

KonDoc - Bestellschein

KOPIE

Bestellart:

Lieferweg: EMAIL

Eingang: 28.01.2014 -
07:00

Lieferung bis:
10.02.2014 - 16:00

Subito-BestNr.: KonDoc:2014012866294

Kundennummer: K000011867

Bestellnummer:
E000163871

Benutzernr.: **03/037078**

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Signatur: **lbs 230.13/n19**

Titel: **Language and earth : elective affinities between the emerging sciences of linguistics and geology**

Jahrgang/Heft::

Erscheinungsjahr: **1992**

Seiten: **221-269**

Autor: **Plank**

Artikel: **Language and earth as recycling machines**

Weitere Angaben:

Bemerkung zum Dokument:

Kundennummer:



Bestellnummer



Language and Earth as Recycling Machines

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1. Language a Machine; or: Improvement

1.1. The question of what happens to languages in the course of time has often been answered by exploiting analogies. Thus, languages have variously been compared to rivers, edifices, institutions (such as governments, which, as Dr Johnson observed, have a natural tendency to degeneration), dress or other habits, and organisms (plants as well as animals), all of which undergo changes – changes supposedly understood well enough to serve as illuminating analogies in coming to terms with the more elusive phenomenon of linguistic change. Machines have also been found suitable for this purpose, and in tracing one particular tradition of this instrumentalist conception of language, originating in the mid-eighteenth century,¹ I shall pay attention specifically to the assumptions it generated or corroborated about developments of grammatical forms.

1.2. A cardinal concern of Adam Smith, the economic theorist, was to show that labour could be greatly facilitated and abbreviated by the application of machinery – proper machinery, of course, such as the drill plough, wind or water mills, or the fire (i.e. steam) engine as recently improved by Smith's friend, James Watt, not the less elaborate tools and devices of olden times, such as a spade, a pair of stones ground together by hand, or the Newcomen steam engine.

Progress in technology, however, stood Smith in good stead also because of the insight it could provide, by way of analogy, into the workings of heavenly bodies, economies, languages, and indeed all science. In his essay on the history of astronomy (dating from the 1750s but only published posthumously), intended to illustrate how philosophers-scientists ought to go about their business of modelling reality in systems, their procedures and products were thus likened to those of mechanical engineers:

Systems in many respects resemble machines. A machine is a little system, created to perform, as well as to connect together, in reality, those different movements and effects which the artist has occasion for. A system is an imaginary machine invented to connect together in the fancy those different movements and effects which are already in reality performed. The machines that are first invented to perform any particular movement are always the most complex, and succeeding artists generally discover that, with fewer wheels, with fewer principles of motion, than had originally been employed, the same effects may be more easily produced. The first systems, in the same manner, are always the most complex, and a particular connecting chain, or principle, is generally thought necessary to unite every two seemingly disjointed appearances: but it often happens, that one great connecting principle is afterwards found to be sufficient to bind together all the discordant phaenomena that occur in a whole species of things. (1795: 44f)

Smith's generalization about the improvement of both machines and scientific systems by simplification of principles may actually have been too sweeping; Watt, for example, accomplished to improve the efficiency of the Newcomen engine, where steam used to be cooled and condensed to liquid in the cylinder itself, by *adding* a separate condenser. Nonetheless, it so appealed to him that he would extend it to languages as well. The third lecture of his course on rhetoric and belles-lettres at the University of Glasgow, treating 'Of the Origin and Progress of Language', concludes with a comparison of the advances in languages such as French and English, vis-à-vis Latin and Anglo-Saxon, to advances in the construction of machines in terms of decreasing complexity.² When this lecture was worked up into an article, entitled

Considerations Concerning the First Formation of Languages, and the Different Genius of Original and Compounded Languages and published in *The Philological Miscellany* of 1761 and again, more accessibly, as an appendix to the third (1767) and subsequent editions of *The Theory of Moral Sentiments*, the machine passage from the astronomy essay reappears almost verbatim, with languages now taking the place of systems:

[...] language becomes more simple in its rudiments and principles, just in proportion as it grows more complex in its composition, and the same thing has happened in it, which commonly happens with regard to mechanical engines. All machines are generally, when first invented, extremely complex in their principles, and there is often a particular principle of motion for every particular movement which it is intended they should perform. Succeeding improvers observe, that one principle may be so applied as to produce several of those movements; and thus the machine becomes gradually more and more simple, and produces its effects with fewer wheels, and fewer principles of motion. In language, in the same manner, every case of every noun, and every tense of every verb, was originally expressed by a particular distinct word, which served for this purpose and for no other. But succeeding observation discovered, that one set of words was capable of supplying the place of all that infinite number, and that four or five prepositions, and half a dozen auxiliary verbs, were capable of answering the end of all the declensions, and of all the conjugations in the ancient languages. (pp. 223f.)

This was no vague and global comparison; it was grammatical changes of a very specific kind, representing the final stage of an essentially tripartite developmental scenario outlined in his *Considerations*, whose plausibility Smith was here trying to increase by his favourite mechanical analogy.

As the first formers of languages of Smith's conjectural history³ were accumulating a lexicon of basic expressions denoting events (verbs), substances (nouns), and, lastly, qualities (adjectives), and were acquiring syntactic rules for combining these, the need arose to distinguish syntagmatic relations, quantities, and qualities (such as those of animacy and size) of nouns and of adjectives, and likewise to make verb-related distinctions such as those of person-number of the subject, tense, modality, and voice. The very first, purely

lexical strategy to express all such distinctions was to create an entirely new word for every one of them. There were thus, for example, distinct nouns to denote a wolf in an agent/subject, patient/object, recipient, possessor, comitative, etc. relation, to denote one, two, three, etc. wolves, to denote a male and a female wolf, a large and a small wolf; and analogously for adjectives and verbs. This lexical strategy, however, had two crucial disadvantages: it was utterly uneconomical insofar as eventually too many distinct words had to be memorized (in principle in fact an infinite number of them, corresponding to the infinity of possible *denotata*), and totally undiagrammatic insofar as similarities in the meanings of different words (e.g. of the words for 'one wolf' and 'two wolves') were not mirrored by similarities of form.

Both these deficiencies could be overcome if notionally complex basic expressions were replaced by composite ones, where one, invariable part would denote the core meaning and the other, changeable part all kinds of accessory meanings. Of the two variants of this combinatory strategy—to vary the shapes of lexical words or to introduce separate grammatical words for the expression of accessory meanings—the morphological one seemed to Smith to be more congenial to the formers of original languages because it required less abstraction, less 'metaphysical' separation of wholes into constituent parts.

Subscribing to a secretion, rather than a coalescence, theory about the origin of inflection (to use terminology preferred by Jespersen 1922), Smith suggested, if not very explicitly, that the language reformers began to vary parts of the inherited words, especially terminations, and thereby created paradigmatic contrasts and imbued the variable parts, still "thoroughly mixed and blended" with word stems, with meaning. For example, by altering the two final sounds of an originally invariable noun such as *lupus* 'wolf', a pair of nouns could be produced, *lupus* and, say, *lupi*, containing an invar-

iable core, *lup-*, and variable terminations, *-us* and *-i*, and this paradigmatic contrast could be used to express distinctions such as those between singular and plural. Given a stock of words differing randomly in their phonetic make-up, the variations of their terminations thus semanticized to take care of accessory distinctions such as those of number, case, gender, person, tense, mood, and voice, could not but differ a great deal from one word to the other. It was only to be expected that, for example, a noun such as *arbor* 'tree' would possess a different set of inflections to express distinctions of number (say, *-o* and *-es*) from *lupus*; and so on for every further noun. Moreover, Smith took for granted that all relevant accessory distinctions would be expressed cumulatively in the termination. A single final sound such as *-i* in *lup-i* could, thus, end up distinguishing simultaneously gender (masculine, contrasting with *-ae* in *lupae* 'female wolves'), number (plural, contrasting with *-us*), as well as case (nominative/vocative, contrasting with *-os*, *-orum*, and *-is*). Consequently, if there were as few as three genders, three numbers, and ten cases, a word needed as many as ninety variants to distinguish them all; and the non-uniformity of variable terminations across different words further multiplied the amount of forms that had to be memorized at this second developmental stage, at which rudiments and principles of grammar had made their first appearance in the form of inflection.

Owing to the haphazard manner of their creation, inflectional systems of this kind were liable to grow unwieldy, unless they were regularized at least to some extent. The near-random variety of the sets of inflections, still uneconomical as well as insufficiently diagrammatic, could be reduced, presumably (and this is another point on which Smith's *Considerations* are less than explicit) by the transference of one inflectional set to words of the same class which had previously been inflected differently or not been

inflected at all. Such transitions from chaos to relative order, from inflections peculiar to individual words, hence to be memorized individually, to inflections applicable to larger groups of words, were effectuated "insensibly, and by slow degrees" and "without any intention or foresight in those who first set the example, and who never meant to establish any general rule". This part of Smith's story, where language improvers, as if led by an invisible hand, promoted ends which were not part of their original intention,⁴ thus, bore little resemblance to technological progress.

