PROCESSABILITY THEORY
EIN ANSATZ ZUR ERKLÄRUNG VON SPRACHERWERBSPROZESSEN

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Learnability Theory (Wexler & Culicover) Three approaches

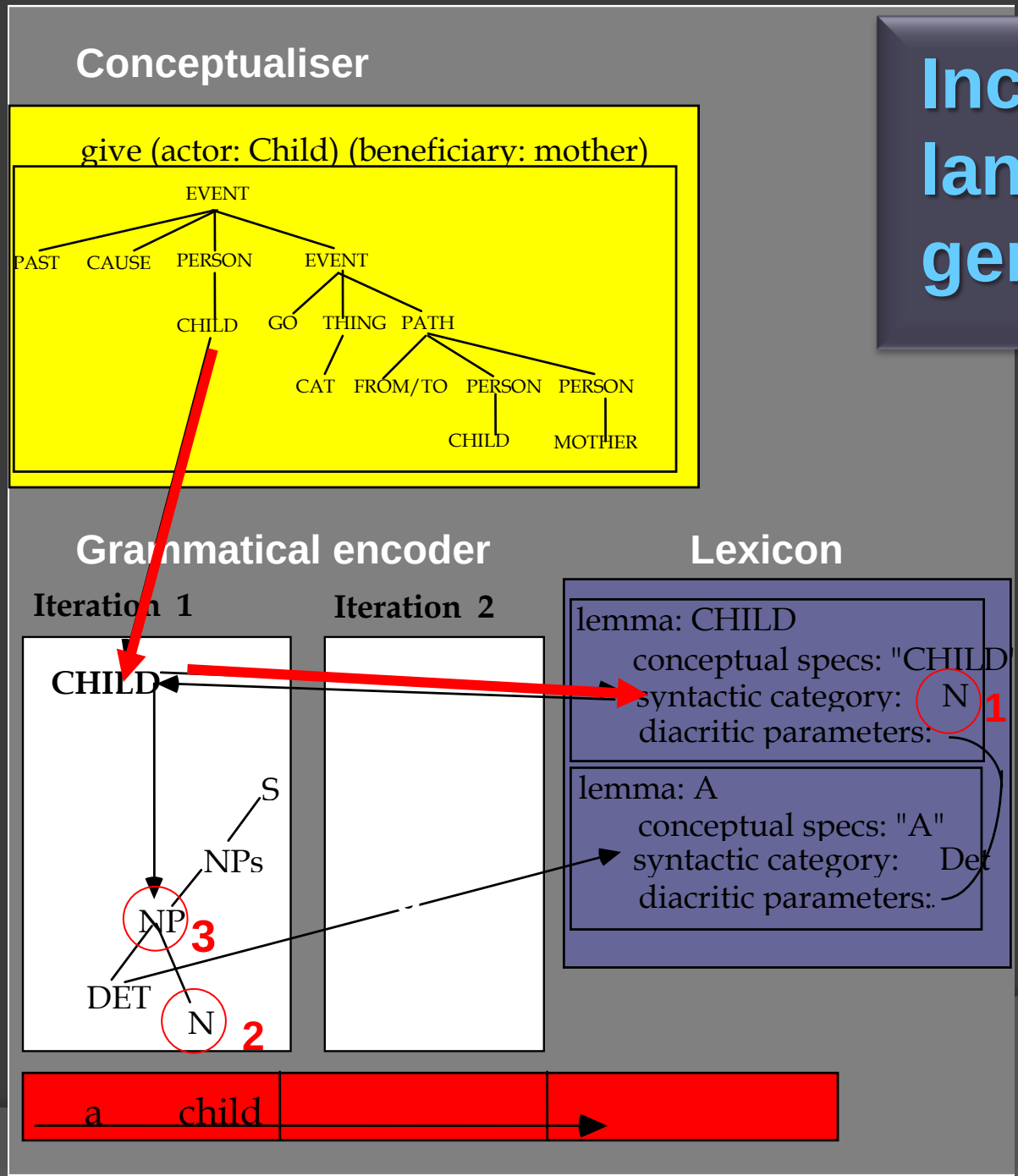
	Parameter Theory	**Constructivism** (e.g.J.Piaget)	**Functionalism** (Bates, MacWhinney)
Target grammar	UG	not applied to language	only fragments
Input	unsystematic	assimilation into schemata	aided by speech adjustments
Learning device	triggering of parameters	complex system self-organisat.	complex system Competition Mod.
Initial state	very rich UG	contains basic learning princ.	no innate linguistic knowledge

Das logische Problem und Das Entwicklungsproblem

- **The logical problem**:
  What is the source of linguistic knowledge?
  - Nature: universal grammar
  - Nurture: form-function relationships
  - PT: unmarked alignment, PT-OT

- **The developmental problem:**
  Why do learners follow universal paths of development?
  - Nature: universal grammar
  - Nurture: interaction
  - PT: gradual development of processing resources

Incremental language generation



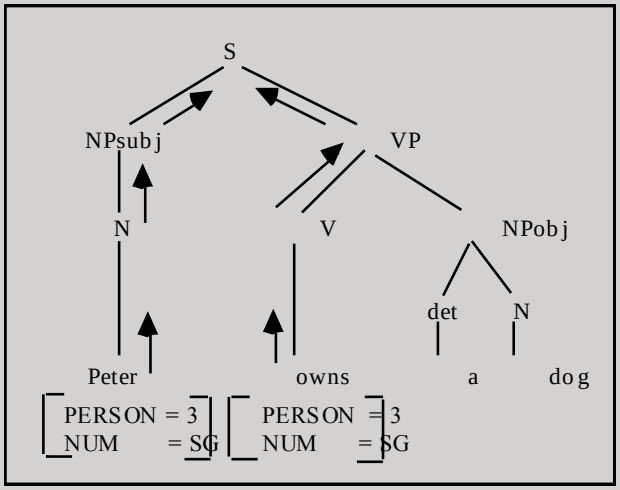
The linearisation problem

Linearity

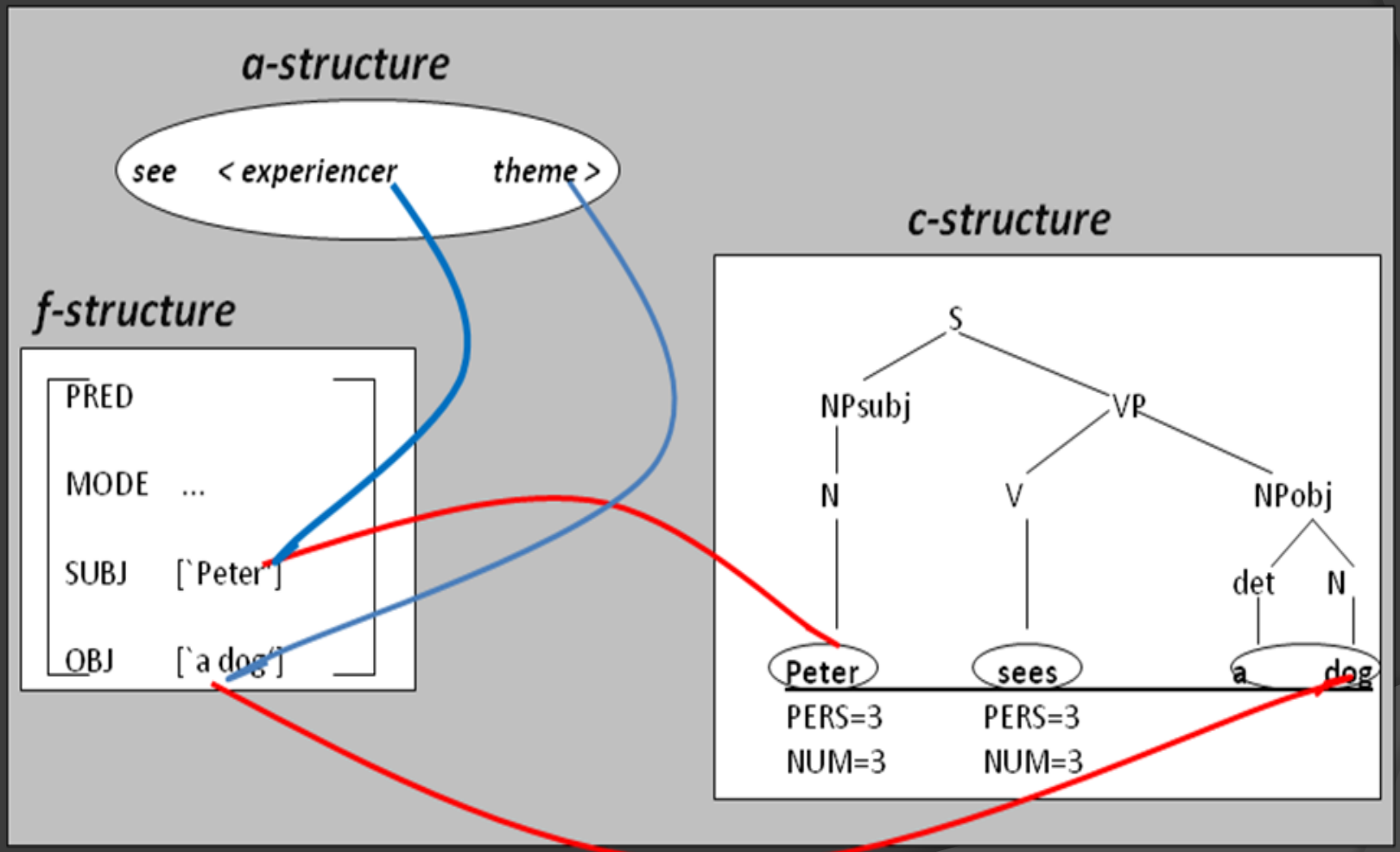
Text: The man rode off **after** he mounted the horse

