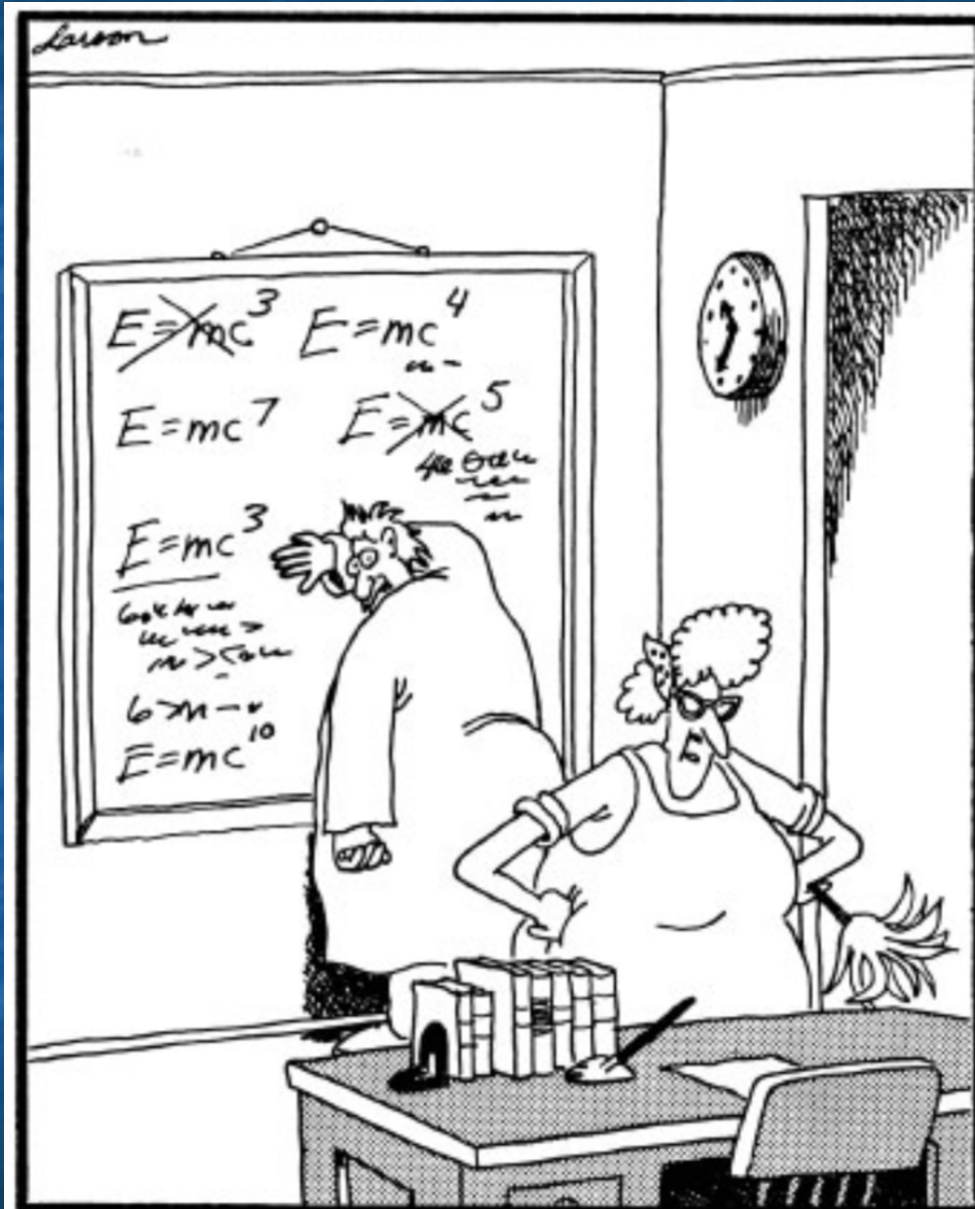
Lecture 28

Some philosophical choices  
within cognitive modelling (2)

Richard Shillcock

# Today's goals

To look at some of the choices that are made in cognitive modelling and the implications that flow from them.



"Now that desk looks better. Everything's squared away, yessir, squaaaaaaared away."