In logical continuation of Smith's scheme, subsequent generations of language reformers might be expected to have gone on reducing the diversity of declensions and conjugations until there were single sets of inflections each for nouns (and perhaps adjectives) and for verbs; and, becoming increasingly expert at abstraction, they should eventually have been able to disentangle the various accessory categories and to dissociate inflections from word stems to which they used to be tightly bound, thus automatically converting them into separate words, more loosely bound to their lexical words. However, although it was Smith's view that "original" languages, whose rudiments and principles were inflectional, were destined to exchange inflections for grammatical words, this was not the way he thought such transitions from the morphological to a purely syntactic mode of combinatorial expression could possibly be brought about. And there indeed was too little material and positional identity between inflections, on the one hand, and grammatical words such as prepositions, personal pronouns, auxiliaries, on the other, in languages believed to have undergone such transitions, to suggest that the latter had continuously evolved from the former by way of separation. (But this was apparently not a consideration of Smith's.) For Smith, such transitions required the more extraordinary, though none too unusual, historical circumstances — veritable catastrophes — of "the mixture of

several languages with one another, occasioned by the mixture of different nations"; hence the term "compounded". Only mixture, especially if repeated, could cause such conspicuous discontinuities in the history of languages because "the intricacy of declensions and conjugations", while not beyond the reach of children slowly acquiring their original mother tongues and indeed too "insensible" to attempt radical improvements, represented too much of a learning problem under the less favourable circumstances of migrations and conquests, and indeed was recognized as superfluous by adult learners of a foreign language who, comparable to improvers of mechanical engines, were sensible enough to think of alternative, more economical rudiments and principles of grammar, viz. special grammatical words and "the place of words" and "the order and construction of the sentence". The fate of inflections, thus, was to be discarded like redundant pieces of machinery: they simply went out of use, rather than to change their forms or status. Curiously, what Smith's *Considerations* did not enlarge on was the provenance of the grammatical words introduced by ingenious foreign language learners in their stead; there are no indications that he regarded prepositions, pronouns, or auxiliaries as deriving from items of some different kind, such as full lexical words.

At the transition from the "original" to the "compounded" genius the natural history of a language had come to an end and its technological history had begun.⁵ While from now on there could well be room for further gradual improvements in the course of further language mixtures — "the more simple any language is in its composition, the more complex it must be in its declensions and conjugations; and, on the contrary, the more simple it is in its declensions and conjugations, the more complex it must be in its composition" (pp. 221f.) —, Smith's scheme did not provide for the possibility or necessity of grammatical words being in turn replaced by connecting principles of any different kind. Thus, linguistic history, as

portrayed in his *Considerations*, was essentially linear in its natural part: almost like growths on a plant (the lexicon), inflections sprouted (from invariable lexical words), grew wild, were cultivated, and were cast off (metamorphosing imperceptibly into moving parts of a machine); it was both linear and static in its technological part: grammatical words, once implemented, were there to stay. Theoretically, it would in fact not have been inconceivable for new inflections, like sprouts in the next spring, to be again developed by secretion from the lexical words of a compounded language, being as invariable as had been the words of the primordial languages devoid of any composite expressions. But why should any sensible or insensible language reformers, by now equipped with the superior technology of grammatical words, have taken the trouble to do so? Perhaps it would not have been inconceivable, either, for compounded languages to be decompounded, with declensions and conjugations being re-complicated accordingly. But such retrograde purist movements were not on the agenda of Smith's *Considerations*.

Perfectibility was a fundamental tenet of the Enlightenment, and with respect to machines Smith apparently saw no reason not to embrace it. With respect to languages, however, progress seemed to him a mixed blessing. Although languages, when compounded, were simplified exactly like machines were (and, "perhaps, from similar causes"), their simplification rendered them more and more imperfect, rather than, as was the case with machines, more and more perfect. Smith's criteria for the perfection of a language were essentially aesthetic rather than functional. Languages simple in rudiments and principles struck him as "more prolix" (in terms of the number of words—compare concise Latin *amavissem* with verbose English *I should have loved*), "less agreeable to the ear" (owing to the lack of variety of terminations), and more constrained (concerning the transposition of words) than languages with more cumbersome inflectional machinery.

Comparable though languages and machines were in Adam Smith's view, they nonetheless differed in the significance which beauty had vis-à-vis economy.

1.3. Adam Smith's mechanical imagery caught on, in Edinburgh and further afield. It must suffice here to mention only a few variations on this recurrent theme.

1.3.1. In the anonymous article *Language* in the first edition of the *Encyclopædia Britannica* (1771), produced at Edinburgh under the supervision of William Smellie (who may have compiled this article himself), the development of languages was again compared to that of machines, amidst many further reminiscences of Smith's *Considerations*.

What then shall we say of the discernment of those grammarians, who are every day echoing back to one another complaints of the poverty of our language on account of the few and simple rules which it requires in syntax? As justly might we complain of an invention in mechanics, which, by means of two simple movements, obvious to an ordinary capacity, little liable to accidents, and easily put in order by the rudest hand, should possess the whole powers of a complex machine, which had required an infinite apparatus of wheels and contrary movements, the knowledge of which could only be acquired, or the various accidents to which it was exposed by using it be repaired, by the powers of an ingenious artist, as complain of this characteristic excellence of our language as a defect. (1771: 878)

Smith's objections to the inflectional and transpositional poverty of modern, compounded languages on aesthetic grounds were, thus, brushed aside, and functional simplicity was recognized as the sole criterion of linguistic and mechanical perfection alike.

A considerable part of *Language* was devoted to the presentation and elaboration of the typological distinction of "transpositive" (or inflectional) and "analogous" (or non-inflectional) languages, due to the abbé Gabriel Girard (1747), an inspiration also of Smith's. Languages of these opposite classes differed in a whole set of interrelated properties,

rather than just in a few arbitrary particulars, and, as systems *où tout se tient*, they bore again resemblance to machines. These were, however, in need of some fine tuning, because

it often happens in human inventions, that every part which composes a whole, taken separately, may appear extremely fine; and yet, when all these parts are put together, they may not agree, but produce a jarring and confusion very different from what we might have expected. (1771: 871)

It is not immediately obvious what such fine tuning was supposed to amount to in linguistic systems according to the author of *Language*. Transpositive, inflectional languages, despite their complexity, were portrayed as systemic wholes, not differing in this respect from analogous, non-inflectional ones. The exclusively lexical languages preceding the advent of combinatorial grammar in Smith's scheme, on the other hand, could have been aptly characterized as disjointed. And in language mixtures, which Smith had held primarily responsible for the irreversible transformation of transpositive languages into analogous ones (a possibility ruled out by Girard, who proclaimed the immutability of a language's genius), one might also have seen some danger of disharmony, as long as inflectional residues were not discarded completely.

1.3.2. James Burnett (Lord Monboddo), who had a reputation of not being averse to paradox, adapted the machine comparison of his Edinburgh acquaintance thus:

It is true indeed, that to learn the use of a Greek verb, is a matter of more pains and trouble than to learn the use of an English verb, as it may be much easier to use a clumsy, ill-contrived machine, than one complete and perfect in all its parts; but if this last machine, when the use of it is once learned, can be employed with as little or less trouble, it is certainly preferable. (1774: 169)

What Burnett, for whom Classical Greek represented the apogee of linguistic evolution, rivalled only by Sanskrit in his later writings, was intent on proving was that even the most extensive inflectional system could be perfectly regular,

easily manipulable by very general rules with few or ideally no exceptions. Discovering these rules was the only real problem for the learner. This was not necessarily at odds with Smith's views on inflection, though, which also allowed for the regularization of the haphazardly created meaningful variations of terminations. Smith's real point had been that inflectional systems, owing to the cumulation of categories and to the multiplicity of declensions and conjugations resulting from the close cohesion of stems and terminations, are in principle less economical than grammatical words, insofar as a greater supply of forms is needed to express the same number of distinctions. And this factual observation could not possibly be disputed, no matter how ardent an admirer one was of inflections. With the economy of moving parts disregarded, the very precision of Smith's mechanical imagery was, thus, gone when Burnett compared the English verb, rudimentarily inflected and heavily reliant on auxiliaries and personal pronouns, to a clumsy, ill-contrived machine. It remained rather vague what the imperfection of that English machine was supposed to consist in.

As to the possible developments of grammatical forms, Burnett's scenario, elaborated on a much wider empirical basis, did not in fact differ radically from Smith's in the essentials that determined direction. Once natural communication, effectuated by inarticulate cries, gestures, imitative sounds, painting, and music, had been superseded by barbarous languages, employing a lexicon but virtually no grammar of any kind, a further major step forward was the invention of the wonderfully economical art of combinatorial grammar, consisting primarily in inflection. Inflectional systems, like other artifices of grammar, could only have been devised, from scratch (rather than from pre-existing lexical material, as Smith had it), by superior intellects, with Burnett's prime candidates being the philosophers of ancient Egypt, very likely receiving instructions from their demigods. In the

course of migrations of peoples, inflections could then be transferred to barbarous languages where indigenous ones had not been invented. (For Smith, on the other hand, language contact was the beginning of the end of inflections.) Once borrowed, they could even be over-elaborated by maladroït improvers, mass-producing novel inflections apparently out of nothing, as had sometimes happened in the New World. Inflectional systems, however, could also easily fall into disorder, when successive generations did no longer take the trouble of learning them conscientiously. However well-contrived a machine of expression once was, it was always in danger of degenerating if not properly maintained. Arts of grammar inferior to inflection—"prepositions, conjunctions, and such like words [...] the pegs and nails that fasten the several parts of the language together" (1774: 188)—had then to be relied on instead. Where suchlike grammatical words came from and what became of them were questions occupying Burnett as little as they had Smith. Perhaps he did expect another flourishing of the supreme grammatical art from a revival of classical values; but were there still demigods and philosophers prepared to cooperate in devising a new set of inflections?