Events: 2nd event 1st event

Morphology



Lexical-Functional Grammar
(Bresnan 2001)



Hierarchy of processing resources

S-bar procedure	-	-	-	-	+
S-procedure	-	simplified	simplified	inter-phrasal informat. exchange	inter-phrasal informat. exchange
Phrasal procedure (head)	-	-	phrasal informat. exchange	phrasal informat. exchange	phrasal informat. exchange
category procedure (lexical category	-	lexical informat.	lexical informat.	lexical informat.	lexical informat.
word/ lemma	+	+	+	+	+

Processing hierarchy and ESL morphemes

- 1 Lexical morpheme
- 2 Phrasal morpheme
- 3 Inter-phrasal morpheme

- 1 Lexical morpheme: “walk-ed”

Lexical entry

walked V	(PRED)	= “WALKED” (SUBJ) (OBJ)
	(TENSE)	= PAST
	…	

Processing hierarchy and ESL morphemes

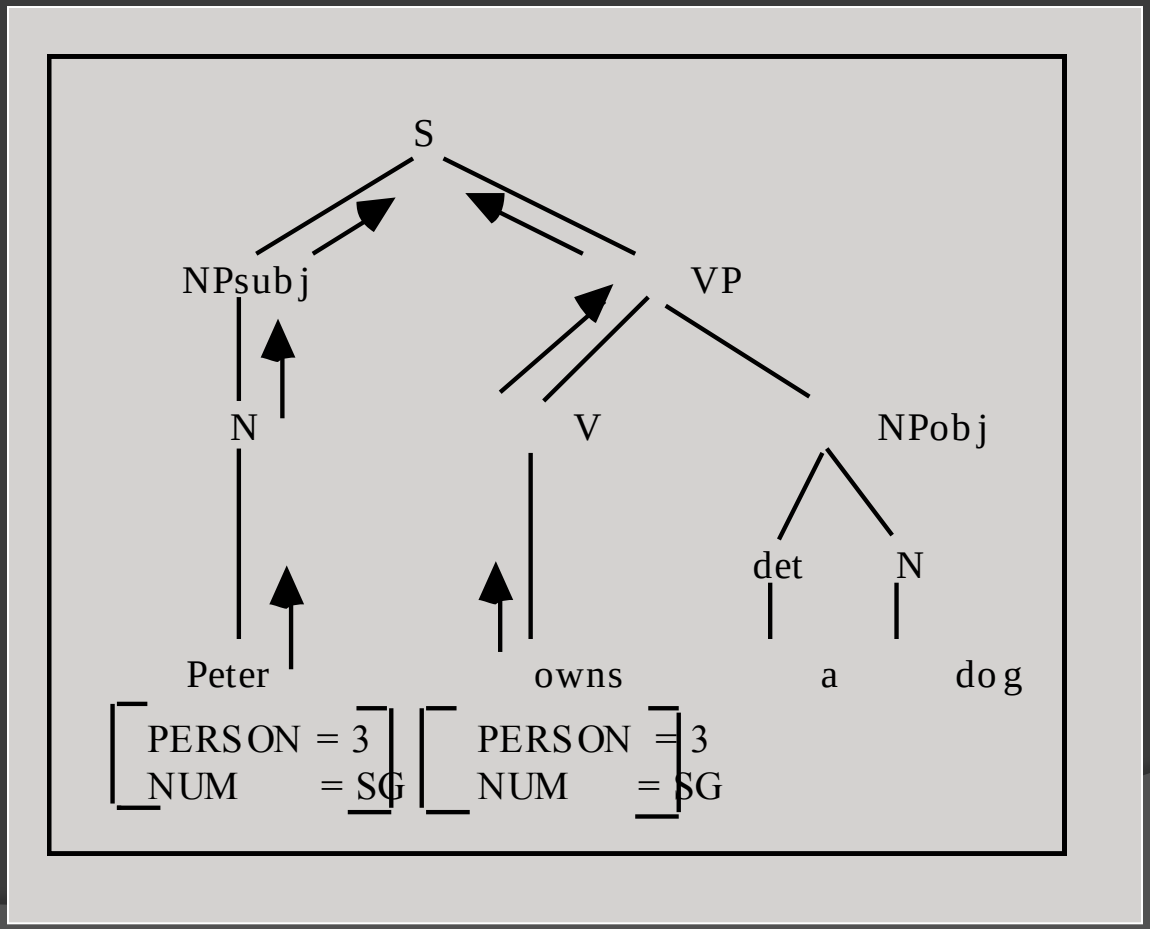
2 Phrasal morpheme: “has walk-ed”

Lexical entry

walked	V	PRED = “WALKED” (SUBJ) (OBJ)
		PARTICIPLE = PAST
		INF = +
		…
has	V	PRED = “HAVE, V-COMP (SUBJ)”
		TENSE = PAST
		AUX = +
		V-COMP PARTICIPLE = PAST
		V-COMP INF =c +

Processing hierarchy and ESL morphemes

3 Inter-phrasal morpheme "*Peter owns a dog*"



Developmental features: English

Stage	Phenomena	Examples
6	Cancel Aux-2nd	I wonder what he wants.
5	Neg/Aux-2nd-? Aux-2nd -? 3sg-s -	Why didn't you tell me? Why can't she come? Why did she eat that? What will you do? Peter likes bananas.
4	Copula S (x) V-Particle	Is she at home? Turn it off!
3	Do/Wh/Aux-SV(O)-? Adverb-First Poss (Pronoun)	Do he live here? Today he stay here. I show you my garden. This is your pencil.
2	S (neg) VO SVO-Question -ed Plural –s (Noun)	Me live here. Me no live here. You live here? John played I like cats.
1	Words Formulae	Hello, Five Dock, Central How are you? Where is X? What's your name?

Inter-phrasal morph.