# Today's reading

Shillcock, R. (2013). The concrete universal and cognitive science. *Axiomathes*. DOI 10.1007/s10516-013-9210-y.

available at:

<https://sites.google.com/site/rcspplsinf/publications>

[Not in the exam ... just if you're interested in what I do ...]

# A concrete universal ...

- ... provides a *conceptual* understanding of the domain in question.
- ... is a material thing, reached by a far abstraction within the domain.
- ... still has content, itself.
- ... has all the richness of the particular.



# Completeness and explanation

We can *analyze* down to the concrete universal.

We can *synthesize* other aspects of the real world around it, in *necessary* ways.

Explanation resides in this dialectical view of analysis  $\Leftrightarrow$  synthesis.

The goal is *completeness*, not simplicity.

Parsimony increases with each move towards completeness.



# A concrete approach

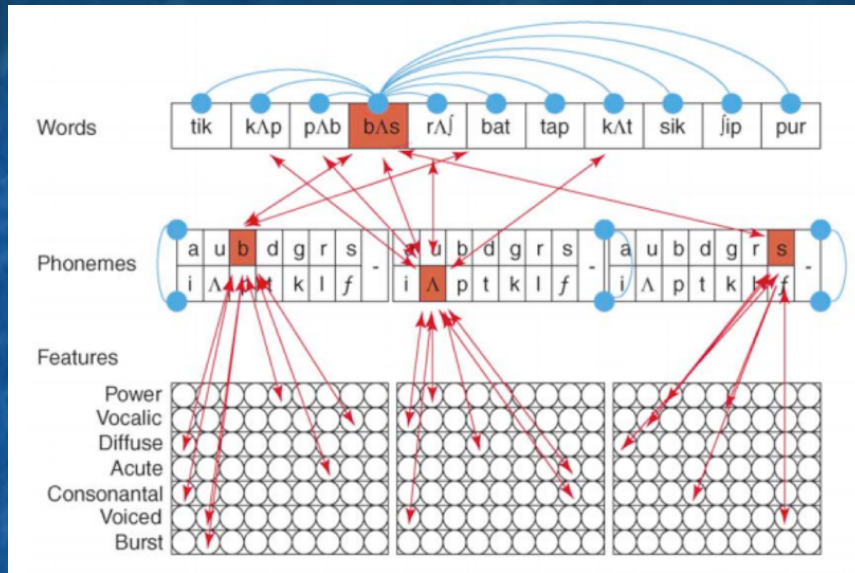
Some models in science contain a *fictional entity* that seems to play a useful role; many cognitive models contain *exclusively* fictional entities.

A concrete universal is the point in the model at which we can pour in new, material detail.





# A fictionalist approach



## The model

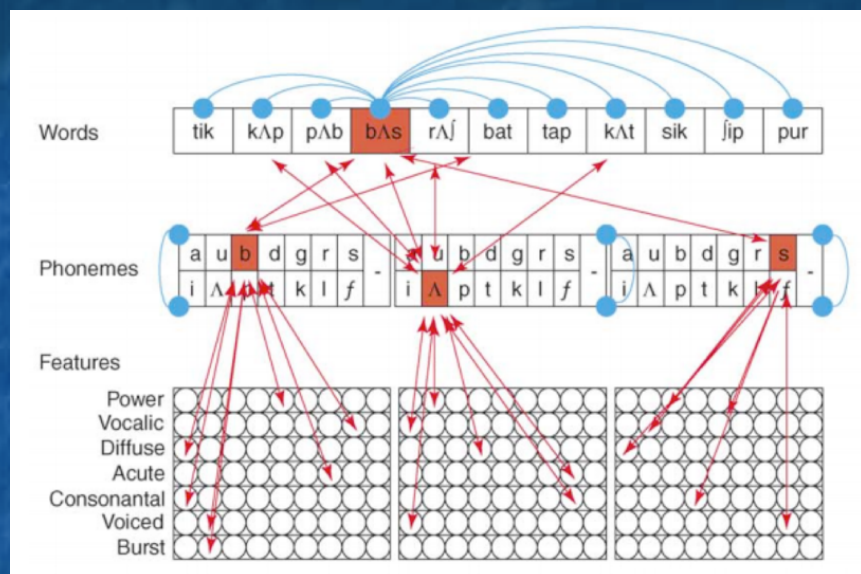


## Real spoken language

In a fictionalist approach, things start with the model and tend to end up with the model. Entities in the model map to entities in the world, but the latter are just destinations of these mappings.