1.3.3. Moving in the same circles of Edinburgh *literati* as Adam Smith and Lord Monboddo, James Hutton tried his hand at many things, least successfully perhaps at investigating the principles of knowledge and the progress of reason and of language. When, inevitably, the difference between inflectional languages such as Latin and inflectionally impoverished ones such as his own came up for discussion, he felt indebted to his friend Smith for illumination:

It may be alledged, that there is a material difference in this example, so far as the Latin language makes but one word of the nominative case in writing *penna*, whereas the other [English] makes two words [*a pen*] in expressing the same idea; this, however, arises from the greater perfection of our grammar, in separating the nominative case from the common vocable, and by this means having only one declension in our

nouns. By this grammatical contrivance, which Mr Smith compares to the simplification of machinery, the nominative a, in English, applies to every noun; whereas, the Latin language had many different nominatives, or several different syllables by which that case was determined in their nouns. (1794: I, 636)

Hutton had evidently grasped the gist of Smith's mechanical comparison,⁶ but got some linguistic details wrong, mixing up case inflections (arguably missing in English) and articles (which Latin was entirely lacking), perhaps misled by an accidental similarity of sound.⁷ Concerning actual mechanisms of change, Hutton had to say but little of his own.

1.3.4. Nathaniel Brassey Halhed was a pioneer British orientalist,⁸ who acted as one of Lord Monboddo's consultants on matters Indian and professed an admiration for his writings, all published without an author's name on the title page. A letter to George Costard betrayed Halhed to have been a reader also of Smith's *Considerations*, for the way he remembered the mechanical comparison was not as it had been intended by the attributee:

For we find in all *artificial works*, that improvement follows invention; and that it is one of the last gradations of art to simplify a complex machine. I do not state this argument fully, but much may be said upon it; and the topic has been handled in a very ingenious manner in a book called "An Essay on the Origin and Progress of Language" I think it is written by Lord Monboddo. (1779, quoted from Rocher 1983: 295)

In his *Grammar of the Bengal Language* (1778) Halhed indeed noted an important peculiarity of inflections, which was at the time rarely commented on in descriptive grammars but which Smith had identified as one of the factors responsible for the proliferation of grammatical forms: in Sanskrit, Arabic, Greek, and Latin, inflections cumulatively expressed several categories simultaneously, "perfectly blended and united" (1778: 101, *passim*). It was, however, not at all in the spirit of Smith's mechanical analogy that the highly inflectional ancient languages of the Orient and the Occident were characterized by Halhed as naturally simple and elegant, later

unfortunately greatly debased and corrupted owing to the ignorance, idleness, and affectation of speakers and writers abandoning traditional inflections for auxiliary and subsidiary words.

1.3.5. Matthew Lumsden was another early British orientalist of note, a professor of Arabic and Persian in the East India Company's College of Fort William in Bengal, and he, too, had read his Smith (and the *Encyclopædia Britannica*), as even showed in his Persian grammar:

And if it be considered that the most important improvements in the machinery now employed in various manufactures, have been the invention, not of philosophers but of *common workmen*; possessed of no theoretical knowledge whatever, but merely of that practical skill resulting from the occupations in which they were daily engaged; (see *WEALTH OF NATIONS*, vol. I, page 16,) it will not be deemed incredible that men, living in the rudest age, might yet be capable, by their ingenuity, of improving Language. For every Language may be considered as a *great machine*; in the use of which those who speak it, (however deficient in theory,) have acquired a considerable degree of practical skill; and as their thoughts must be naturally turned to its improvement, because every man desires to express his sentiments in the shortest possible way; so, they might easily hit on primitive particles, (as the letters of the plural number) which were not originally verbs or nouns. (1810: II, 45)

It would perhaps be quibbling to point out that Smith had not quite located the improvements at issue in the rudest age of linguistic prehistory, whose hallmarks indeed were grammarlessness and then inflections. What is far more un-Smithian is Lumsdens identification of shortness of expression as the advantage gained by making use of 'primitive particles': Smith's criterion of simplicity had been the size of the inventory of grammatical forms. For Smith, "prolixity" had on the contrary been one of the disadvantages inevitably traded in by the abandoning of inflections for grammatical words. But then Lumsden recognized no principled difference between inflections and prepositions, postpositions, or such-like words in the first place; he ascribed no great significance to the difference between morphological coalescence or non-

coalescence ("accidents [...] which cannot, in the least diminish or augment the difficulty of their invention by a rude people", 1810: II, 46), and failed to appreciate the further distinctive features of uniformity and cumulation, which had primarily prompted Smith's mechanical analogy.

In fact, by insisting that there could be "primitive particles [...] which were not originally verbs or nouns" a theme was here being introduced by Lumsden which was not really a variation on Smith's one for which a different kind of imagery ultimately was to prove more illuminating.

1.4. Skipping more than half a century, within which span of time historical-comparative linguistics had been gaining academic respectability,⁹ we find William Dwight Whitney, eager to acquaint the general educated public with recent progress in his discipline, still availing himself of mechanical analogies (among others). Language, for Whitney, was "only an instrumentality, and the mind the force that uses it", thus "externalizing man's inner consciousness" for the sake of communication,¹⁰ and, as such, it belonged with the other "great institutions that make man what he is", including "society, the arts of life, machinery, art" (1875: 238, 303f.). Language being literally, rather than metaphorically, an instrumentality, although not a physical one, "the law of simplicity of beginnings applies to it not less naturally and necessarily than to other (physical) instrumentalities" (1875: 226). A law of simplicity of very first beginnings would presumably have found favour also with Adam Smith, but in Smith's version of the less remote history of mechanics a law had prevailed which was the exact opposite of Whitney's,¹¹ holding that complex machinery was constantly simplified in its principles by improvers. It was this law of simplification which had been transferred to the domain of language, generating or at least supporting particular assumptions about grammatical change. Now, what did the law of complication, as evinced by develop-

ments from crude, multipurpose tools and weapons (such as sticks or stones) to more specialized hammers, saws, planes, nails, iron-headed lances, bows, and catapults, and eventually to a variety of even more intricate and well-membered instruments and machines (such as power-looms or locomotives), imply for the development of grammar?

In Whitney's scenario, exactly as in Smith's, there originally was no grammar; what was being accumulated by early language makers, driven by an impulse to communicate and endowed with the capacity to imitate and with the power of intelligently adapting means to ends,¹² was a stock of basic unanalysed expressions—

comprehensive utterances in which the parts of speech lay as yet undeveloped, sentences in the germ; [...] [signifying] a whole assertion, or inquiry, or command, to which the tone and accompanying gesture, or the mere circumstances of its utterance, furnished the sufficient interpretation: just as in the stick or stone was present [...] a variety of instruments or weapons. (1875: 302, 227)

Upon this holophrastic "root" stage followed that of "collocation", with primordial grammar plainly consisting in several roots being loosely strung together, the relations between which were "left to be supplied by the intelligently apprehending mind". As roots were subsequently differentiated into separate semantic classes, collocation was superseded by the more strictly regulated syntactic "combination" of what could now properly be called words. The classes of words first distinguished were verbs, designed to predicate, and nouns, designed to name; and these material words were eventually supplemented by more formal and relational words such as adverbs or personal pronouns, but the difference between material and formal words was at best a gradual one at this stage.

From here on Whitney's story began decisively to diverge from Smith's: it told the tale of coalescence (or "external accretion") rather than that of secretion. Far from varying the terminations of words (which in Whitney's scheme would

have been a rather pointless complication), speakers began to put together independent words which were recurring in syntactic combination to form single designations, with all connecting words that may have been present at the stage of syntactic combination omitted "for the sake of brevity and convenience". Of any two words thus connected in morphological "composition" (or "aggregation"), one was then destined to yield its former independence ever more completely: undergoing abbreviations and other alterations of form and attenuations and transfers of meaning, owing especially to the speaker's "tendency toward economy of effort in expression", it was to become a mere subordinate element, an affix of inflection (or derivation). With the same abbreviating force of the economy of articulatory effort continuing to be effective, the cohesion between main and subordinate parts of words was strengthened, and "agglutination" gave way to "integration" (or "fusion"). Thus, formed words, consisting of radical and formative elements, had been created from syntactic combinations of independent words in essentially the same manner as composite tools (such as hammers) had been assembled from parts (such as stones and sticks) representing modifications of what had previously served as tools in their own right (with stone and stick joined together as head and handle of the hammer).