Lexical morphemes

Implicational analysis of a cross-sectional corpus

(Johnston 1997)

S

VP

Stage	Structure	1:7	1:4	1:2	1:3	2:3	1:5	2:2	2:1	2:5	2:4	1::6	2.6	1:1
6	Cancel Inversion	/	/	/	/	/	/	/	/	/	-	-	+	+
5	Aux2nd/ Do2nd	/	/	-	-	+	/	+	+	+	+	+	+	/
	3 sg-s	-	-	-	-	+	+	+	+	+	+	+	+	+
4	Y/N Inversion	/	-	+	+	+	/	+	+	+	+	/	+	/
	Particle verbs	/	-	+	+	+	+	+	+	+	+	+	+	+
	Copula Inversion	/	-	+	+	+	/	+	+	+	+	+	+	/
3	Neg+V	+	+	+	+	+	+	+	+	+	+	+	+	+
	Do Front.	/	/	+	/	/	/	+	+	+	+	/	+	/
	Topi	+	+	+	+	+	/	+	+	+	+	+	+	+
	ADV	+	/	+	+	+	+	+	+	+	+	/	+	+
2	SVO	+	+	+	+	+	+	+	+	+	+	+	+	+
	Plural	+	+	+	+	+	+	+	+	+	+	+	+	+
	poss. pro	+	+	+	+	+	+	+	+	+	+	+	+	+
	object pronoun	+	+	+	+	+	+	+	+	+	+	+	+	+
1	single words	+	+	/	/	/	+	/	/	/	/	/	+	/

L2 syntatic development in Germanic languages (selected structures)

PT level	**ESL syntax**	**Swed. L2 syntax**	**GSL syntax** (Meisel et al.)
6 •	Cancel INV	---	V-Final
5 •	**Do2nd, Aux2nd**	**V2**	**V2**
4 •	Y/N inv, copula inv	---	V-Front
3 •	ADV-1st WH-1st Do-1st,	ADV-1st WH-1st	ADV 1st, WH-1st
2 •	SVO	SVO	SVO
1 •	invariant forms	invariant forms	invariant forms

(R3a) S' → (V) S

{ aux =c +
ROOT =c +
SENT MOOD =c INV }

(R2a) S'' → (XP) S'

{ wh =c +
adv =c +
SENT MOOD = INV }

(R2) S' → (XP) S/ event

{ wh =c +
adv =c + }

(R1a) Event → agent action …

(R1) S → NP_{subj} V (NP_{obj}) (ADJ) (S)

Recall:
ESL development (unification)

	Processing procedures	L2 process	Syntax	morphology
6	sub. clause procedure	main and sub clause	cancel INV	
5	S-procedure	inter-phrasal inform.	INV	SV-agreement
4	VP-procedure	phrasal inform.	SEP	
3	phrasal procedure	phrasal inform.	ADV	phrasal agreement
2	category procedure	lexical information	canonical order	past-ed
1	word/ lemma	'words‘	single constituent, invariant forms	

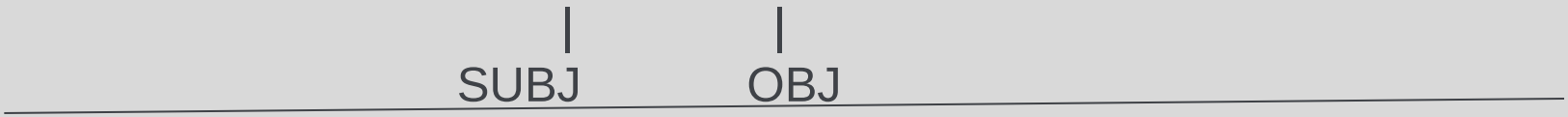
The case of German L1 and L2 acquisition
(Clahsen 1987; Meisel 1991)

PT level	L1 German	Examples	L2 German	Examples
6	**---**	[dass]$_{comp}$ [Mama]$_{SUBJ}$ nach Hause [geht]$_{V}$	**V-final**	[dass]$_{comp}$ [Peter]$_{SUBJ}$ nach Hause [gehen]$_{V}$ [hat]$_{V}$
5	**V2**	[Dann]$_{ADV}$ [geht]$_{V}$ [Mama]$_{SUBJ}$ nach Hause	**INV**	[Dann]$_{ADV}$ [hat]$_{V}$ [Peter]$_{SUBJ}$ nach Hause [gehen]$_{V}$
4	**---**		**SEP**	* [Dann]$_{ADV}$ [Peter]$_{SUBJ}$ [hab]$_{V}$ nach Hause [gehen]$_{V}$
3	**---**		**ADV**	* [Dann]$_{ADV}$ [Peter]$_{SUBJ}$ [geh]$_{V}$ nach Hause
2	**SOV**	[Mama]$_{SUBJ}$ hause [geht]$_{V}$	**SVO**	Peter geh Italien
1				

Lexical Mapping

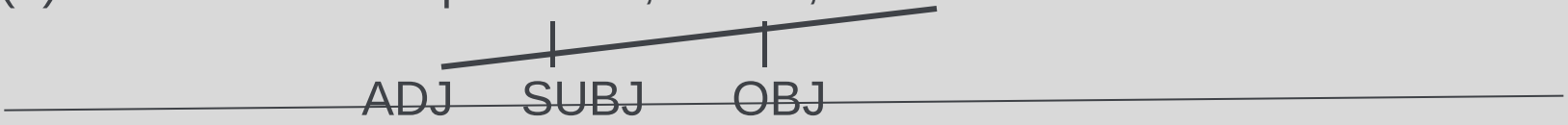
(1) *Peter saw a dog*.

(2) see <experiencer, theme>



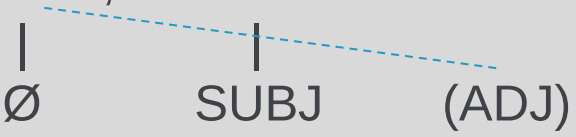
(3) Yesterday Peter saw a dog.

(4) see <experiencer, theme, locative>



(5) *A dog was seen by Peter*.

(6) seen <experiencer, theme>



Lexical Mapping Theory 1

- **A-structure consists of a predicator and its argument roles:**

give ___ < *agent* *beneficiary* *experiencer* >

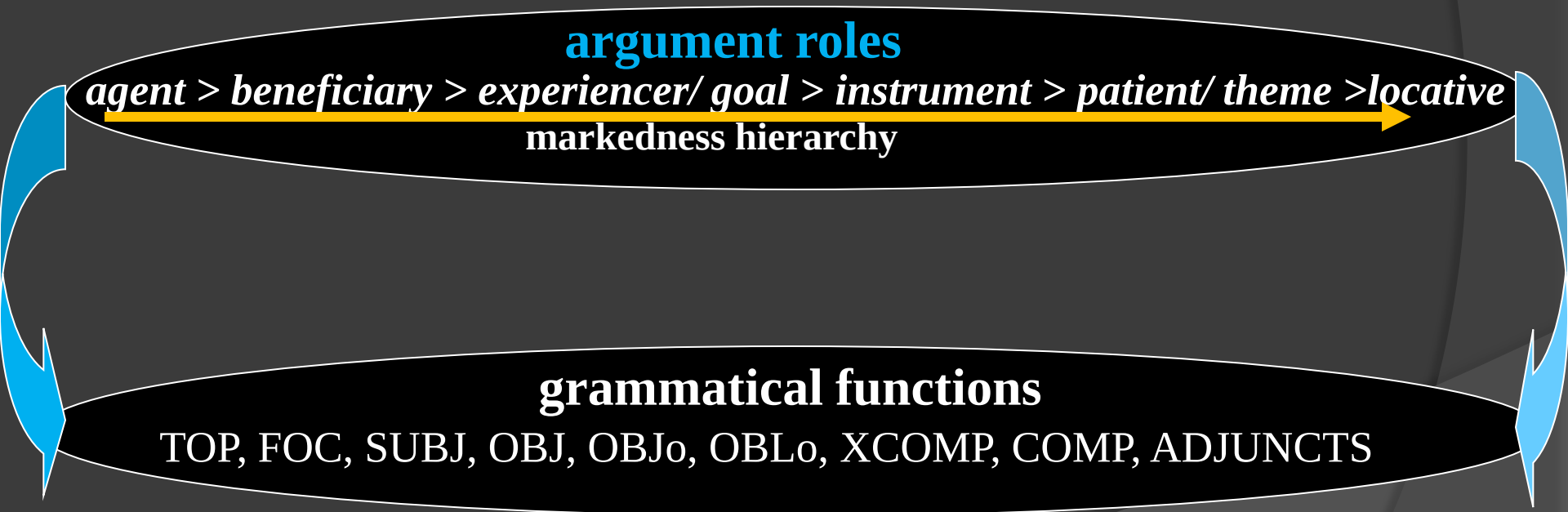
- **Argument roles follow their markedness in the thematic hierarchy**

