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Cognitive evolution: Why language systems are society-based and usage-friendly adaptations of *robust, autonomous, structural* systems

System-based or **usage-based** ?

YES!

Conference announcement: "This debate showed two things:

Firstly, that the system-usage issue **remains controversial** in modern linguistics, and

secondly, that a **single axis** with the end-points **system-based** and **usage-based** does **not** do justice the complexity of linguistic reality."

Claim:

In a 'single axis' approach, a satisfactory solution does not exist. The two concepts are **orthogonal** & **coexisting.**

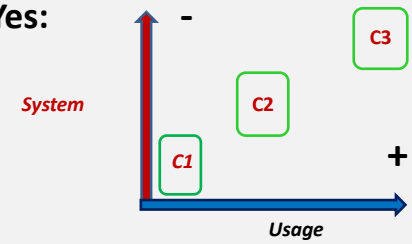
Individual-based system – *society*-based usage ?

Claim:

The two concepts are **orthogonal** & **co-determining**

No: System ? Usage

Yes:



e.g.:
- **Obligatory expletives** in VO passive of intransitives

vs.
- **Extraposition** vs. **verb clustering** (in OV Germanic)

Individual-based system – *society*-based usage ?

Examples **I.**

☛ **Obligatory expletives** in VO passive of intransitives (**DYSFUNCTIONAL**)

a. Nie wurde gestritten
b.* Never was argued (no passive with intransitives in English)

☛ **Extraposition vs. clustering**

c. Wurde denn versucht, [den Wagen$_{ACC}$ zu reparieren]? (**extrap.**)
was PRt tried the car to fix

c. Wurde der Wagen$_{NOM}$ denn [zu reparieren versucht]? (**clustering**)

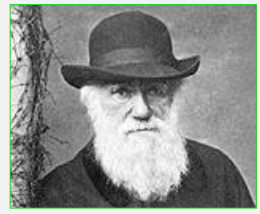
☛ The **exceptionality** of the cognates of ‚**enough**'

e. Das ist nicht groß *genug*
f. Dat is niet groot *genoeg*
g. That is not big *enough*

☛ .....

Today, linguists are replicating a dated controversy:

Lamarck vs. Darwin



Usage vs. **system**

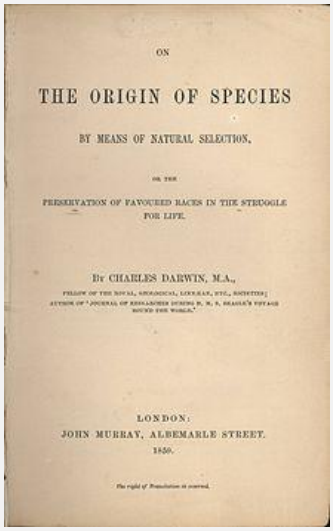
Usage driven **transformations** vs. **system** with random individual **mutations**

Specific needs of the 'society' vs**.** blind **selection**

Adaptation – tool-making** vs**. evolution

Lamarck's *transformationalist* theory of evolution incorporated two ideas that in his days were considered to be generally true:

1. ***L'influence des circonstances*** *(an* **adaptive** ***force****) - in which the* ***use and disuse*** *of characters led organisms to become more adapted to their environment. This would take organisms sideways off the path from simple to complex,* ***specializing them for their environment.***
2. ***Le pouvoir de la vie*** *(a* ***complexifying force****) - in which the natural movements of fluids would etch out organs from tissues, leading to ever more complex construction regardless of the organ's use or disuse. This would* ***drive organisms from simple to complex forms.***



ON

THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION,

OR THE

PRESERVATION OF FAVOURED RACES IN THE STRUGGLE FOR LIFE.

By CHARLES DARWIN, M.A.,

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1859.

Charles Darwin (First Edition 1859. Sixth Edition 1872). **On the Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life.**

Ernst Mayr. 1991. ***One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought.*** Harvard University Press, Cambridge Massachusetts 1991.