From this stage onwards there were again some common motives in Whitney's and Smith's stories. Whitney, too, recognized "mental economy" as a driving force: inflections were bound to be made more uniform due to "an avoidance of the effort of memory involved in remembering exceptions and observing them accurately in practice" (1875: 74). (Smith's account of their origin by secretion, however, would seem to have provided a better explanation for their being non-uniform and exception-ridden in the first place.) And, with language contacts and mixtures acknowledged as at least quickening the demise of inflections, it was again the adult learner of

strange languages who, especially given to ease and abbreviation and content "to get the body of the word, its main significant part, intelligibly correct", took much of the blame for "making bad work with its endings" (1875: 105). The agent primarily responsible for the subsequent development of inflections in Whitney's scheme, however, was one that had already been instrumental in their creation from independent words. It was "the disposition, or at least the readiness, to give up such parts of words as can be spared without detriment to the sense", a sense of "true economy" or mere "lazy wastefulness" (1875: 49f.), which permanently, and not only in language learning, lead to further "contraction" and "mutilation" of inflections, and ultimately to their "corruption" and "loss". The results of this "most fundamental law governing all changes of form",¹³ comparable to what might be dubbed the Law of Wear and Tear, no doubt applicable to all ordinary machinery (although Whitney himself did not invoke mechanical analogies at this stage), actually represented a simplification rather than a complication of grammar. As inflections wore out, however, there were simultaneous replenishments of grammar in the shape of auxiliary words performing the duties of the former inflections. Smith's developmental scheme had also come to an end with the takeover of such specialized function words from inflections. But, apart from emphasizing articulatory rather than mental economy as the primary cause for the decay of inflection, Whitney could now also account for the provenance of the new grammatical machinery. These prepositions and other auxiliary words were "faded words", "etherealized formals" which had evolved from full, material words (especially nouns and verbs) by extensions of their meaning so wide that most of what was originally distinctive was attenuated and effaced, with reductions in form as the concomitants of such intelligent adaptations of lexical means to grammatical ends. These processes were, thus, essentially the same, and had similar intellectual and

economical reasons, as those having earlier converted independent words to inflectional appendages.

All differences notwithstanding, Whitney's history of grammatical forms was as linear as had been Smith's—this at least was how he saw it himself. Inflections made their appearance (created by coalescence rather than secretion), flourished until they reached their climax (epitomized by morphologically complex words such as Latin *amavisset*), and disappeared again, with grammatical words (derived from lexical ones) simultaneously rising to pre-eminence (as in English *he might have loved*, with a few residual verbal inflections). What Whitney was curiously reluctant to countenance was the possibility of history repeating itself. By his own principles of change—he after all championed a theory of external accretion rather than, as Smith had done, one of secretion—it would only have been logical if the grammatical words of a language that had suffered the loss of inflections were once more turned into inflectional affixes. And there indeed was nothing to prevent the cycles of ups and downs of inflection, and of the simultaneous downs and ups of grammatical words, from continuing indefinitely. But did such cycles of complication, simplification, and re-complication have analogues in the history of mechanics? Once hammers had been assembled from sticks and stones, continual use was bound eventually to wear away their handles or heads; but would one expect composite tools of the same kind then to be re-assembled from the debris? Perhaps this had happened; but real progress in mechanics, whether by simplification or complication, surely was not made by mere recycling.

2. The Earth a Machine; or: Repair

2.1. In order to come to terms with changes—past, present, and future—it is undergoing in time, the Earth has been compared to very similar things than language has been

compared to, including edifices, organisms (plants as well as animals), and machines. It is again the machine analogy, especially as first expounded in late eighteenth-century Scotland, that we will devote some attention to.

2.2. For those who held that the Earth was god-made it was not farfetched to conceive of it as a machine—and of course as the most beautiful, powerful, and useful machine imaginable, a fitting testimony to the omniscience, omnipotence, and benevolence of the supreme artificer.¹⁴ The theist creed, especially after Newton, was that God's design had been perfect from the beginning and that his creation, therefore, was in no need of any subsequent divine interventions. Machines with analogous properties, rendering any improvement (by simplification or complication), maintenance and repair, and the continuous supply of driving power superfluous, did only exist in the imagination—for instance in that of the royal chaplain-in-ordinary Thomas Burnet, as he was contemplating the question why "the Frame or Machine of an humane Body, or of another Animal, having that construction of parts and those faculties which it hath, lasts so short a time":

suppose a Mill, where the Water may represent the nourishment and humours in our Body, and the Frame of Wood and Stone, the solid parts; If we could suppose this Mill to have a power of nourishing it self by the Water it receiv'd, and of repairing all the parts that were worn away, whether of the Wood-work or the Stone, feed it but with a constant stream, and it would subsist and grind for ever. And 'tis the same thing for all other Artificial Machines of this nature, if they had a faculty of nourishing themselves, and repairing their parts. ([1691] 1965: 153)

The artificial machine that the Earth, and indeed the whole cosmos, was most commonly compared to at the time was not the mill but the clock, designed by the divine clock-maker to strike regularly at every hour if once wound. No matter how ingeniously contrived, the regular motions of actual clockwork were eventually to come to a standstill, though. In another of

Burnet's flights of fancy, the perfect clock would even, "upon a signal given, or a Spring toucht, [...] of its own accord fall all to pieces" ([1691] 1965: 89), once it had come to its pre-ordained halt.

Thomas Burnet's real subject was neither the longevity of man nor the art of clock-making but the [*Sacred*] *Theory of the Earth* (1690-91). Like man-made artifacts, the Earth in Burnet's history had a beginning as well as an end: it had begun as "dark Chaos", yet uninhabitable by what were to be God's noblest creations, and presumably was to end as a bright sun or "fixt Star", again uninhabited because those worth redeeming had been removed to heaven. The Earth's career having thus come full circle (and its course could indeed be perceived as a circle¹⁵), there was no reason to believe that Providence had plans for another such cycle. Like perfect clockwork, the Earth was fully automatic and regular even in its most enormous upheavals and needed no servicing, once set in motion by the power, wisdom, and benevolence of God. It underwent two major transformations while mankind's abode: from Primitive Earth to Present Earth, with the paradise transformed into a hideous ruin by the destructive Deluge of Water, and from Present Earth to New Earth, with the ruin of our days to be transformed into the millenium by a destructive as well as renovative Deluge of Fire. Sacred though Burnet's theory aspired to be, it thus had the beauty of the terraqueous globe undone and restored, entirely unmiraculously, by the profane natural forces of water and fire. While individually irreversible, the combined effect of his two global deluges was essentially to recreate paradisiacal conditions. "Revolution to the same state again, in a great circle of Time," indeed seemed to Burnet to be "according to the methods of Providence; which loves to recover what was lost or decay'd, after certain periods: and what was originally good and happy, to make it so again" ([1691] 1965: 376). Nonetheless, he found the traditional idea, espoused by ancient Greek philosophers, of

irreparable in Burnet's *Sacred Theory*, where its role, however, had not nearly been comparable to those of universal floods and conflagrations, was now automatically undone at the next cycle, thanks to the crucial repair mechanism of elevation (reflected, for instance, in intrusive veins of granite, a rock previously considered the product of decay, as observed by Hutton at Glen Tilt and elsewhere). Insofar as it was self-recycling, Hutton's global machine resembled the imaginary *perpetuum mobiles* of Burnet's; and Hutton himself had his doubts as to the appropriateness of characterizing something so beautifully capable of reproduction as a machine:

But is this world to be considered thus merely as a machine, to last no longer than its parts retain their present position, their proper forms and qualities? Or may it not be also considered as an organized body? such as has a constitution in which the necessary decay of the machine is naturally repaired, in the exertion of those productive powers by which it had been formed? (1795: 16)

Machine or organized body,¹⁹ its cycles were never advancing beyond one and the same state of dynamic equilibrium. Time had become an abyss; "no vestige of a beginning" was rationally reconstructible and "no prospect of an end" (Hutton 1788: 304) was rationally foreseeable.²⁰ Regardless of such burning empirical issues as those of the aqueous or igneous origin of basalt or granite, there could, thus, be no *Urgebirge* in the sense of stratigraphies such as those of Johann Gottlob Lehmann, Georg Christian Fuchsel, or Abraham Gottlob Werner and his neptunist disciples (i.e. rocks forming the *original* surface of the globe), because there was no way of telling whether any recoverable stratum or succession of strata was not preceded by others of the same kind eroded away without leaving a trace. And unconformities indeed were incontrovertible proof of multiple cycles. As Thomas Burnet had rightly remarked, horrifiedly: "If time is infinite, we may be at any point in time."

3. Word—Rock and Grammar—Soil; or: Vertigo

3.1. If language could be compared to a machine, could it not be compared to one of the kind that the Earth could be compared to? Or could it not be compared to the Earth itself?

There indeed are potentially illuminating analogies between language and the Huttonian Earth-machine, and fairly obvious ones, at that. They eluded Adam Smith, who did not have any notion of the restoration of grammatical forms, nor the appropriate one of their decay; and the vision of machines being self-recycling in the manner of the Earth, which might have suggested the analogies, could not have had much appeal for any practically minded improver. James Hutton, on the other hand, was insufficiently versed, or interested, in matters linguistic to realize that his notion of an eternal cycle of decay and restoration might be equally meaningful in this domain of less sublime dimensions.

3.2. Opinions about the crucial linguistic issue of the life cycle of inflections were divided at the time of Smith and Hutton; and this controversy was not to subside soon.

As outlined above (§ 1.2), Smith held that inflections were made out of originally meaningless terminations of invariable lexical words, could to some extent be regularized (by generalizing one set of them from one word to others), and were eventually discarded by (foreign) learners who simply did not use them any longer. The theory of secretion-regularization-disuse enjoyed some limited popularity, sometimes with special emphasis on a possible intermediate stage of deregularization. Among those condemning the exuberant, almost weedlike growth of inflections, in danger of running out of control unless checked by linguistic conservationists, were James Burnett (1773/74), criticizing the proliferation of inflectional categories in (later so-called) polysynthetic languages of America, and the brothers Friedrich (1808) and August

Wilhelm Schlegel ([1818/19]1913), who were more concerned about the lack of care in preserving the inflectional systems of languages closer to home.