Thematic hierarchy

agent > beneficiary > experiencer/ goal > instrument > patient/ theme > locative

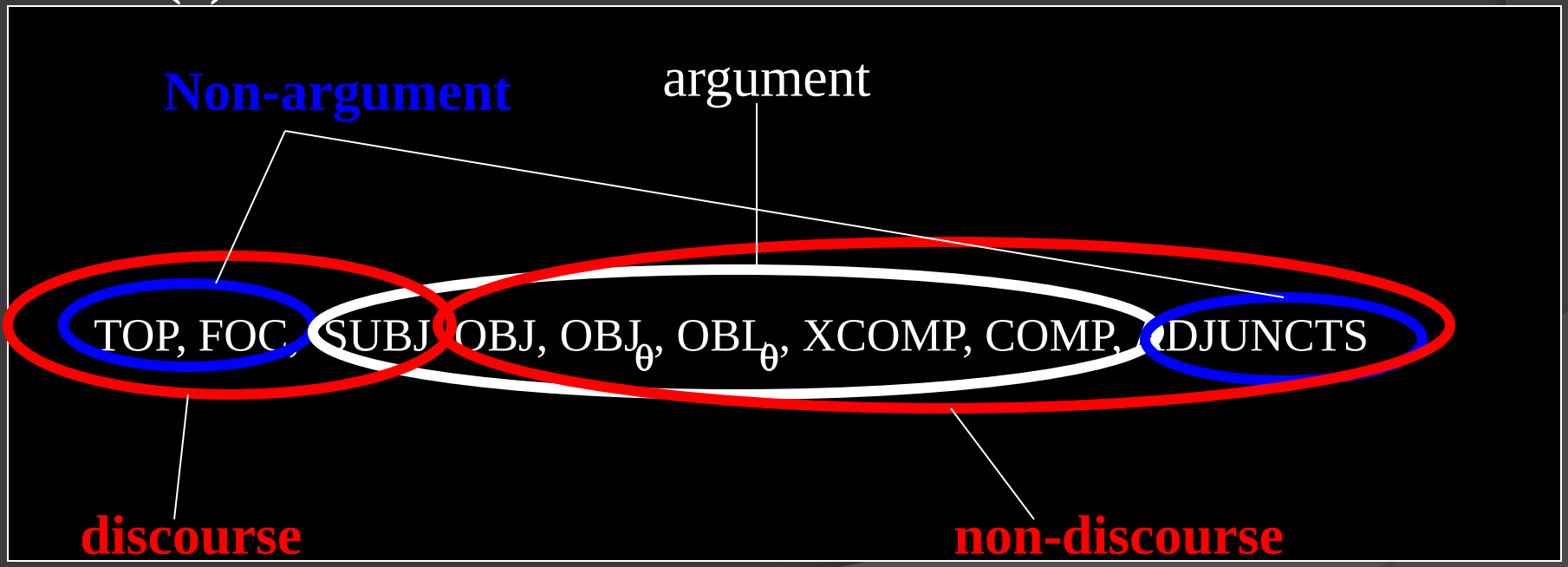
Lexical Mapping Theory 2

- Argument roles are mapped onto grammatical functions:



Lexical Mapping Theory 3

- **Two dichotomies apply to grammatical functions**
  (1) argument functions vs. non-argument functions
  (2) discourse functions vs. non-discourse functions



Lexical Mapping Theory 4

Principles of mapping a-structures onto grammatical functions

- DEFAULT: If the given role is the first argument of the predicator and it is the most prominent role classified [-o], it has to be mapped onto the subject function.

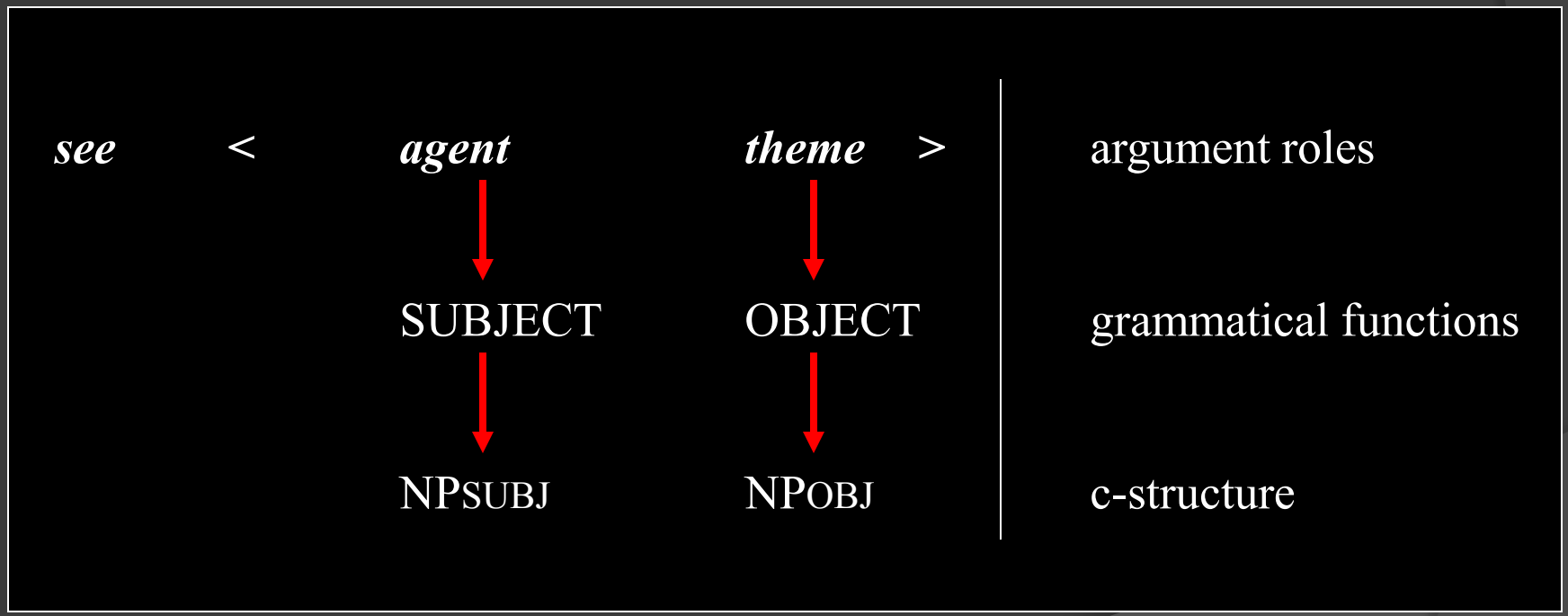
- If the given a-structure does not contain such a role, a non-agentive role marked [-r] has to be mapped onto the subject function. All other roles are mapped onto the lowest compatible grammatical function on the following hierarchy:

  SUBJ > OBJ, OBJθ > OBLθ

(cf. Bresnan 2001, 309).