Ch. Darwin (1809-1882)	**J. B. de Lamarck** (1744-1829)
1. **Variations** of inheritable features which already exist	'**Need/Drive' to change** directed to **meet organism needs.**
2. **Environment *'screens out'* (selects) features contributing to survival/thriving**, and tends to eliminate the others (indirectly)	**Active Adaptation:** Development of *new* features, ***'in order'*** to survive/thrive.
3. **Passive adaptation:** Those with traits which support survival/ thriving have more off-springs, who inherit those traits.	**Heredity** of 'experience': Newly acquired traits somehow get passed down to offsprings .
4. New species, eventually	New species, eventually

Workshop 'System, usage, society' - Freiburg, Nov. 2011

*Darwins theory consists of **5 theories** (E.Mayr 1991)*

- **Evolution as such**. This is the theory that the world is not constant or recently created nor perpetually cycling, but rather **is steadily changing**, and that organisms are transformed in time.
  - **Common descent**. This is the theory that every group of organisms descended from a common ancestor, and that all groups of organisms, ultimately go back to a single origin of life on earth.
- **Multiplication of species**. This theory explains the origin of the enormous organic diversity. It postulates that species multiply, either by **splitting** into daughter species or by "**budding**", that is, by the establishment of geographically isloated founder populations that evolve into new species.
- **Gradualism**. According to this theory, evolutionary change takes place through the gradual change of populations and **not by the sudden (saltational)** production of new individuals that represent a new type.
- **Natural selection**. According to this theory, evolutionary change comes about through the **production of variation** in every generation. The (relatively few) individuals who survive, owing to a **better adapted combination** of inheritable characters, give rise to the next generation.

And here comes SOCIETY

☞ ***Note!*** *- Evolutionary change is **society-based.***

Only groups** of organisms* can **evolve** (populations or species; 'society-based***'); *individuals **never** evolve.*

- The (grammatic) ***structure*** is **individual based**
- The ***variation*** is **society based** (as the aggregate of variants and the recruiting for social purposes)
- The **selection** is **individual based** (cognitive filtering during language acquisition)
- Therefore, the resulting ***adaptation*** is **society based**

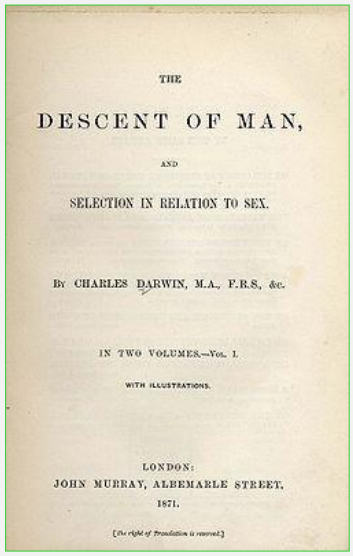
(Friedrich) Max Müller (1823-1900)

"**Language** is the Rubicon which divides man from beast, and **no animal will ever cross it** [...]

the science of language will yet enable us **to withstand the extreme theories of the Darwinians**, and to draw a hard and fast line between man and brute."

(Lecture from 1861. Published 1862 in: *Lectures on the Science of Language*. London: Longman, Green, Longman, and Roberts).

Impossibility of biological evolution of language as a strong argument against Darwin's theory of evolution.


THE

DESCENT OF MAN,

AND

SELECTION IN RELATION TO SEX.

BY CHARLES DARWIN, M.A., F.R.S., &c.

IN TWO VOLUMES.—VOL. I.

WITH ILLUSTRATIONS.

LONDON:
JOHN MURRAY, ALBEMARLE STREET,
1871.

[The right of Translation is reserved.]

Darwin (1871): ***Evolution is* substance neutral.** It may apply to any complex ***reproductive*** system.

(*Evolution* = variation + selection in reproduction)

Darwin (1871, vol. I: p. 59).

"The **formation** of different **languages** and of distinct **species**, and *the proofs that both have been developed through a gradual process*, ***are curiously parallel***."

"The **survival** or preservation **of** certain favoured **words** in the **struggle for existence** is *natural selection*."

Result: **cognitive adaptation**.

s. also Michael Dennet (2002), *The new replicators*.

Curiously, linguists have not taken up Darwins‘s original idea that **evolution** as a **substance-neutral** process can be directly applied to language**.**

Evolution happens whenever there is a ***reproducing system*** *with* ***variation*** *+* ***selection****.*

This is true of grammars of human languages, too.

BUT: If linguists invoke linguistic **evolution**, they are used to think in terms of **biological** evolution.

(cf. PINKER, Stephen & P. BLOOM (1990): Natural language and natural selection, in: *Behavioral and brain sciences* 13, 707-784.)