# A materialist approach



The model

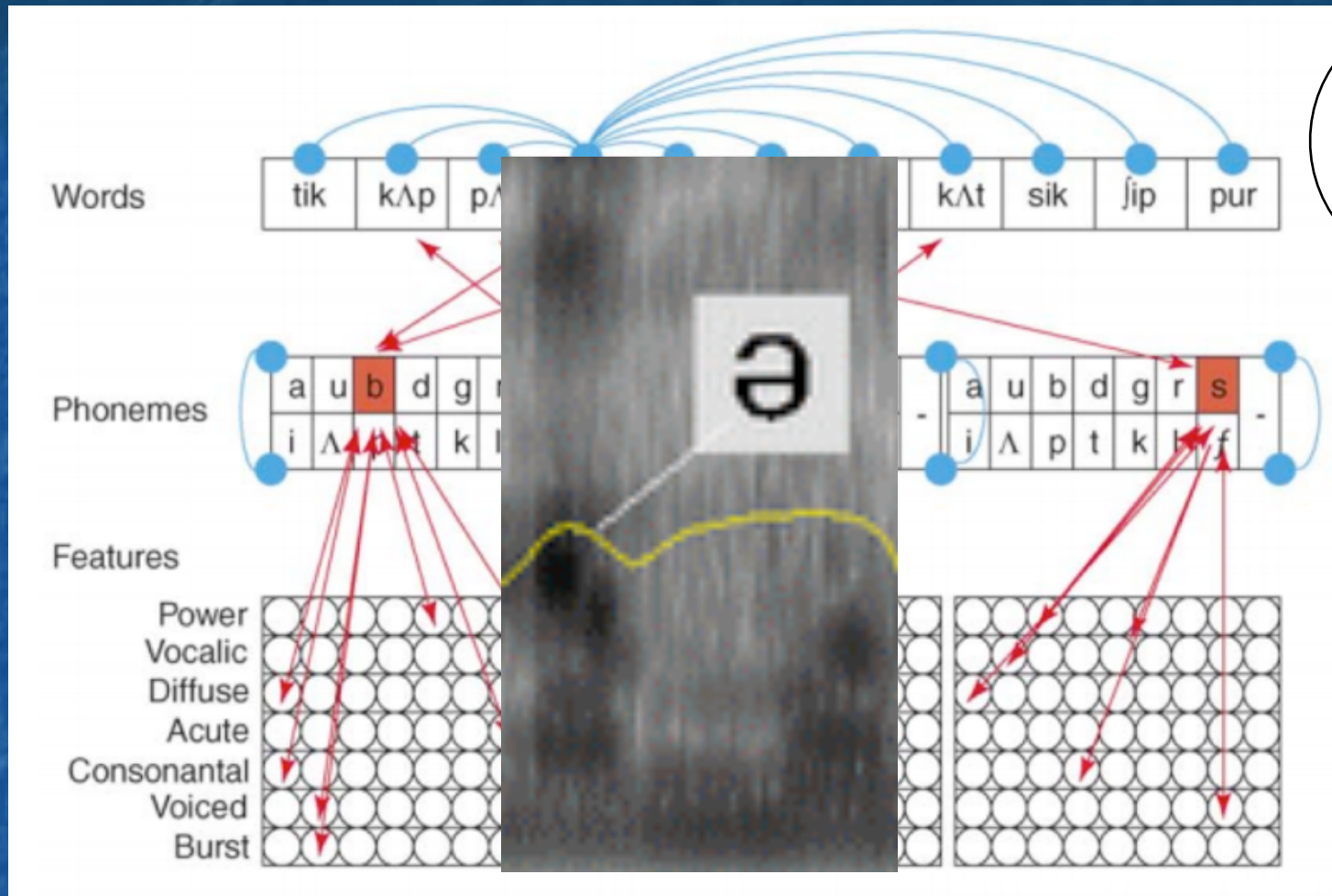


Real spoken language

In a materialist approach, things start with the real world and end up there too. An understanding of the domain suggests one entity – the concrete universal – that is the *essence* of the domain.



