

# Reflections on language, cognition, normativity and evolution

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## Introduction

The DS- Predictive-Processing (PP) model fit

Groups as adaptive units: Multi-Level Selection Hypothesis MLSH

Narratives in language evolution: increasingly invoking *interaction*

The DS attempt at evolution, following MLSH

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  - Unique niche within Multi-level Selection model of evolution as a practice directly inducing and buttressing groups (if we can get it right!)

Modelling incremental build-up as the language system led to a whole range of solutions to cross-linguistic puzzles:

- anaphora, quantifier, tense interactions

Kempson et al 2001, Gregoromichelaki 2006, Cann 2011

- relative clause construals, cleft structures

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- left-right asymmetries (Greek): Gregoromichelaki 2013, Chatzikyriakis 2016, ...

- word-order effects (Japanese, Korean, Rangi, Bantu, Chinese)

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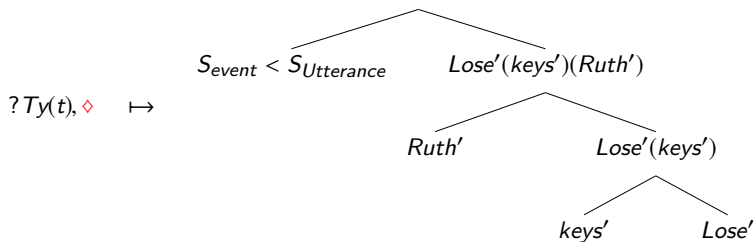
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- ellipsis heterogeneities  
(Purver et al 2005, Ashghi et al 2011, 2015, Kempson et al 2015)
- conversational dialogue dynamics  
(Gregoromichelaki et al 2013a,b, Purver et al 2014, Kempson et al 2016, Hough 2015)

# Building up a tree constructively by either party

Building up content representations as expectation-driven context-dependent, tree-growth from emerging word-sequence

Producing/parsing: R: *I lost* M: *the keys* R: *No, my bag*

$Lose'(keys')(Ruth')(S_{event} < S_{utterance}), \diamond$



Production and parsing operate in tandem, each update interpreted relative to agent's own context

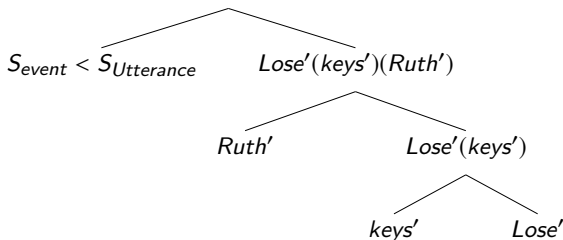
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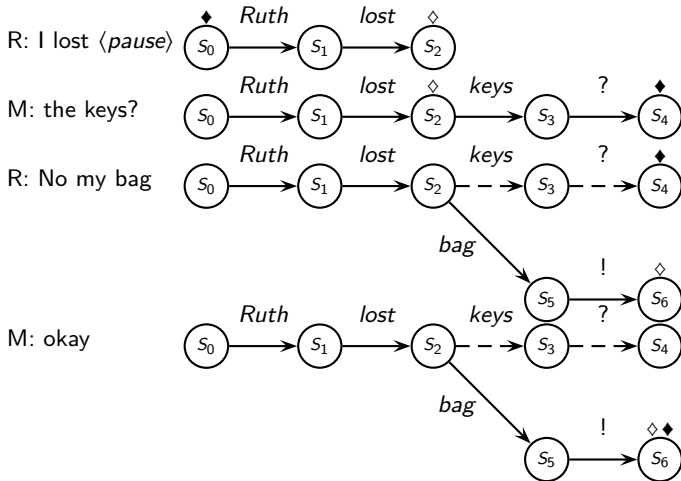
Producing words makes manifest a sequence of actions - affordances ('what the environment offers the agent' Gibson)

Words may guide actions, determine edges, indicate corrections.....

# Interaction Control State, DAG, as an affordance

Utterance

M's Context After Utterance



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# PPT Perception as action: Guesses in face of uncertainty

- ▶ A generative probabilistic model: constantly predicting information to associate with incoming signal (estimating state of world relative to own uncertainty), with prediction errors as driving force. A.Clark 2016
- ▶ Incoming signal provides the filter to check/correct/modify the best top-down guesses, changing moment by moment
  - Brain specifies in parallel several potential actions (*affordances*) which compete against each other for further processing until all but one eliminated (*affordance competition hypothesis*)
- ▶ Context is everything: brains are “lazy” predictive engines, using their own immediate/encyclopedic context to continuously generate predictions of structure/shape of the incoming sensory array.

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- ▶ The system is self-organising, learning from routinised guesses filtered by progressive ongoing flow of input stimuli

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**With one gap of probabilistic base (ongoing research task), parallelism opens up potential for evolution narrative**

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**Selfishness beats altruism within groups. Altruistic groups beat selfish groups. All the rest is commentary**

Wilson & Wilson 2007

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  - \* **Function** with respect to balance between individual and group level cost/benefits
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- For trait adaptivity within organism at any level, the advantages of the higher level for that trait have to be greater than pressures from the competing lower individual level, to ensure dominance
- Major evolutionary transition occurs when information transmittable across generations and imbalance between group and individual benefits so great that group entity becomes adaptive in its own right

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All views retain conventional grammars, so hit ceiling: none can explain systemic ambiguity; (ii)-(iii) presume mind-reading, representations, high-order inference and co-operativity already in place.

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4-6	game-creating social norms sharing with in-group partner	enforcing social-norm conformity? sense of group fairness?

Tomasello view presumes some mind-reading/inference abilities/altruism in all higher mammals. He takes his challenge to be explaining human higher-intentionality, mental-state sharing: "social cognition". To be able to express dependence of variability of languages on culture, he lists acquisition of language as identified only as full language control relatively late

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**Goal of DS/PP/MLSH marriage:** Tomasello tests confirm parallelism of developmental emergent group capacity and evolution of human development, given we can explain both **without** invoking innate mind-reading, cooperativity (altruism) or higher-order inference.

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- Structural adaptivity at **individual** and **group** levels, real-time constraint a basis for locality of operations, and the fully determined structural operations ensuring **group** effectiveness
- Semantic ambiguity problem? Semantic flexibility needed at **individual** and **group** levels to enable stability across uses, and interactive exchange without shared-agent content.

## Semantics? Uncertainty projectable by fixed tools

- \* Word-semantics must capture word meaning as projecting areas of usability ( $lose_1, lose_2, lose_3, lose_4, \dots$ )  
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  - emerging from non-symbolic interactivity via symbol-creation, and the practising/routinising of word-triggering affordances to achieve shift from individual- to group-directed perspective.
- \* First-language acquisition gives us a window on language as a complex adaptive system evolved for group interactivity

Introduction

The DS- Predictive-Processing (PP) model fit

Groups as adaptive units: Multi-Level Selection Hypothesis MLSH

Narratives in language evolution: increasingly invoking *interaction*

The DS attempt at evolution, following MLSH

Can Vector Space Semantics solve the ambiguity puzzle?

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**Its significance:** Capturing nondeterminism of word meanings is essential to communicative effectiveness, stability over time yet allowing change, and group adaptivity

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- ▶ for DS publications, see  
<http://www.dynamicsyntax.org/publications>