In a significant variation of this theory its final stage was altered: instead of being simply disused, inflections were gradually wearing out, until there was nothing left of them. Precariously situated on the margin of words (generally in final position) and usually lacking phonetic substance and prominence (being typically rather short in terms of syllables and sounds as well as unstressed), inflections could easily fall victim to careless articulation. Those espousing a theory whose final stage was decay rather than disuse²¹ were more likely than not to borrow geological terminology: words with inflections were talked of as being inevitably 'eroded' by the very action of their articulation, like rocks were eroded by the perpetual action of water and wind and cold and heat. Adding related images, the "Abschleifung des gemeinen Gebrauchs" seemed to Friedrich Schlegel (1808: 15) to resemble the rubbing off of the marks on coins in constant circulation, and to August Schleicher (1860: 34) the wearing off of the beautiful limbs of a statue that has been rolling for a long time in the bed of a river and of which now scarcely anything remains but a polished stone cylinder with faint indications of what it once was.

An alternative theory about the origin of inflections and indeed all morphology, known since antiquity and elaborated on since the sixteenth century,²² was always more popular than its secretional rival. It was at Smith's time, most notoriously ever, championed by John Horne Tooke, who would in his *ΕΠΕΑ ΠΤΕΡΟΕΝΤΑ, or the Diversions of Purley* (1786/1805) perform etymological feats such as to derive the three-letter Latin verb form *ibo* 'I will go' from *i(re)*, *b(oul)* (cf. Greek *βο λομαι* and Latin *volo*), plus *(eg)ο*, and, a little more respectably, by the Dutch school of classicists, and also by the abbé Condillac (1746, pt. II: i, ix), then perhaps the most influential

philosopher of language. It had bound morphemes added from outside, originally words of their own now deprived of their independence. Coalescence was achieved by degrees, with mere univibration being followed by processes of closer formal integration and by the phonetic and semantic reduction of one of the erstwhile words to the status of an inflectional appendage and probably even of an internal modification of its stem, although these stages were not yet completed in all relevant languages. The terminology standardly used by advocates of this theory²³ to account for the gradual emergence of inflected words—agglutination, fusion, coalescence, synthesis, polysynthesis, and the like—would have been equally apt to describe the stages of deposition and consolidation in the formation of rocks, and may indeed have been borrowed from the petrological or also mineralogical and metallurgical literature.²⁴ (The provenance of 'Einverleibung' or 'incorporation', by contrast, was ultimately organismic.) If inflections assumed to be created by coalescence were further assumed to be headed for decay rather than plain disuse, their whole life cycle was reminiscent of that of rocks, where consolidation was also inexorably followed by erosion.

As to the other chief variety of grammatical forms, divisions of words into lexical and grammatical ones, into *materia* (comprising in particular verbs, nouns, and adjectives, all meaningful in themselves) and *forma* (particles of all kinds, insignificant in themselves), had been made since antiquity, and assumptions that at least some kinds of grammatical words may historically derive from lexical ones, bleached of meaning and reduced in form,²⁵ had almost been commonplace since the sixteenth century. In opposition to the likes of James Burnett and Adam Smith, in whose developmental theories grammatical words, once invented as such, were virtually immune to change, it was again John Horne Tooke who, around 1800, pleaded most forcefully for their lexical provenance. For Horne Tooke (1786/1805), only two parts of

speech, viz. nouns and verbs, were necessary for the "communication of our thoughts"; words of all other kinds were mere "substitutes" of nouns and verbs, serving the purpose of "dispatch" ("A short, close, and compact method of speech, answers the purpose of a map upon a reduced scale: it assists greatly the comprehension of our understanding: and, in general reasoning, frequently enables us, at one glance, to take in very numerous and distant important relations and conclusions, which would otherwise totally escape us", ([1805: 1860: 683), and were actually derived from these by "abbreviation" and "corruption", processes busiest with words most frequently used (such as, for instance, Old English *gifan*, whose imperative provided the conjunction *if*, or Latin *casa*, ending up in French as the preposition *chez*).²⁶

If this abbreviation (or erosion) theory about the origin of grammatical words and the coalescence-decay theory about inflections were pieced together, the full story of grammatical forms now went essentially like this: the lexical fund of a language supplied words which, abbreviated and corrupted, could be utilized for grammatical purposes; grammaticized words, abbreviated and corrupted, sooner or later coalesced with lexical words, thus becoming inflections; inflections were destined to be abbreviated and corrupted to nought. As dawned on Horne Tooke (e.g. [1805]1860: 662), this story was potentially a never-ending one, since the constant destructive working of abbreviation and corruption could always be made up for, as long as there were lexical words for grammar to feed on. But did it have a beginning?

3.3. Historians of language certainly needed no special geological and related expertise to be able to talk metaphorically about the agglutination, fusion, and erosion of grammatical forms. Suppose, however, users of such terminology, subscribing to the corresponding theories of grammatical change, were in fact acquainted with the discovery of 'deep' time in

geology, might they not be expected to have taken a lead from historians of the Earth concerning beginnings?

3.3.1. Considering the proven significance of stratification for the reconstruction of the geological past, it is not surprising to find historians of language availing themselves of the image of strata. Thus, throughout the nineteenth century and beyond, the idea that *different* languages or language families now in existence represented different stages of linguistic evolution was commonly expressed in terms of strata of rock of different age superimposed upon one another:²⁷

zudem sind in Europa die 3 Sanskritsprachfamilien, wie schon ihre geographische Stellung lehrt, eine verhältnißmäßig junge Formation, aufgeschichtet und aufgeschwemmt auf den Granit der Iberer, Kelten, Kymren und durchmengt mit dem verwitterten Gestein anderer, in Trümmer zerschlagener Europäischer Völker. (Pott 1832: 68)

Linguistic types come one out of another, like orders in architecture or ages in geology. The Indo-European system rests on the Semitic and Turanian systems, as they do on the Chinese, and as the Chinese does upon the primitive speech of Western Africa. (Edkins 1871: 205)

Alternatively, single languages were conceived of as internally stratified, as having preserved traces of the preceding stages of their formation:²⁸

[Die kaukasischen Sprachen] bewahren am handgreiflichsten das Material vergangener Stufen der Entwicklung menschlicher Rede; in ihnen kann man anschaulich den Prozeß der Ablagerung sowohl von Elementen als auch von ganzen Schichten der Sprache auf den ältesten Stufen ihrer Entwicklung verfolgen. (Marr 1922, quoted from Klimov 1969: 82)

Convinced (by the time of his second series of popular *Lectures*) that modern geology, especially as practised by Sir Charles Lyell, was the science of the greatest possible benefit to linguists, (Friedrich) Max Müller made perhaps the most extensive use of the notion of strata, in a lecture, delivered in front of a distinguished audience, that was entitled *On the Stratification of Language* (1868). Laden with imagery of all kinds, this lecture waxed quite lyrical over "the pulses of

former life [...] still throbbing in the petrified forms imbedded in grammars and dictionaries" of individual languages, like "the clearly marked lines of different strata" of rock. Its chief technical topic, however, was the classification of languages according to their genetic relatedness and to their common structural features—and for Müller these two kinds of classification were not independent. Classifiability presupposed historical growth and decay "in natural order and according to rational rule", and law-governed developments were manifesting themselves in particular in the realm of grammatical forms.

Pouring scorn on prescientific fantasies about the coming into being of grammatical forms either by convention or by organic growth ("sprouting forth from the radicals and stems and branches of language, like so many buds and flowers"),²⁹ which were evidently at odds with how such forms were now known to have arisen in familiar languages (with the future verb inflections in French, for instance, deriving from the independent word *avoir*), Müller doubted

whether even thus we should have arrived at a thorough understanding of the real antecedents of language, unless, what happened in the study of the stratification of the earth, had happened in the study of language. If the formation of the crust of the earth had been throughout regular and uniform, and if none of the lower strata had been tilted up, so that even those who run might read, no shaft from the surface could have been sunk deep enough to bring the geologist from the tertiary down to the Silurian rocks. The same in language. Unless some languages had been arrested in their growth during their earlier stages, and had remained on the surface in this primitive state, exposed only to the decomposing influence of atmospheric action, and to the ill-treatment of literary cultivation, I doubt whether any scholar would have had the courage to say that at one time Sanskrit was like unto Chinese, and Hebrew no better than Malay. In the successive strata of language thus exposed to our view, we have in fact, as in Geology, the very thread of Ariadne which, if we will but trust to it, will lead us out of the dark labyrinth of language in which we live, by the same road by which we and those who came before us, first entered into it. The more we retrace our steps, the more we advance from stratum to stratum, from story to story, the more shall we feel almost dazzled by the daylight that breaks in upon us; the more shall we be struck, no longer by the intricacy of Greek or Sanskrit grammar, but by the marvellous simplicity

of the original warp of human speech, as preserved, for instance, in Chinese; by the childlike contrivances, that are at the bottom of Paulo-post Futures and Conditional Moods. (1868: 12f.)