Evolution at the level of a **cognitive system**

1. **Grammar** is a **cognitive ‚virus‘** (functions and replicates parasitically)
2. **Phenotype variants** result from various sources (mutations = linguistic variants)
3. **Reproduction** (i.e. grammar acquistion) is open for **selection** between **grammar variants** (‚genotypes‘)
4. **Selection:** ease of acquisition, ease of production or reception, … (adaptive qualities)
5. **V**ariation + selection yields **adaptation** by a process of cognitive evolution (that is, not by *biological* evolution)

- **Evolution** proceeds by the process of **variation,** a *random* process, and **selection**, an **environmentally**-**based** *non-random* process.
- Individual **intentions** *do not play* a role. Organisms do **not acquire** what they **'need'** through 'inner **drives**' or 'use and disuse.'
- **Mutations** are not **directed** for the overall benefit of the individual.
- Evolution is **neither goal-directed nor random**. It is driven by the non-random and non-directed process of **selection.**

Functionalism strongly corresponds to a Lamarckian stance:

- Functionality is seen as a property of the **phenotype** (the linguistic expression/construction), not as a property of the grammar system (i.e. at the ‚**genotype'**-level).

Commonsensically appealing though f**unctionalist** (= *teleologi-cal*) **reasoning** may be, it is logically **invalid:**

- Either a property P of a system S is taken to be **necessarily pre-sent** to guarantee a function F, then this premise is **empirically incorrect**. F could be guaranteed by alternative means. (cf. Nagel 1961, 1974: 403)
- Or, the presence of P is taken to be a **sufficient condition** for F, then the **inference** from the function F to the **necessary presence** of P in S is **not valid**. All we can infer is that the presence of F ***con-tributes*** to a function. (Hempel 1959: 310)

Cognitive evolution of grammars

1. ‚Target' of evolution: **population** of grammar **variants** (surfacing as language variants)
2. Grammars **replicate** (as cognitive systems in the process of grammar acquisition)
3. Replication is **imperfect** and produces/admits **variation** (im-perfect reconstruction of the grammar from its productions.
4. Variants involve **recombinations** (cf. ‚**grammaticalization**', restructuring, …)
5. Replication exposes grammars to continuous ***selection.***
6. The ***selecting environment*** is the recipients' brain. A ‚superior' grammar variant eventually wins (i.e.: by infesting more brains than other variants).
7. The result is **adaptation** (ease of processing and usage).

What is **selectable** ?

⇕

What is the **variation space** provided/admitted by the system?
(‚UG')

Why? - Variants that violate the systems do not survive.

Cognitive evolution of grammars accounts for

- **Adaptive properties** of grammars (**usage friendliness** within the autonomous **system boundaries**)
- The **close parallels** between biological evolution and language change (due to the same basic mechanism):

  - the **emergence** of new languages (‚species')
  - the **drift** character of change (unlike ***design fashions***)
  - the ‚**bicolage**' qualities of change
  - the ‚**invisible hand**' quality of adaptations
  - origination of **diverse and complex systems** from a simpler and less diverse stock. (see: language families).

In sum:

Is it SYSTEM or USAGE in SOCIETY?

YES !

It is cognitive EVOLUTION, and hence a process that produces diverse systems with adaptive qualities

(that have a usage in **societies**)

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Examples **II:** **The Germanic OV/VO split**

Grammar 1: a. XP YP ZP V (eg. OE, OHG, ON, …)
b. XP YP V ZP
c. XP V YP ZP

Grammar 1' = Grammar 1 + V2
[ΔP] $\mathbf{V}_i$ XP **(e)** YP **(e)** ZP **(e)** 3-ways ambiguous

Grammar 2: [ΔP] V_i [XP [$\mathbf{e}_i$ YP ZP]] VO + V2

Grammar 3: [ΔP] V_i [XP [YP ZP $\mathbf{e}_i$]] OV + V2

Haider. 2010. Wie wurde Deutsch OV? Zur diachronen Dynamik eines Strukturparameters der germanischen Sprachen. Ed. by Ziegler, Arne. *Historische Textgrammatik und Historische Syntax des Deutschen - Traditionen, Innovationen, Perspektiven*. Berlin: De Gruyter (p. 11-32).
Haider 2012: Symmetry breaking in Syntax. Cambridge: Cambridge Univ. Press. (ch. 4).

Examples III: Universally asymmetric structures

- **V2-languages**, but no **V-penultimate** languages
- **Wh-movement** to a clause-initial position, but not to a **clause-final** position
- ***recursive* compounds** are head-final, not head-initial
- ..... (see Haider 2010 & 2012. CUP)

In sum:

a. [a [b [c […]]]]

b.* [[[[….] c] b] a]

Why? – Grammar – Parser adaptation (by cognitive evolution)