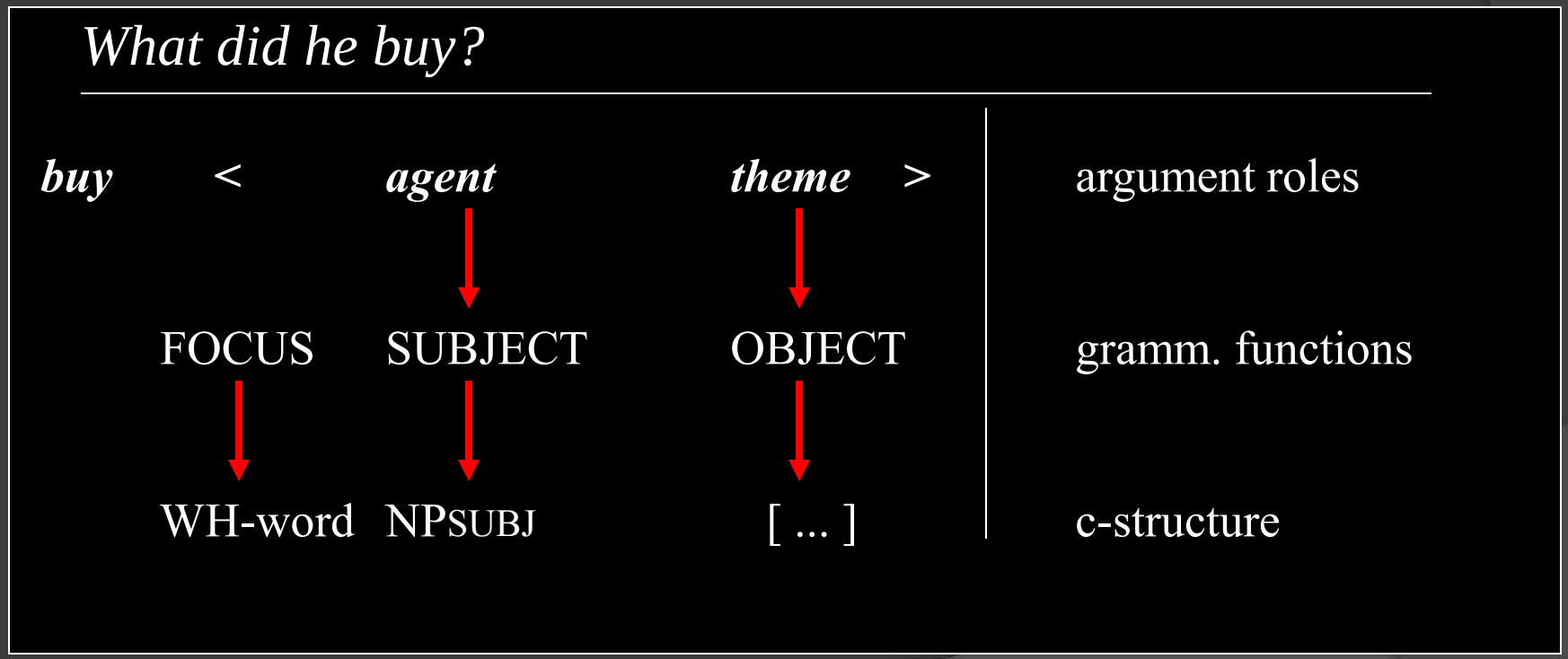
Linearity and lexical mapping 1

Linear mapping



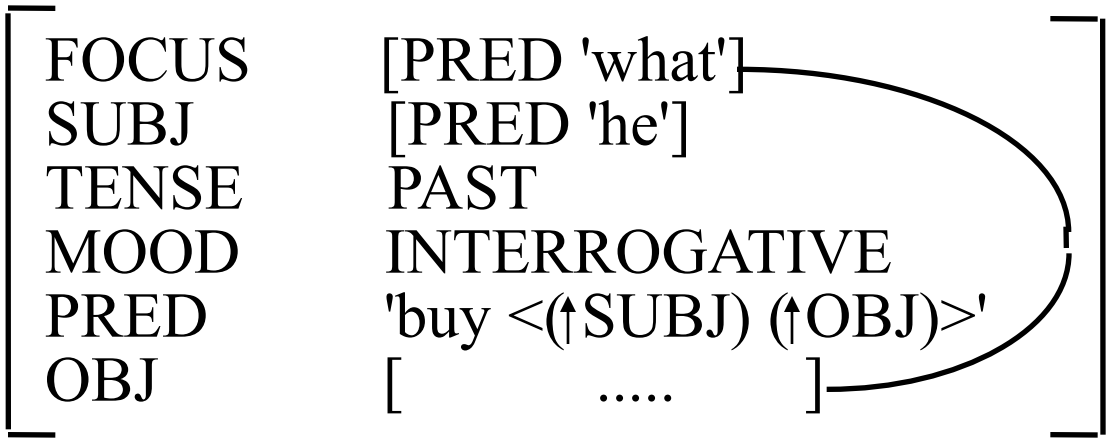
Linearity and lexical mapping 2

Non-linear mapping: *argument structure*

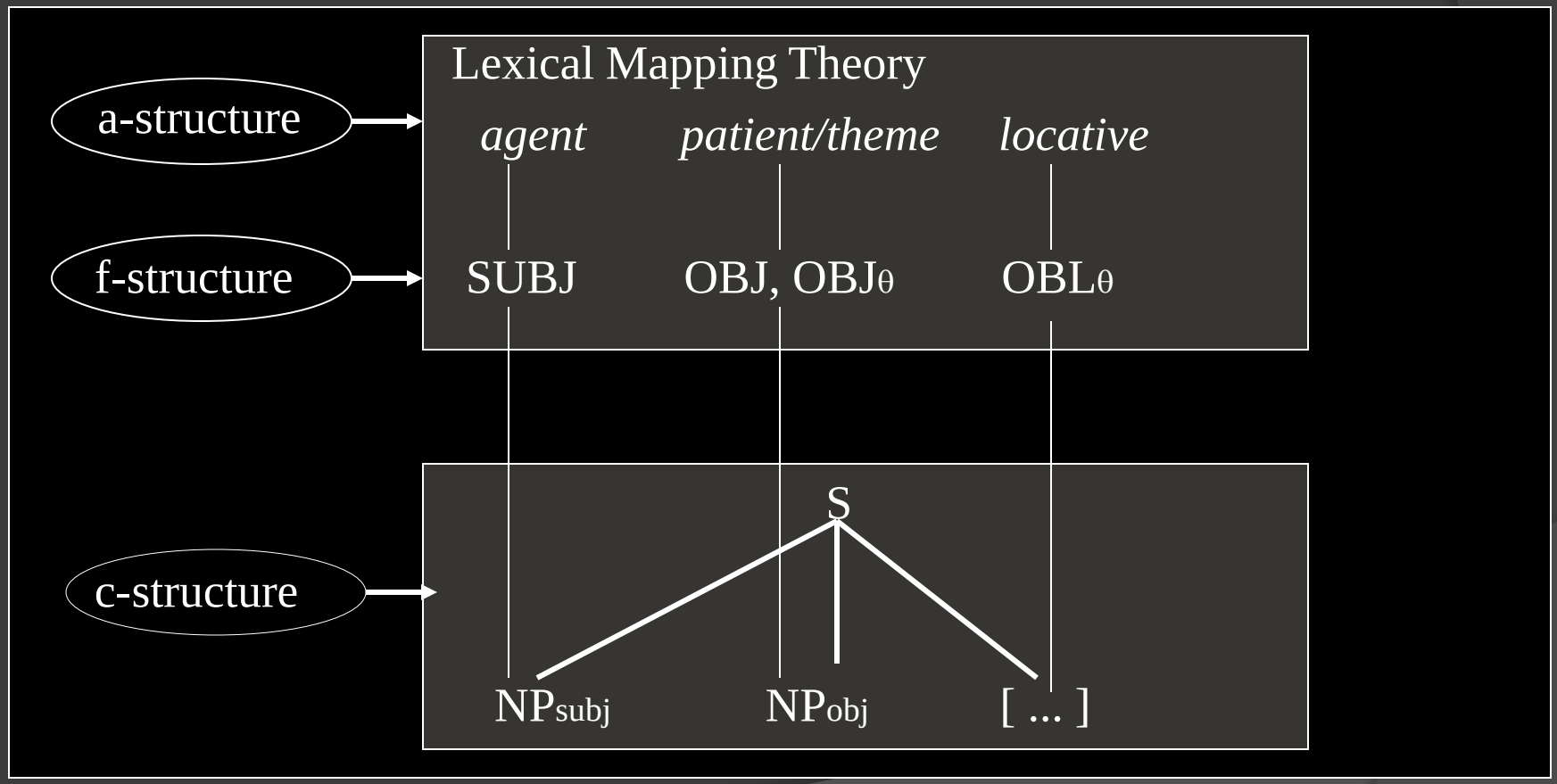


Linearity and lexical mapping 3

Non-linear mapping: *f-structure*

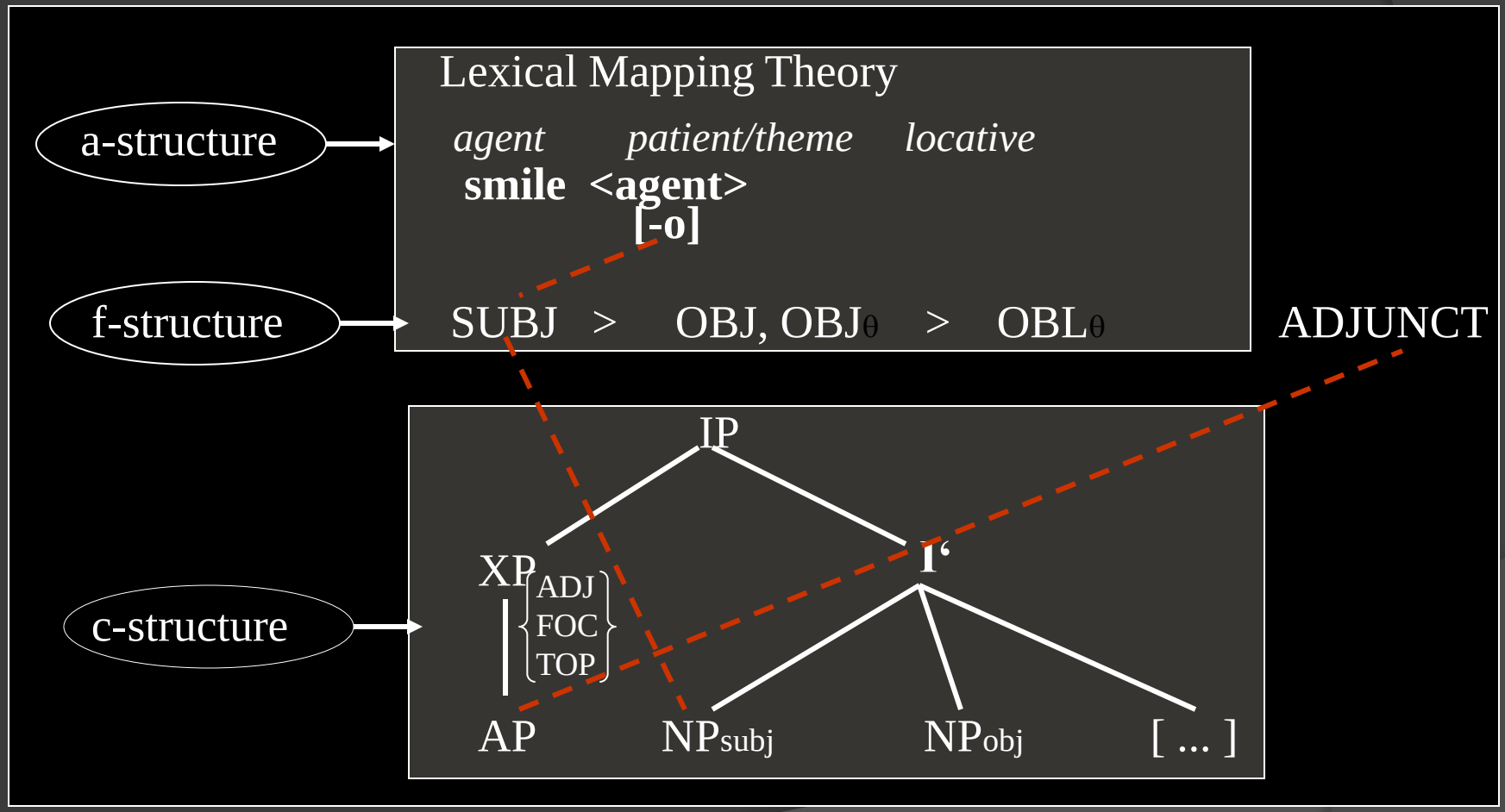