# What is to be done?

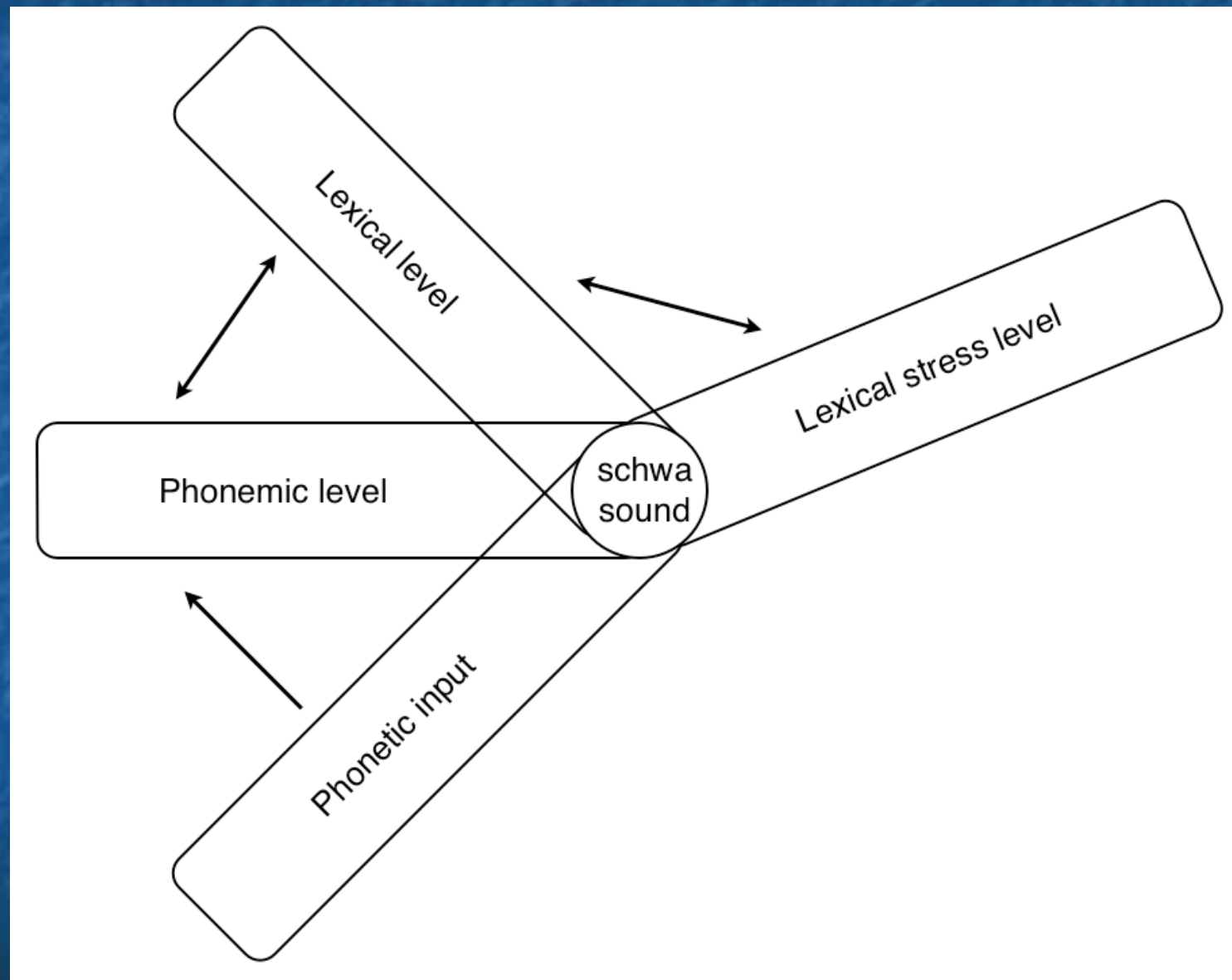
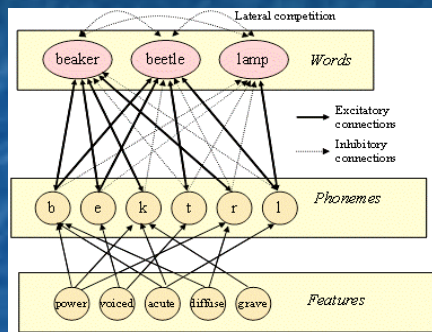


Lexical  
stress

We can think of the simple schwa sound as a piece of real speech that, one way or another, *mediates* everything else in the domain of spoken language.

