Abduction or inertia? The logic of syntactic change

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Introduction

Two assumptions often considered principles of inquiry in historical syntax:

- **Abduction**: Linguistic change is abductive
  (Andersen 1973, Lightfoot 1979, McMahon 1994, Roberts 2007 *inter alia*)
- **Inertia**: Syntax is inert
  (Keenan 1994, 2002, Longobardi 2001, Roberts 2007, Crisma & Longobardi 2009)

My aim in this paper is to demonstrate that these two notions, if meaningfully interpreted, are not compatible: if we wish to develop a coherent theory of language acquisition and change, we must abandon one or the other, with important consequences for the way we conceptualize syntactic change.

Outline of the talk:
1. Abduction
2. Problems with abduction
3. Inertia
4. Problems with inertia
5. The incompatibility of abduction and inertia
6. Conclusion

1. Abduction

Based on the philosophy of Charles Sanders Peirce. Introduced into historical linguistics by Andersen (1973). The following is his exposition (highly problematic, as I show in section 2), which many linguists have followed (e.g. Lightfoot 1979, McMahon 1994, Roberts 2007: 124–5).

Three kinds of inference: deductive, inductive, abductive. Can be distinguished using Aristotelian syllogisms.

Deductive inference: 'applies a law to a case and predicts a result' (1973: 775).

(1) CASE Socrates is a man
LAW All men are mortal
———————————
RESULT Socrates is mortal

Inductive inference: 'proceeds from observed cases and results to establish a law' (1973: 775).

(2) CASE 1 Socrates is a man
RESULT 1 Socrates is mortal
CASE 2 Abraham Lincoln is a man
RESULT 2 Abraham Lincoln is mortal
CASE 3 Michael Jackson is a man
RESULT 3 Michael Jackson is mortal
———————————
LAW All men are mortal

His claim (1973: 775): 'These two modes of inference share two important characteristics: first, the conclusion contains nothing which is not given in the two premises; second – and this is a natural corollary – if the premises are true, the conclusion is certain to be true.'

Abductive inference: 'proceeds from an observed result, invokes a law, and infers that something may be the case' (1973: 775).

(3) RESULT Socrates is dead — Q
LAW All men are mortal — $P \supset Q$
——————————— ≈ —————
CASE Socrates was a man — $\therefore P$

Andersen claims that a) unlike induction and deduction, abduction is fallible, and b) abduction can form hypotheses and 'originate new ideas', while deduction and induction are merely processes of hypothesis *testing* (1973: 775).

To see that abduction is fallible, try replacing the law 'All men are mortal' with 'All fruit flies are mortal' in the abductive syllogism (3) above and see what the conclusion becomes...

2. Problems with abduction

Deutscher (2002): demonstrates that Andersen (1973) was critically confused about abduction. Concludes that 'the term "abductive innovation" is neither adequate nor necessary for a typology of linguistic innovations'.

Deutscher shows that Andersen's claim that deductive and inductive inference are both infallible is clearly false. To see that enumerative induction is also fallible, try replacing the word 'mortal' with 'dead' in the inductive syllogism (2) above. The conclusion then becomes 'All men are dead'. Both enumerative induction and abduction are forms of fallible *ampliative* inference.

Furthermore, Peirce wasn't terminologically consistent. In his early work, he 'felt bound to express his very general notions within the straitjacket of Aristotelian logic' (Deutscher 2002: 471); cf. the syllogisms (1)–(3) above. In his later work 'he came to use abduction in a much more general way, as the process by which any creative hypothesis is formed' (Deutscher 2002: 474).

(4) *Peirce's later notion of abduction*: 'The surprising fact, C, is observed; But if A were true, C would be a matter of course; Hence there is reason to suspect that A is true.'

Although this notion is in no way coextensive with the syllogism in (3), Andersen mixes up the two notions – hence his claim that induction and deduction are processes used only for testing hypotheses formed by abduction.

This mess has led to mass confusion among linguists. Later definitions of abduction in the linguistic literature:

Trask's *Dictionary of historical and comparative linguistics* (2000) gives the linguistic example: 'I have heard people saying things like "books" and "trees"; therefore there must be a rule of English that nouns are pluralized by adding *-S*.' But (in terms of Andersen's exposition) this is not an example of abductive inference but of enumerative induction (Deutscher 2002: 481).