The initial hypothesis of syntax (= UNMARKED ALIGNMENT).



XP-adjunction in interlanguage

Correspondence principle:
Constituents adjoined to XP are non-argument functions TOP, FOC or ADJUNCT



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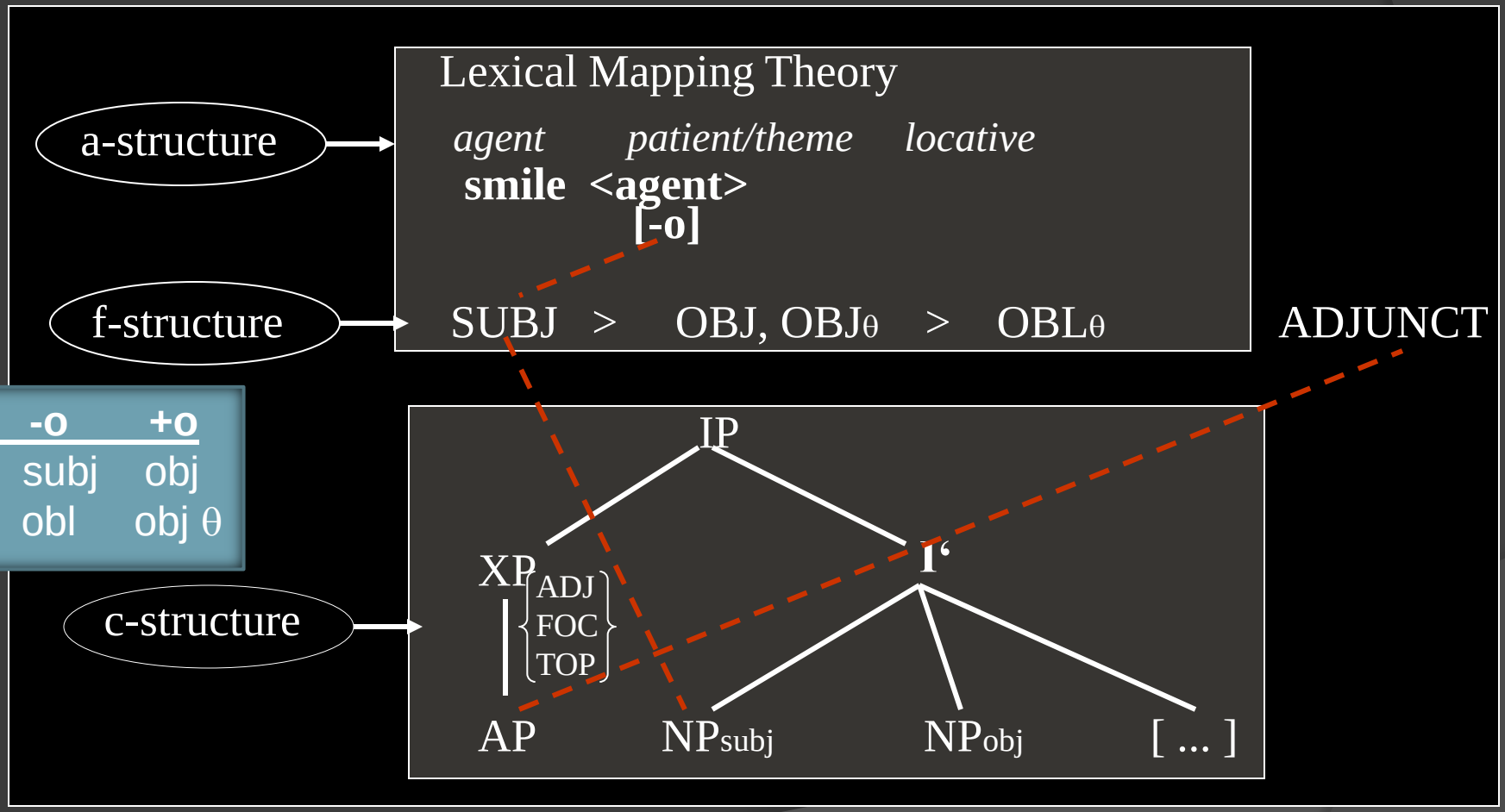
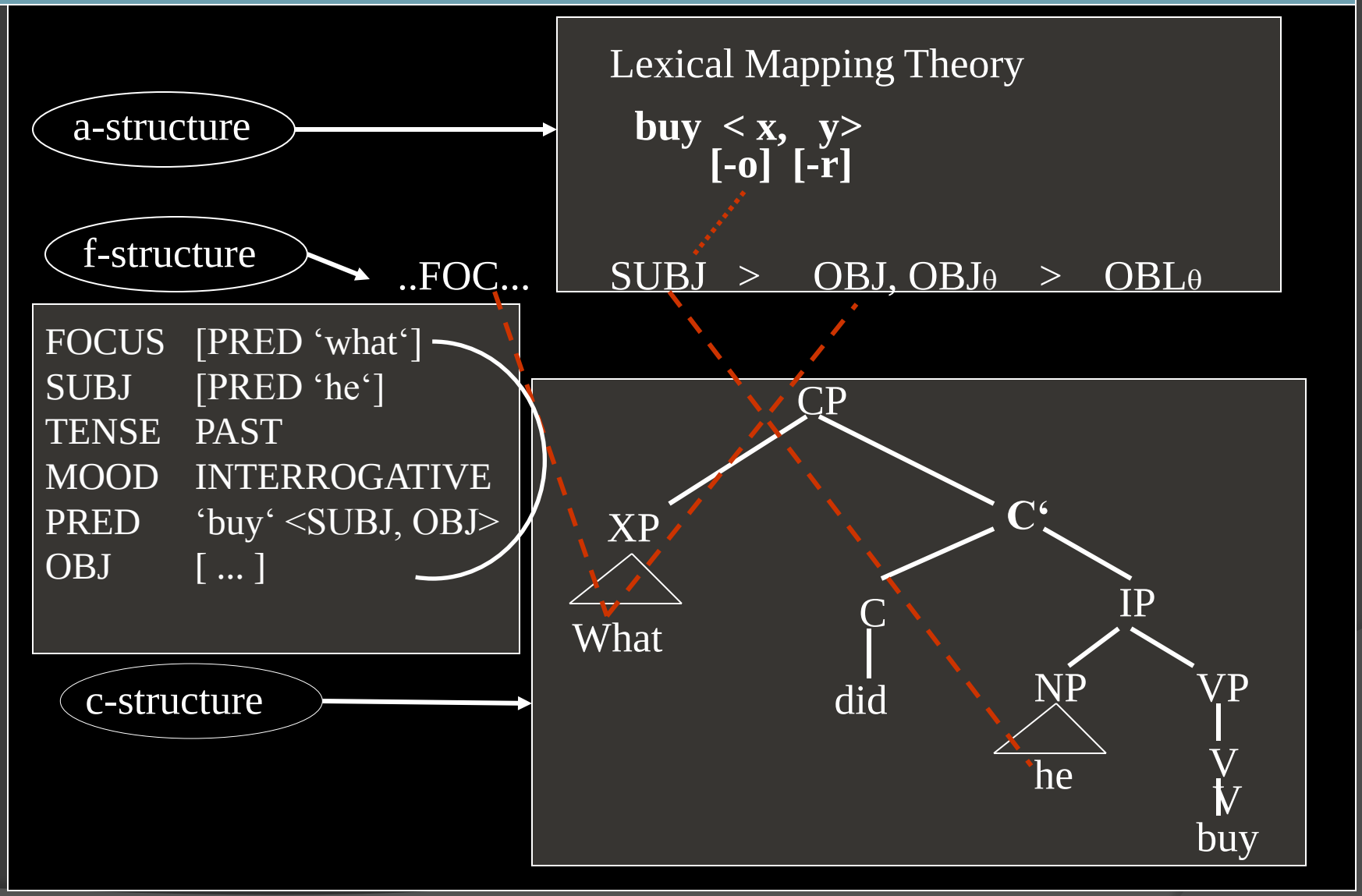