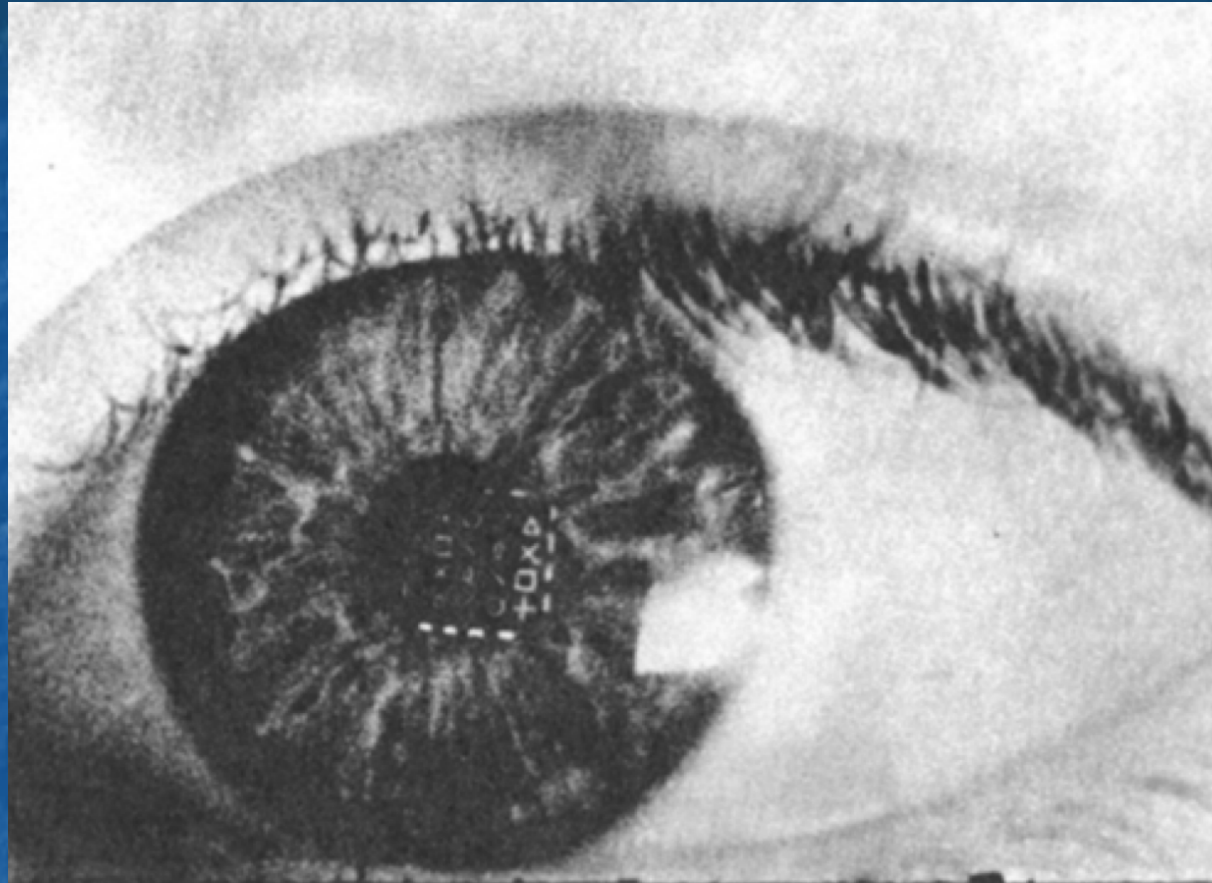
# A concrete approach

## A new version of TRACE – *concrete-TRACE*:



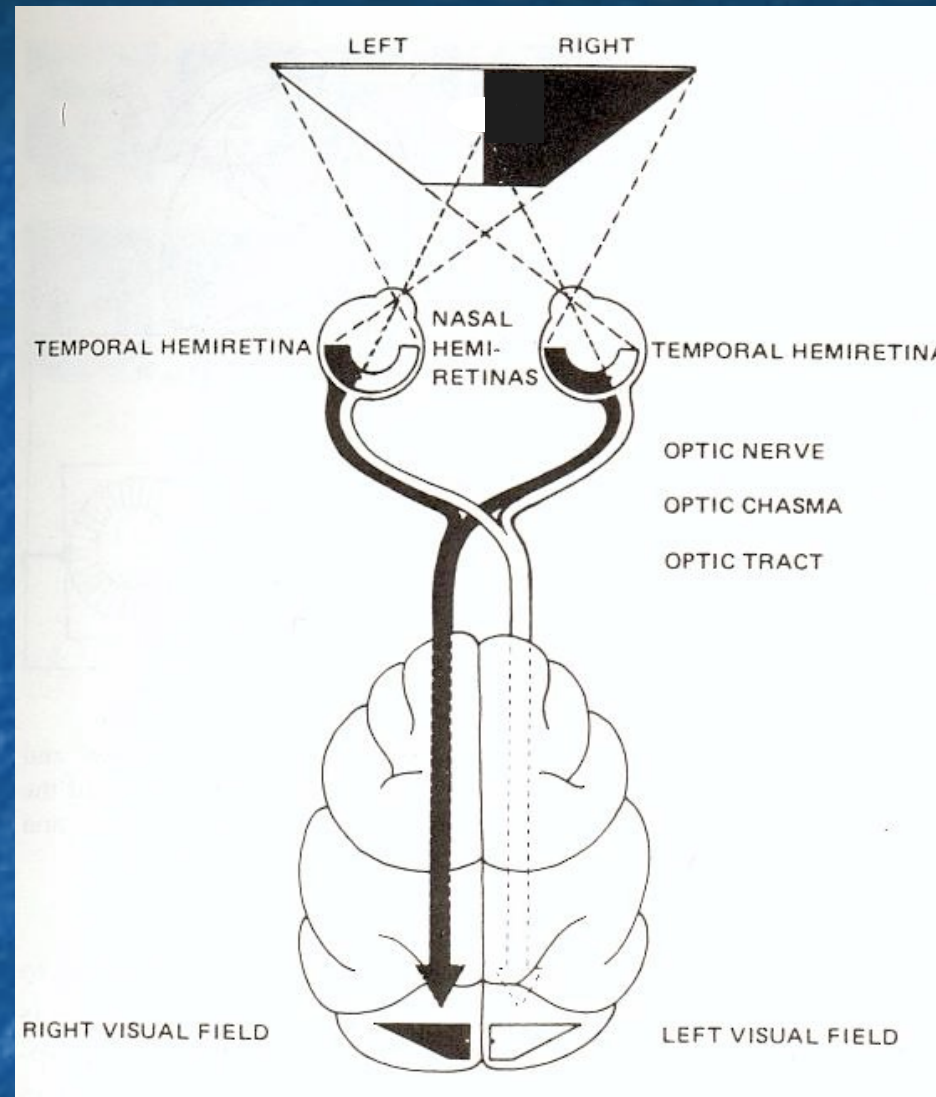


# Neurophysiology and universals



The *orienting reflex* (Pavlov, 1947; Sokolov, 1963), in which the animal orients to novelty, is perhaps a candidate for a concrete universal in the domain of neurophysiology.

# A concrete approach



The division of the visual projection to the cortex and sub-cortex is an attractive candidate for a concrete universal in reading.