What allegedly was to be unravelled by taking a stratigraphers view on grammatical diversity was "the secret of the whole growth of language from Chinese to English".³⁰ Unlike for instance Edkins (1871), another devotee of stratal imagery, Müller was not quite prepared to commit himself on the issue of whether English was ultimately, at the very first stages of its formation, a genetic relative of Chinese; his thesis, far less startlingly, was that languages with grammatical forms of the kind exhibited by English, or much more intricately by Ancient Greek or Sanskrit, must have had as their "original starting point" languages with a Chinese-style grammar—or, to set out the full gamut of three developmental stages or strata, no more sharply delineated from one another in individual languages at any point of their history than typically are rock strata of Tertiary, Secondary, and Primary formations.³¹

No language can by any possibility be inflectional without having passed through the agglutinative and isolating stratum; no language can be agglutinative without clinging with its roots to the underlying stratum of isolation. (1868: 20)

Max Müller, thus, was a true-blue coalescence theorist: the "isolating" stage (exemplified by Chinese) was characterized by the mere "juxtaposition" of lexical (or "material" or "radical") words, some of which were in the process of losing their original meanings and becoming grammatical or "formal" words; at the subsequent "agglutinative" stage (exemplified by Hungarian, Finnish, Turkish, Dravidian, Burmese, etc.—all members of Müller's notorious Turanian family) the formal words were losing their formal and semantic independence as well as part of their phonetic substance, thereby dwindling down to dependent or "obsolete" words and eventually to mere affixes appended to full lexical words;³² finally these appendages, being further corrupted and eroded, and their hosts were "welded together into one indistinguishable mass

through the intense heat of thought, and by the constant hammering of the tongue", yielding the "amalgamations" or "agglomerations" of "radicals" and "formatives" of the "inflectional" stage (exemplified by Sanskrit, Greek, Hebrew, and also English, where the inflectional splendours were again fading).

But was it really sound methodology to deduce the developmental law that "everywhere amalgamation points back to agglutination, and agglutination back to juxtaposition" (Müller 1868: 20) from a comparison of languages, genetically not demonstrably related, that were coexisting at some point in time? Max Müller thought it was because this was precisely what was being done by geologists:³³

Here, too, where different strata have been tilted up, it might seem at first sight as if they were arranged perpendicularly and side by side, none underlying the other, none presupposing the other. But as the geologist on the strength of more general evidence has to reverse this perpendicular position, and to re-arrange his strata in their natural order, and as they followed each other horizontally, the student of language too is irresistibly driven to the same conclusion. (1868: 20)

The "more general evidence" which supposedly authorized the linguistic stratigrapher to reinterpret coexistence as succession was, firstly, the logical principle *ex nihilo nihil fit* and, secondly, the empirical observation that, wherever amenable to rational analysis, inflections were demonstrably derived from agglutinated grammatical words. Of course, the principle *ex nihilo nihil fit* might with equal justification have been invoked also by believers in secretion, such as Adam Smith or perhaps even Friedrich Schlegel, whose tenet was that inflections derived from originally meaningless parts of lexical words rather than from nothing. Nor was the empirical evidence as unequivocal as Müller would have it; at least some inflections continued to be traced back, more or less rationally, to once meaningless word-parts rather than to separate words. Most radically, Otto Jespersen (1922: chap. XIX), not known as a crank, would still espouse an essentially

Smithian "Law of Progressive Development" some fifty years later.

A kind of stratigraphic evidence that Müller appears to have been entirely unaware of, or whose significance he did at any rate not appreciate, were unconformities—horizontal rock formations on top of perpendicular ones. These had suggested to Hutton that the cycle of elevation-folding-erosion-transportation-sedimentation-consolidation had repeated itself at least once, and had to be assumed in principle to be reapplying indefinitely in the future as well as in the past. While not as agnostic as Hutton about the feasibility of determining, from stratigraphic and especially paleontological evidence, which point had at any given moment been reached in the historical sequence of geological events, Charles Lyell, the apostle of the uniformities of law, process, rate, and state, and obviously Müller's chief geological source, had done much to promote rather than challenge the notion of cyclically recurring changes of the Earth's surface, as revealed by unconformities. Perhaps Müller could think of no linguistic analogue of this configuration of strata. And the way he used stratal imagery, there presumably was none. What he might have thought of, however, was a linguistic analogue to the lesson unconformities had taught the geologist. If previous formations—of land or of grammatical forms—could be repeatedly undone by erosion, alternating with phases of renovation, there was no rational way of uncovering absolute beginnings. The isolating state was not perforce the "original starting point" of all future developments towards agglutination and inflectional amalgamation, the "primary stratum" underlying the secondary and tertiary strata, because it was possible for isolation in turn to have been preceded by a state of inflectional amalgamation. As there was no recognizable *Urbirge*, there was no recognizable *Ursprache* or rather *ur-grammar à la Chinese*.

But this was not quite how Max Müller saw it. For him, the

inflectional stratum was special. If he had been a staunch uniformitarian, he would have had to face up to the possibility of grammatical forms of whatever kind disappearing and reappearing always and everywhere, owing to the working of the destructive force of phonetic erosion and of the reconstructive "power of composition". But some of Lyell's uniformities, especially those of rate and state, apparently were not to his liking. For one thing Müller considered the inflectional state to be more stable than the other two, and may even have harboured a feeling that genuine inflections were able to withstand the "constant hammering of the tongue" forever, no matter how rudimentarily. Thus, if anything could follow after this crowning achievement of linguistic evolution at all, the transition to the next state would take much time—more time perhaps than had so far been allotted to *homo* since (s)he had ceased to be *mutus*, which effectively ruled out the possibility of an isolating language having had an inflectional past. (As to Chinese, Müller admittedly did not maintain that, in its earliest attested form, it was actually an *Ursprache*; but the prehistorical changes he reckoned with were essentially only lexical ones and did not involve any phonetic erosion of inflections.)³⁴ Also, Müller did in fact recognize repeated cycles of erosion and "grammatical regeneration" (as he put it in his *Lectures*, 1861: No. 8, 1864: No. 1), but essentially only internal to the agglutinative state, where language communities (typically nomads) were quick to abandon grammatical words or affixes affected by phonetic corruption for different and more distinctive forms, which in turn were to suffer corruption. (Alternatively, agglutination could, also by the "power of composition", be raised to the level of inflection, but that only happened, according to Müller, in the course of changes of lifestyle.) And here he was fully aware of the dilemma of the historian who could not possibly reconstruct what had been replaced without leaving a trace; trying to do so would have been, for Müller (1864: lecture No. 1), like

searching for fossils in strata of granite. A more apposite geological comparison perhaps would have been with James Hutton, unable ever to determine at which point in time he was as events were continually repeating themselves. Inflections were different, or so it seemed to Müller, in that they always carried along traces of their agglutinative and isolating past, like petrifications. In this state, history seemed recoverable and not to lack direction.

3.3.2. William Dwight Whitney's acquaintance with geology was, in a way, more intimate insofar as this was the profession pursued by his older brother Josiah. In his theorizing about linguistic change this perhaps showed in his emphasis on the methodological principle of uniformitarianism, at the time chiefly debated in geological circles. As "the mode of formation of ancient sandstones and conglomerates" had to be inferred "from that of modern sandbanks and gravel and pebble-beds", so "the ancient modes of language-making" had to be inferred from those found active in historical times, always allowing for possibly great differences of "the circumstances and conditions of action of the same forces" (1875: 195ff.). For Whitney as for Max Müller, whose airs and fancies he disliked profoundly, the "essential unity of linguistic history, in all its phases and stages", thus, did not quite entail the unities of state and rate. Whitney would also talk of the erosion of grammatical forms, but so did others who had no geologist brothers and who had never observed rocks crumble or read bestsellers of Lyell's.

Like Max Müller, he held up the geologist's manner of dealing with successions of strata as a model of responsible historical enquiry for the historian of grammar, but made no reference to unconformities. As outlined above (§ 1.4), he subscribed to essentially the same theories about the life cycle of grammatical forms as Max Müller, and he, too, failed to go along with the Huttonian conclusion that cycles of

destruction and repair precluded the discovery of vestiges of a beginning: Chinese-style isolation or "collocation" was also Whitney's original starting point of the evolution of grammar, unpreceded by inflection or "integration". He was adamant that the uninflected monosyllables of Chinese, unlike those of English, could not be "worn-out relics of a formerly inflected condition" (1875: 237). Interestingly, however, his reason for denying Chinese the potential of an inflectional past had nothing to do with the life cycle of grammatical forms as such; it was its lexical organization—the limited number and variety of words and the absence of well-delimited word-classes (also noted by Max Müller)—which made him insist that Chinese was at an early state of development rather than at a late, as was English. Also, inflections were probably special for Whitney as well, almost miraculously resistant to the destructive "tendency to ease and abbreviation": perhaps they could never be wiped out completely, for was there a tongue which, from having been so rich in inflections, had become poorer than English, whose root-syllables after all were still not completely stripped of "the apparatus of suffixes with which they were formerly clothed" (1875: 105). Whitney knew none. However, when faced with the American Indian languages, most of which were of the highly inflected polysynthetic type while some (including Otomi) were apparently entirely uninflected and monosyllabic, Whitney indeed experienced a Huttonian loss of historical direction: for the latter group it could not be determined whether inflections had been "altogether effaced" or were "originally wanting" (1875: 262). For all that was to be known, the destruction of the grammatical apparatus and its rebuilding with lexical means could have gone on indefinitely in the prehistory of these languages. Of time there was plenty—6,000 years, or 12,000, or 100,000, or 1,000,000, "as the new schools of anthropology are beginning to claim", but "the less said about that the better". especially as historians of language had "not

yet found a rule with which to measure the time they actually need[ed]" (1875: 192).³⁵

3.4. The mind seemed to grow giddy by looking so far into the abyss of time; and historians of language engaged in the geological *discours* accordingly preferred to keep at a safe distance, even though it had dawned on them how much further reason might sometimes go than imagination could dare to follow.³⁶

Devotees of architectural imagery, confined to the comparatively cosy dimensions of *homo faber*, were perhaps unaware of the danger of getting lost in infinity when condoning the repetition of cycles, as did, among many others, President de Brosses (1765):

l'homme, à force de l'usage, d'habitude et d'inadvertance, a bâti, détruit, rebâti l'edifice immense et toujours ruineux des langues quelconques.