Roberts (2007: 445): defines abduction as "Change caused by the fact that learners only have access to the output of a generative grammar ... and to Universal Grammar ... with no direct access to the grammar itself. The combination of primary linguistic data ... and Universal Grammar may lead the learner to abduce a system which is distinct from that underlying the primary linguistic data by reanalysis ..." (2007: 445). The notion of abduction used here is essentially as broad as the notion of change itself, since it is entirely possible for deductive and/or enumerative-inductive inference to lead the learner to postulate a different system from that giving rise to the PLD. The insight that children have no access to the grammar underlying the language

they are trying to acquire is, of course, an important one, but this was not what Peirce (or Andersen) ever meant by 'abduction'.

Deutscher concludes that the term is misused and useless in linguistics, and that the way linguists use it is out of step with its more general use in philosophy and science, where the term has largely been replaced by the more general notion of 'inference to the best explanation' (cf. e.g. Lipton 2000).[1]

Perhaps a deeper problem is raised by Lass (1997: 335–336). Lass expresses doubt that abduction or indeed any form of inference can be used to model language change, given that in his view language change is not carried out by a conscious agent. What is the task in language acquisition anyway? Andersen (1973: 776): 'In acquiring his language, a learner observes the verbal activity of his elders, construes it as a "result" – as the output of a grammar – and guesses at what that grammar might be.' BUT cf. Andersen (1973: 777): 'It is worth noting that the language learner's goal is the formulation not of a specific ('true' or 'optimal') grammar, but only of a grammar which in some way conforms to the observed data'. Cf. also Roberts & Roussou (2003: 13): 'The goal of language acquisition is to fix parameter values on the basis of experience ... there is no requirement for convergence with the adult grammar'.

How much intentionality can we attribute to the process of acquisition anyway? It is far from obvious that children *choose* to acquire language. L1 acquisition seems to begin before birth, suggesting that it's better to view it as a biological-mechanical algorithm in the tradition of cognitive science rather than a mission that the acquirer sets out on intentionally because of functional pressures.

3. Inertia

Origins of Inertia: Keenan (1994, 2002, 2009):

(5) 'Things stay as they are unless acted upon by an outside force or DECAY' (Keenan 2002: 327; emphasis his)

Summary of the Inertial Theory of syntactic change as proposed by Longobardi:

[1] An important qualification: 'the questions that Peirce raised about the nature of inference still stand at the core of any theory that attempts to explain language learning and change. How are hypotheses for new linguistic rules formed in the mind? How does a language learner decide between alternative rules that can explain the same surface form? What, from the point of view of the language learner, represents the `best explanation' for his/her input?' (Deutscher 2002: 484); though cf. Lass (1997).

(6) 'syntactic change should not arise, unless it can be shown to be *caused*'[2]
(7) 'linguistic change proper ... may only originate as an interface phenomenon'
(8) '*syntax*, by itself, is diachronically completely inert'
(Longobardi 2001: 277–278; emphases his)

Widely accepted in the literature on diachronic generative syntax: cf. Lightfoot (2002: 130), Ferraresi & Goldbach (2003), Roberts (2007: 232), Crisma & Longobardi (2009).

Longobardi (2001: 278): the Inertial Theory has 'empirically testable consequences' and might turn out to be 'empirically false or only partly correct' (2001: 278). Principle of change?

Lightfoot (2002: 134): 'there are no principles of history', and 'there is no theory of change to be had independent of theories of grammar and acquisition' (2002: 127). It is extremely desirable, then, to reduce the Inertial Theory to properties of the faculty of language and to acquisition if possible.

4. Problems with inertia

Walkden (2010): when working on syntactic change we have to assume the following:

(9) Acquirers do not have access to the grammar of the 'target' language (cf. Andersen 1973!).
(10) Experience plays a direct role in the acquisition of syntax (cf. Chomsky 2005).

To make the Inertial Theory work we also need to assume the following:

(11) The acquisition of syntax is a deterministic process.

The intended meaning of (11) is that, for any totally ordered set of sentences (PLD), any and all learners exposed to it will converge on the same grammar (a one-to-one or many-to-one mapping): there is no '"imperfect" learning or "spontaneous" innovation' (Longobardi 2001: 278). Clearly (11) is necessary for any version of the Inertial Theory, since imperfect learning and spontaneous innovation cannot be said to be 'caused' in any meaningful linguistic sense, and certainly not by interface phenomena: the falsity of (11) entails the falsity of (6)–(8). NB: many algorithms for syntactic acquisition (e.g. Gibson & Wexler 1994, Yang 2002) do not assume that the acquisition of syntax is deterministic in this way.

[2] This wording is not coherent. I take the intended reading to be 'syntactic change does not arise unless caused'.

(11) is NOT coextensive with the Inertial Theory, since it makes no predictions about any relation between grammars diachronically.