# A concrete approach

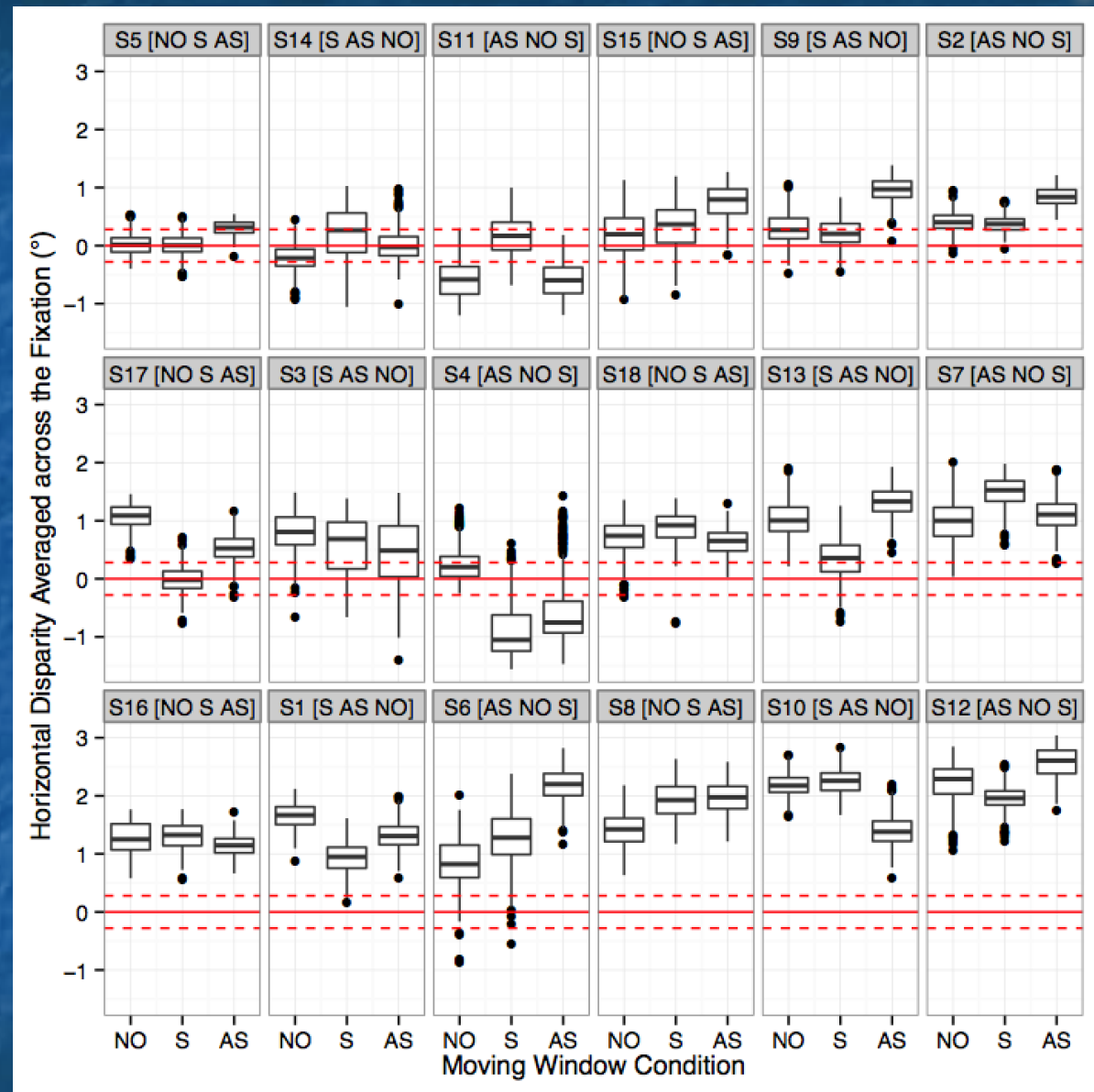
Fixed Effects						
Parameter	Predict	Mdl.Coeff.	Std.Err.	z value		
0	Contralateral; Male; Syll.Brk=Mid; Singular	3.6669	3.6669	0.0873	41.9942	
1	Ipsilateral	3.6500	-0.0169	0.0041	-4.1583	***
2	Male:HQ	4.2047	0.5378	0.2611	2.0598	*
3	Contralateral; Female	3.6330	-0.0339	0.1191	-0.2848	(ns)
4	Male:BeginScore	4.0951	0.4282	0.0774	5.5301	***
5	Male:EndScore	3.3783	-0.2886	0.0444	-6.5037	***
6	Syll.Brk!=Mid	3.6528	-0.0141	0.0049	-2.8517	**
7	Plural	3.6403	-0.0266	0.0067	-3.9910	***
8	log(BNCFreq)	3.7047	0.0378	0.0012	31.4008	***
9	res(log(SbtIFreq))	3.7021	0.0352	0.0017	20.3770	***
10	Female:HQ	4.0271	-0.1437	0.2943	-0.4882	(ns)
11	Male:HQ:BeginScore	3.3082	-1.3247	0.2225	-5.9548	***
12	Male:HQ:EndScore	4.8334	0.9174	0.1108	8.2774	***
13	Female:BeginScore	4.3528	0.2916	0.1045	2.7888	**
14	Female:EndScore	3.5643	0.2199	0.0520	4.2327	***
15	Female:HQ:BeginScore	4.6058	1.1837	0.2714	4.3612	***
16	Female:HQ:EndScore	4.1398	-0.7360	0.1359	-5.4156	***