Alexander Murray, too much under the influence of Horne Tooke for his posthumous *History of the European Languages* (1823) to be taken more seriously than de Brosses' *Traité* by many of the new breed of professionals, must have been familiar, at least vaguely, with Huttonian geology from frequenting the philosophical circles of Edinburgh. His account of language mixture proved him a relatively uniformitarian plutonist; and so was his decidedly anti-Smithian account of developments subsequent to compounding, but here the imagery shifted to the architectural sphere:

Hence all changes, even the most violent, fall within the plan of the philologist. As the material world, however unaccountable its changes may appear to the ignorant, exhibits to the philosopher, in proportion to his knowledge, a perfect obedience to order and regularity; so the analogy between nature and language may be asserted in the broadest terms. When a volcano has ruined the soil in its vicinity, a new one is gradually formed out of the lava, and other actual accumulations, on which arises a new, and possibly a more beautiful vegetation. When one original language is destroyed by the prevalence of another, a new compound is produced out of the existing materials, the formation of which is never accomplished without the action of general laws, modified, indeed, by local circumstances.[...] In the infancy of com-

pounded languages, all such circumstances [tense, case, etc.] were expressed by separate words, which were long moveable, and which possessed a distinct sense. These coalesced in time with the words which they assisted, and losing their distinct sense, went by the name of terminations and inseparable particles. Many verbs and nouns, employed to express the relations of objects and thoughts, lost in a similar manner their separate signification, and acquired the title of indeclinable words or particles. [...] [Persic like Anglo-Saxon] has run the race which experience shows to be due to articulated speech in its natural progress. Time destroys the more delicate and complex parts of the structure, by the hand of ignorance and chance; leaving the ruins for the materials of a smaller and less splendid edifice to future ingenuity. (1823: I, 36; II, 323f., 440)

The architectural imagery of building-destruction-rebuilding notwithstanding, Murray perceived the dilemma which any recycling of debris created for the historian as clearly as had Hutton, remarking apropos of the language that would continue to serve future historical-comparative grammarians-cum-stratigraphers such as Müller and Whitney as the model of originality:

It is a problem in philology, whether the Chinese language be a dialect composed of mutilated words that have formerly been longer, or of monosyllables, varied by accent [i.e. tone], for the purposes of communication. (1823: II, 486)

On the other hand, at least with respect to languages deemed uncompounded, Murray, too, continued to search for the very first beginnings of language formation, and found it in nine interjectional monosyllables, of which he was sure that they had not previously been recycled.

3.5. Ultimately it was not imagery nor observation but bold and yet rational speculation which ensured the breakthrough of the cycle.

3.5.1. In 1806 or 1807, still a pupil at the *Katedralskole* of Odense but one well versed in linguistic theories of the Enlightenment,³⁷ Rasmus Kristian Rask wrote up 'Betragtningær i anledning af dæt kreolske språk'. Equipped with some knowledge about a creole derivative of Dutch spoken in the

Danish West Indies, he had evidence that a language as highly inflected as Classical Greek could, via the intermediate stages of Gothic, Saxon, and Dutch, deteriorate to a state of utter uninflectedness, i.e. beyond that attested in modern Germanic languages such as English.³⁸ And since the state of inflectedness, whose zenith Rask saw reached in Greenlandic, the language of an unpolished people, was to be supposed to be preceded by one of uninflectedness, it could be inferred that the natural history of language could involve cycles. Being none too specific about the actual processes responsible for the destruction and renewal of inflections (apparently allowing for both decay and disuse, secretion and coalescence), young Rask thus pieced together a chain of destructive developments that had occurred over a span of some 3,000 years, and a phase of reconstruction as presumably lying behind present-day Greenlandic, although direct historical evidence was here lacking:

således åg mæ tungemålene de oprinne af ænkælte lyd, dannes, udvides sammensættes, opløses attar i ænkælte lyd mæn aldrig de samme sām fūr (når dæt ikke sker ved unaturlig voldsāmhed), ja de få ikke engang samme inrætning igjæn. ([1806/07]1960: 163)

When Rask emphasized that language's natural course was more like a spiral ("skruegænge") than a circle ("krésløb"), in this resembling the evolution of religion as well as of organisms, he was not denying the exact recurrence of the structural states of uninflectedness and inflectedness but merely that of the very same lexical and grammatical forms.

Of course, Rask's spiral theory continued to be conjectural, since no repeated rotation in the history of any single language family was actually on record. Apparently the speakers of West Indian Dutch Creole had not yet begun to reacquire inflections.

3.5.2. Although Wilhelm Gesenius (1817: 181ff.) paid lip service to Friedrich Schlegel's secretional theory, the majority of inflections in Hebrew seemed to him to have come about by

coalescence and erosion, and he saw a potential, as a matter of course, of them being lost again in processes not very specifically characterized as "Entartung":

Man mag daraus abnehmen, da die Sprachen von jener unvollkommenen, mehr mechanischen Art der grammatischen Structur ausgehend, sich bey größerer Ausbildung immer mehr der Wortbildung durch Flexion genähert haben, wie sie denn auch umgekehrt in der Zeit ihrer Entartung jene mühsamere und kunstreichere Flexion verlassend wieder zu dem Gebrauche der Partikeln zurückzukehren pflegen. (1817: 191)

It is not entirely clear whether Gesenius was of the opinion that the Semitic family was already going through a second round of coalescence. By his own assumptions he should indeed have been unable to distinguish whether it was the first or the umpteenth time that the cycle was repeating itself, as long as the historical evidence was missing. And comparatively long though the *attested* history of Semitic was, it was perhaps not long enough to have accommodated more than one cycle.

3.5.3. After Rask's school essay, which remained unpublished, it was only in Georg von der Gabelentz's *Die Sprachwissenschaft* (1891) that the idea of a spiral development, driven by antagonistic, destructive and reconstructive forces found its most incisive expression:³⁹

Nun bewegt sich die Geschichte der Sprachen in der Diagonale zweier Kräfte: des Bequemlichkeitstriebes, der zur Abnutzung der Laute führt, und des Deutlichkeitstriebes, der jene Abnutzung nicht zur Zerstörung der Sprache ausarten lässt. Die Affixe verschleifen sich, verschwinden am Ende spurlos; ihre Functionen aber oder ähnliche bleiben und drängen wieder nach Ausdruck. Diesen Ausdruck erhalten sie, nach der Methode der isolirenden Sprachen, durch Wortstellung oder verdeutlichende Wörter. Letztere unterliegen wiederum mit der Zeit dem Agglutinationsprozesse, dem Verschleiffe und Schwunde, und derweile bereitet sich für das Verderbende neuer Ersatz vor: periphrastische Ausdrücke werden bevorzugt; mögen sie syntaktische Gefüge oder wahre Composita sein (englisch *I shall see*, -lateinisch *videbo* = *vide-fuo*): immer gilt das Gleiche: die Entwicklungslinie krümmt sich zurück nach der Seite der Isolation, nicht in die alte Bahn, sondern in eine annähernd parallele. Darum vergleiche ich sie der Spirale. (1901: 256)

It was, then, only logical that, for Gabelentz, the monosyllabic isolating languages of East Asia, including Chinese, the virtual *lingua Adamica* of old, could not legitimately be classified as particularly original. On the strength of the spiral principle and of uniformitarianism,⁴⁰ there was no way of telling whether it was the first, fourth, seventh, or twentieth time that this structural state had been reached.

From the earliest evidence available to Gabelentz about Chinese, he concluded that it had been predominantly isolating as early as about 4,000 years back, showing, however, traces of agglutination and perhaps genuine inflection. As Modern Chinese was just about to move on from isolation to agglutination, the spiral had here come almost full circle. But that was the furthest that any family had yet been followed in its gyrating course. Historical time had apparently not sufficed to produce the equivalent of Hutton's unconformity: tangible proof that developmental cycles had repeated themselves.