Imagine a child whose parents' grammar requires V-to-C movement in *wh*-questions. Now let us suppose that the parents never needed or wanted to ask direct questions in the presence of the child (for whatever reason), and therefore that the PLD includes no relevant examples. The child therefore fails to acquire V-to-C movement in *wh*-questions in her grammar. Implausible, perhaps, but not impossible.

Syntactic change has clearly occurred in the above scenario. Is this change 'caused', in the terminology of (6)? The answer is unclear: if there is a cause, it is clearly an extralinguistic one, namely whatever motivated the fluctuation in the trigger experience. Here it is essentially chance that has 'caused' the change; even assuming (6), there is just no guarantee that the PLD will contain examples. It seems that the claim that syntactic change does not arise unless caused makes predictions that are too strong. The scenario is even more of a problem for (7), since there can be no question that the change in this scenario might have originated as an 'interface phenomenon': no semantic or morphophonological change preceded it. Finally, if (6) and (7) are false of this scenario, then (8) is also false: syntax is not 'diachronically completely inert'.

While the assumption in (11), that acquisition is deterministic, *may* be tenable, then, the Inertial Theory as proposed by Longobardi (2001) is not.

Deeper problem with inertia: (5), Keenan's claim that things stay as they are unless acted on by an outside force or decay, applies not only in linguistics, as he stresses. But in what sense is a language diachronically a 'thing'? Each generation has to acquire a grammar anew (cf. e.g. Lightfoot *ad nauseam*). If the I-language thesis is accepted, the very notion of a language as a 'thing' across generations becomes incoherent, and there is no reason we'd *expect* inertia to hold.

5. The incompatibility of abduction and inertia

The assumption of determinism in (11), and therefore also the Inertial Theory, cannot easily be reconciled with abduction or inference to the best explanation. (11) is intended to mean that, for any totally ordered set of sentences (PLD), any and all learners exposed to it will converge on the same grammar. But if learning takes place by abduction or inference to the best explanation, how can this be guaranteed? Peirce's late notion of abduction as in (4) and inference to the best explanation are forms of ampliative inference, and as such are, *definitionally*, not deductively valid (cf. e.g. Craig 1998). So if learning takes place by abduction or inference to the best explanation, it cannot be deterministic, and syntax therefore cannot be inert.

We might try to save the compatibility of abduction and inertia in the following way: we could argue that abduction/inference to the best explanation applied regularly in L1 acquisition, in that, given a set of conditions *R*, the criteria for the best explanation would always apply in the same way and the same explanation would be adduced by each acquirer. Notationally this would look something like the following:

$P \supset Q$
$R \supset (Q \supset P)$
Q
R
_____
$\therefore P$

What's the problem with this? Well, in one important sense there's no problem: it's a deductively valid inference. But if we apply this logic then we have reduced this instance of 'inference to the best explanation' to deductive inference. Since inference to the best explanation is definitionally *ampliative*, what we've argued is actually that if L1 acquisition works in this way it is *not* a case of ampliative inference, inference to the best explanation or abduction, but rather a deductive process. It becomes redundant and meaningless to refer to the acquisition process as 'abductive'.

Alternatively, we could abandon the notion of determinism, and with it any notion of 'inertia'. But if we do this, we commit ourselves to saying that there are random 'rolls of the dice' involved in language acquisition, and we forfeit our ability to predict pretty much anything whatsoever (cf. Bresnan & Deo's 2001 'Fallacy of Reified Ignorance' and the discussion in Hale 2007). Perhaps it's methodologically more responsible to argue, with Einstein, that '*He* does not throw dice'.

6. Conclusion

I have argued that:

- The notion of 'abduction' in linguistics is confused, misused, and out of step with other sciences. It may well be the case that abduction (or inference to the best explanation) is not relevant to language acquisition at all. (section 2; cf. also Deutscher 2002, Lass 1997)
- The notion of 'inertia', insofar as it has content as a hypothesis, cannot hold, and even a weaker claim, the assumption of determinism in acquisition, is far from uncontroversial. (section 4; cf. also Walkden 2010)
- No version of inertia with empirical content is compatible with any version of abduction (or inference to the best explanation) with empirical content (section 5).

My conclusions for syntactic change are:

- We should stop talking about abduction.
- We should stop talking about inertia.
- We should start taking seriously the task of coming up with syntactic learning algorithms that are compatible with what we know about language acquisition and language change.

Borrowing terms and metaphors from philosophy and other sciences may be useful on occasion, but in the case of 'abduction' and 'inertia' it has led only to confusion and time-wasting. Sometimes it's better to talk about language on its own terms.

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