Lexical mapping in WH-questions



The Lexical Mapping Hypothesis

a- to f- structure mapping	***Structural outcomes***
Non-default, complex mapping.	Complex predicates e.g. Causative (in Romance languages, Japanese, Finnish ...)
↑	↑
Non-default mapping. (single clause)	Passive (Japanese) Exceptional verbs
↑	↑
Default mapping, ie. Most prominent thematic role is mapped onto SUBJ.	Canonical Order

The TOPIC Hypothesis

Discourse principle	***c- to f- mapping***	***structural outcomes***
Topicalization of core arguments	TOP = OBJ	The TOP function is assigned to a *core* argument other than SUBJ.
↑	↑	↑
XP adjunction	TOP = ADJ	Initial constituent = adjunct or a FOCUS WH-word. TOPIC differentiated from SUBJECT
↑	↑	↑
Canonical Order	SUBJ = default TOP	TOPIC and SUBJECT are not differentiated.

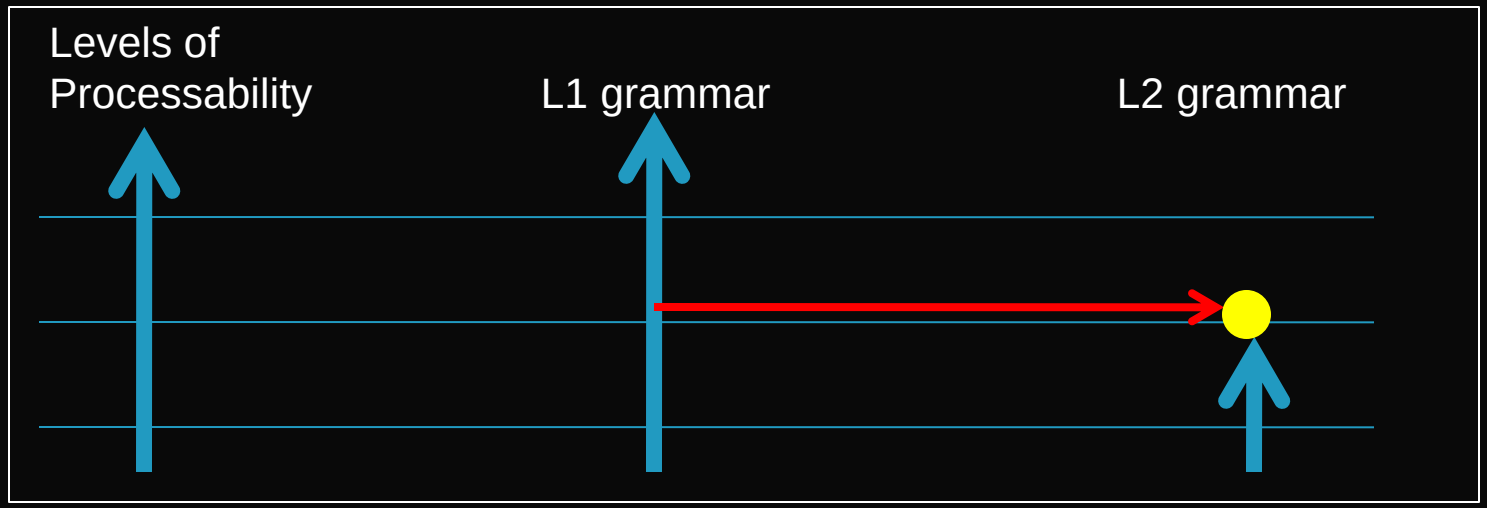
Predictions for ESL development

Process. procedure	unification	morphology	syntax	mapping
6 • subordinate clause. procedure	main and sub clause		Cancel INV	
5 • S-procedure	inter-phrasal - S	SV agreement (= 3sg-s)	Do2nd, Aux2nd TOPI	1st argument = core argument ≠ [-o] uncertainty
4 • VP-procedure	inter-phrasal - VP	tense agreement	Y/N inv, copula inv	
3 • NP- procedure	phrasal	NP agreement	ADV 1st, WH-1st Do-1st,	• 1st argument = discourse fn or ADJUNCT, rest=direct mapping
2 • category procedure	lexical morphemes	plural possessive pro	canonical order	1st argument = SUBJ (default)
1 • word/ lemma	'words‘	invariant forms	single word	no mapping

Processability Theory and L1 transfer

Pienemann, Di Biase, Kawaguchi & Håkansson 2002

1. L1 transfer is developmentally moderated.
   "One can transfer only structures which one can process."
   = L1 transfer may occur when the given structure can be processed, not before.



2. The initial hypothesis of syntax is created by the unmarked alignment of argument structure, functional structure and constituent structure and on the structure of the L2. (Based on LFG and processing constraints)

Processability constrains L1-transfer

Name	SVO	advSVO	V2
Gelika (Year 1)	+	-	-
Emily (Year 1)	+	-	-
Robin (Year 1)	+	-	-
Kennet (Year 1)	+	-	-
Mats (Year 2)	+	-	-
Camilla (Year 2)	+	-	-
Johann (Year 1)	+	+	-
Cecilia (Year 1)	+	+	-
Eduard (Year 1	+	+	-
Anna (Year 1)	+	+	-
Sandra (Year 1)	+	+	-
Erika (Year 1)	+	+	-
Mateus (Year 2)	+	+	-
Karolin (Year 2)	+	+	-
Ceci (Year 2)	+	+	-
Peter (Year 2)	+	+	-
Johan (Year 2)	+	+	+
Zandra (Year 2)	+	+	+
Zofie (Year 2)	+	+	+
Caro (Year 2)	+	+	+