0: Intercept case. Significance levels: . < 0.1; \* < 0.05; \*\* < 0.01; \*\*\* < 0.001

Random Effects			
Groups	N	Variance	Std.Dev.
Participant	37	0.2292	0.4788
NxtPrDel Pp		0.0005	0.0221

Experimental manipulations that play with the relevant concrete universal really do feel like “carving nature at its joints”, as above.

# A concrete approach

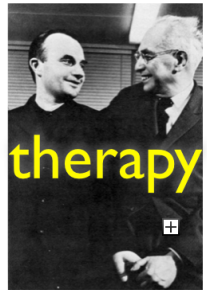


Developments in statistics reveal pervasive individual differences ...

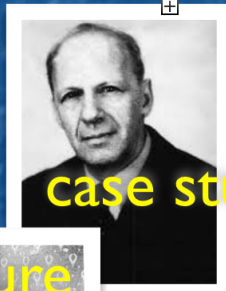


# Idiographic

# Nomothetic



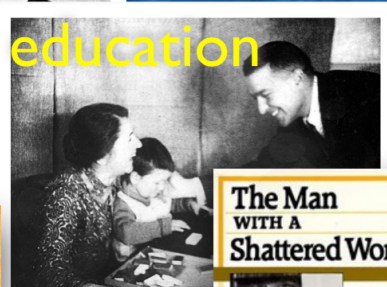
therapy



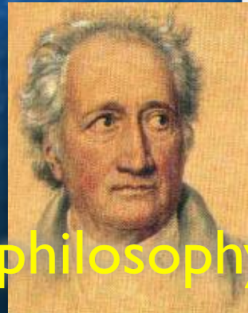
case studies



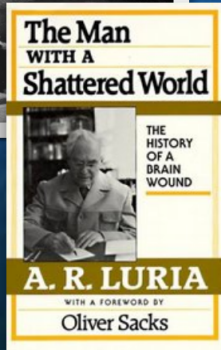
culture



education



philosophy



The Man WITH A Shattered World

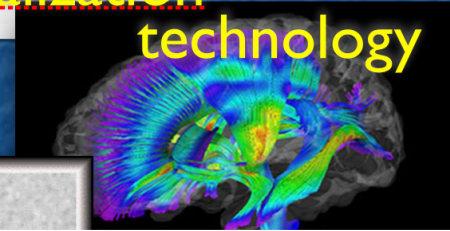
THE HISTORY OF A BRAIN WOUND  
A. R. LURIA  
WITH A FOREWORD BY Oliver Sacks



generalization



experiments



technology



quantification, formalisms

Is this a unified theory of the brain?  
28 May 2008  
From New Scientist Print Edition.  
Gregory T. Huang

13/xx

Philosophical advances (the concrete universal) and data-analytical advances (regression-type statistics) hold out the promise that we can move between the idiographic and nomothetic in revealing ways.

# Overall challenges

Cognitive Science seems to be moving towards integrating the idiographic and nomothetic.

We may be approaching valuing complexity as much as simplicity.

More is beginning to be understood about the domains we have looked at – vision, attention and memory.

The research paradigms we have looked at – laboratory experiments, computational modelling, impaired processing, imaging – all have something to offer to a richer, more integrated Cognitive Science.



# How to revise

Short-answer questions, and a longer (sub-divided question).

Perhaps with one or more partners, look at the slides and your notes.

Be able to say something about the major topics in the slides.

Have a look at the films we watched (all on the [www](#), see References). (Lectures were also filmed.)

Understand the overall points made in the readings listed at the beginning of each lecture.

The References at the end of each lecture are for if you need to check out the meaning of a lecture slide.