	SVO	advSVO	V2
Swedish	+	-	+
German	+	-	+
English	+	+	-

The effect of 30 minutes' exposure to L2 Swedish with L1 German

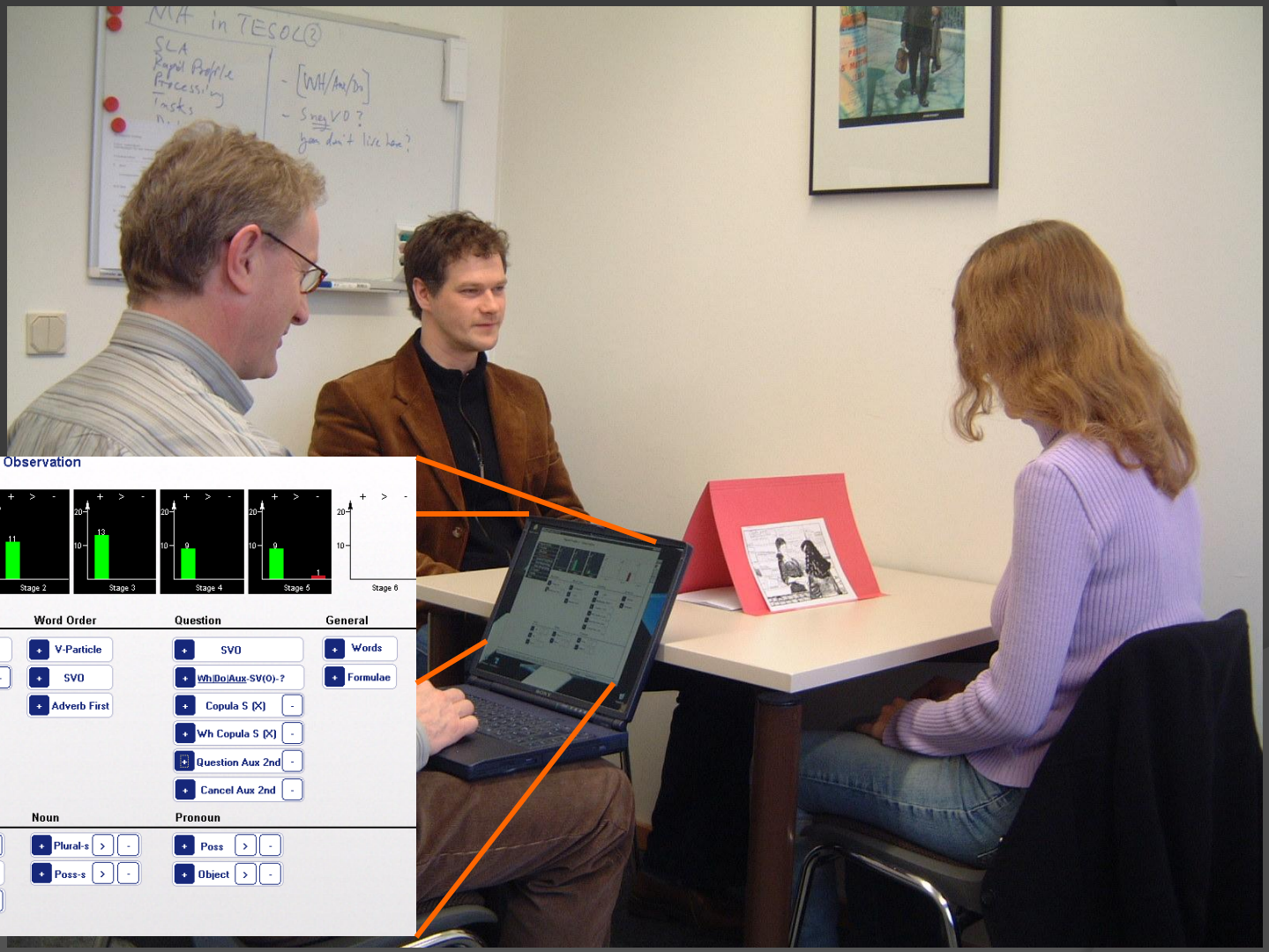
	SVO	advSVO	V2
Swedish	+	-	+
German	+	-	+
English	+	+	-

Informant	SVO	*adv SVO	V2	L2 = V2?	Swedish before?	Imitation of V2
C03	+	14	-	-	-	16
C05	+	25	-	-	-	14
C07	+	-	-	-	-	10
C04	+	-	-	-	-	20
C01	+	30	-	+	+	30
C02	+	15	-	+	+	15
C06	+	13	-	+	-	9

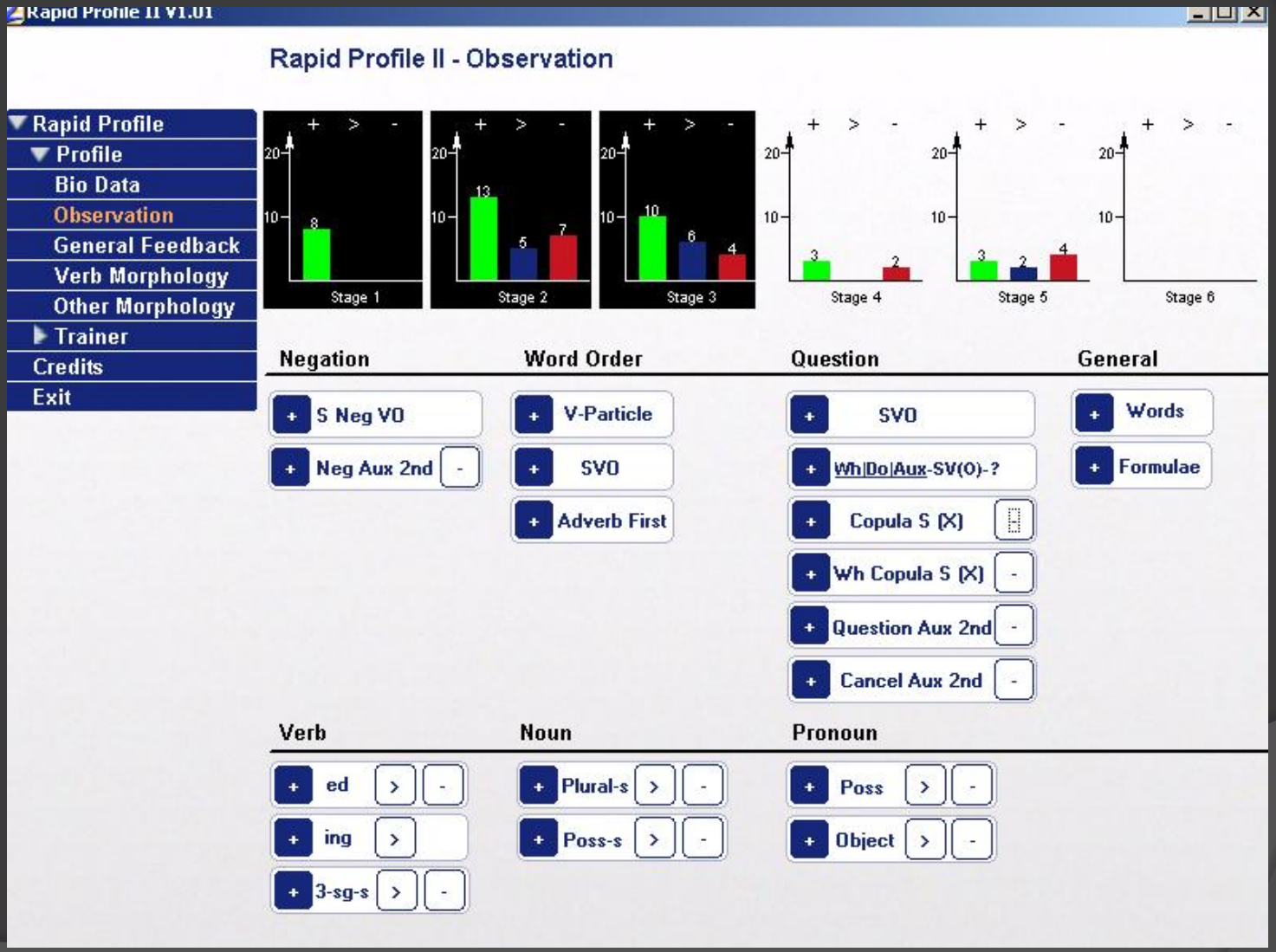
Outlook: What PT can do

- Universal matrix for L2 development,
- Cross-linguistically valid,
- Basis for study of L1 transfer,
- Basis for the comparison of L1, L2, SLI etc
- Basis for L2 assessment → Rapid Profile
- Basis for automatic profiling (Bi-jar Lin)
- Basis for measuring bilingual development,
- Basis for the teachability hyopthesis.

Rapid Profile: setup



Rapid Profile: observation form



The architecture of AutoProfiling