3.5.4. Since Gabelentz there have been innumerable invocations of the grammatical spiral or cycle.⁴¹ Most significantly, the language with the longest attested history, Egyptian, has meanwhile been argued (by Hodge 1970) to furnish the only real example of a complete cycle, or even two: Coptic (c. 300-1600 A.D.) was predominantly inflecting, Late Egyptian (c. 1300-700 B.C.) predominantly isolating, Old Egyptian (c. 3000-2200 B.C.) appears to have had inflections, and its antecedent Proto-Afroasiatic has been reconstructed, very hypothetically, as predominantly isolating again. For East and Southeast Asia, further attempts have been made at least to reconstruct a complete cycle of the fall, rise, and fall of inflections, perhaps keeping in step with the fall, rise, and fall of tone (Matisoff 1973). The sequence of pidginization, creolization, and decreolization, attested variously, is now known to accelerate the recursion of the same states considerably, which otherwise appears to take some 3,000 years

or more. For individual categories, as opposed to whole languages, complete cycles have also been described for languages whose attested history is considerably shorter (e.g. by Heine & Claudi 1986 for Eastern Sudanic Maa and its dialect Samburu, where a coordinative conjunction, having been turned into a tense inflection, has disappeared, with the conjunction being recreated from its own debris plus another formative).

The result, therefore, of such enquiries is, that with respect to human observation, this world of grammar has neither a beginning nor an end. If it were not for the limits set by the vagaries of human evolution, Chinese, Turkish, Sanskrit, Hebrew, Greenlandic, and English might have been alternating ever since that rationally unobservable moment the Earth-machine has been set going.

Acknowledgment

The idea of this paper first germinated in the summer and autumn of 1986 when I was a Fellow at the Edinburgh Institute for Advanced Studies in the Humanities, working on the Institute's Project on the Scottish Enlightenment and being much enlightened as well as entertained by conversations with and talks by Jean and Peter Jones, Gordon Craig, and the late Thomas Frank, among others.

NOTES

1) Prior to the eighteenth century 'mechanism/mechanical' and 'organism/organic' were largely synonymous terms, which may have hindered the earlier dissociation of the two domains of imagery along the lines especially of Romanticist ideology. What is not at issue here are conceptualizations of language *users* in terms of machines, fairly familiar after Descartes and especially La Mettrie. An interest in the (natural or artificial) mechanics of language or speech production, however, was certainly not mutually exclusive with a mechanistic view of language structures—witness, for example, Kempelen's *Mechanismus der menschlichen Sprache nebst der Beschreibung einer sprechenden Maschine* (1791).

2) This rhetoric course, annually repeated throughout Smith's thirteen years as a professor at Glasgow (1751–63), is only preserved in the form of extensive students' notes from the session of 1762–63. Smith may in fact have used the language-machine comparison earlier since he had given public lectures on the same subject at Edinburgh from 1748–51. All subsequent quotations are taken from volume IV of the Glasgow Edition of Smith's works.

3) See Plank 1991 for a fuller exposition of Smith's views on language and their historical context. A wider perspective on early language typology is taken in Plank 1989.

4) To adapt a phrase which Smith was so fond of as to use it in all his major writings, including the essay on the history of astronomy, though not in the 'Considerations'.

5) It is instructive, by the way, to compare the imagery which Friedrich Schlegel (1808), a tacit beneficiary and opponent of Smith's 'Considerations' (cf. Plank 1987a, b), used to emphasize how unbridgeable the gap was between his two major language types: in "Sprachen durch Flexion" everything was organic, and the roots of words in particular were like fecund seeds or living sprouts, while in "Sprachen durch Affixa", characterized as mechanical without being specifically compared to machines, all meaningful elements were like heaps of atoms joined and separated by the winds of chance (i.e. dead matter).

6) For Smith, (functional) simplification was not tantamount to (aesthetic) perfection, though.

7) Relating articles and case inflections was not without precedent, however. Julius Caesar Scaliger (1540: ch. 131), for instance, had derived the Latin noun endings *-us*, *-a*, *-um* from the Greek 'definite articles' *ὁ*, *ἡ*, *ὅ*.

8) The preface to his *Code of Gentoo Laws*, originally published in 1776, and observations in his *Grammar of the Bengal Language* of 1778 were among the earliest sources of information on Sanskrit available, and heavily utilized, in the West.

9) It is another, and more controversial, question whether views on language had indeed been "crude and inconsistent" before and had only now been "tending to crystallize into shape", as Whitney (in the preface to his *Life and Growth of Language* of 1875) was not the only one to proclaim at the time.

10) Compare, among many others, Lyell's characterization of language as "a wonderful instrument of thought, a machine" (1863: 469).

11) Darwin's emphasis for the organic realms, incidentally, was also on increasing complexity, and he, too, drew support from mechanical analogies in his *Origin of Species* (1859: ch. II, 'Variations under Nature'): "Almost every part of every organic being is so beautifully related to its complex conditions of life that it seems as improbable that any part should have been suddenly produced perfect, as that a complex machine should have been invented by man in a perfect state". Max Müller later called the idea of natural selection "a new engine of thought" (1864: lecture No. 7).

12) The conjectural historian Smith had been no less a uniformitarian than Whitney

(cf. 1875: 195f., 297, 300, *passim*) in attributing to early language formers no materially different cognitive capacities from those now in operation.

13) Whitney (1875: 50) did in fact allow for occasional "counter-movements on a small scale".

14) Henri de Monantheuil, for instance, made such a comparison in his *Aristotelis Mechanica* (1599); see Hooykaas (1983: 176ff.). A later writer of some interest in this respect is Erasmus Darwin, the inventor of a "fiery chariot", a horizontal windmill, a speaking machine, a canal lift, an "artificial bird" (flying machine), and member of the highly inventive Birmingham Lunar Society, who was exceptionally fond of mechanical imagery in his versified treatises on nature.

15) It was in the frontispiece of Burnet's book, lucidly commented on by Gould 1987.

16) See recently Ito 1988.

17) Hutton had, at any rate, previously been much concerned with circulation—that of blood (in his medical dissertation at Leiden) and of crops (in his own practical work as a farmer and agricultural improver, from which period, 1754–67, dates his unpublished *Elements of Agriculture*). My main sources on Hutton, apart from his own writings, were Hallam 1983, Hooykaas 1983: 489–503, Jones 1986, and Gould 1987.

18) The machine comparison did not yet appear in the *Abstract* of 1785, but only in the more extended discussions of 1788 and 1795.

19) And doubts like Hutton's about the Earth being more like a machine or a living organism appear to be lingering on witness, for example, the view of the Earth as "une gigantesque machine thermique, capable [...] de transformer en énergie mécanique (courants océaniques ou vents) une partie de la chaleur qu'elle reçoit", advanced by Talagrand (1988), and the Gaia, or Mother Earth, hypothesis, apparently not intended as a metaphor, of J. E. Lovelock (e.g. 1979) and his followers.

20) Relying on evidence other than successions of rock formation, efforts continued to be made rationally to determine at least a starting-point e.g. by Buffon (1778), who created quite a stir by calculating, on the basis of the theory of the solar system ruled by Newtonian gravitation and of conjectures about cooling-down rates of hot bodies of metal or mineral, that 75,000 years must have elapsed since the Earth began its existence as a nebular mass of matter in fusion. (In calculations wisely kept secret, Buffon even fixed the age of the Earth at about three million years.) Nowadays the age of the oldest terrestrial rocks known is dated radiometrically at 3,800 million years, and taking into account yet older meteorites, the age of the Earth is assumed to be about 4,700 million years (Hallam 1988).

21) It was also possible to assume both decay and ultimately whole-sale disuse.

22) An early source is Plato's *Cratylus*, where Socrates mentions, as one of the ways the primordial words could be changed, their being compounded with other words. Later it was a standard assumption of grammarians of Hebrew that personal pronouns were affixed to verbs.

23) Coalescence was not perforce incompatible with secretion. Friedrich Schlegel saw both processes at work, although in different classes of languages, "Sprachen durch Affixa" and "Sprachen durch Flexion", respectively. The controversy between the Schlegels and the mature Franz Bopp (who would only have coalescence) was anticipated in earlier debates such as that between Matthew Lumsden (who, in his Persian grammar, pointed to Semitic vowel alternations and English ablaut as resisting any coalescence interpretation) and John Horne Tooke.

24) 'Crystallization', a term commonly used for the structural formation of languages in general, was specifically applied to coalescence processes by Farrar (1860: 35). It was, however, chemists who William Hazlitt (1825: 125) was reminded of by the analytic strategy of the foremost coalescence theorist, or fantasist, of his day: "Mr. [Horne] Tooke, in fact, treated words as the chemists do substances; he separated those which are compounded of others from those which are not decomposable."

25) Socrates in Plato's *Cratylus* knew that primordial words could be changed by phonetic degeneration.

26) There were also technological and organismic metaphors in the *Diversions*: "Abbreviations are the wheels of language, the wings of Mercury" (Horne Tooke [1786]1860: 13). To a reviewer of volume I of *ΕΠΕΑ ΠΤΕΡΟΕΝΤΑ*, words, as Horne Tooke saw them, seemed to be "the machines used by the mind; and the lever, the wheel, or the screw, are but faint representations of their power and utility" (*Monthly Review* N.S. 27, December 1798: 423-425).

27) Associated with stratal imagery was that of fossils; to quote only one typical passage: "Comme les ossements du mammoth et les coquilles d'animaux testacés, dont les races sont depuis long-temps éteintes, la langue basque existe comme un monument effrayant de l'immense destruction produite par une longue suite de siècles" (Du Ponceau 1838: 454f.). Technical terms such as 'substratum', 'superstratum', and 'adstratum' were to gain currency somewhat later.

28) For parallel fossil imagery see, for instance, Buss (1834: XVIII-XIX): "Aehnliche Umwälzungen [wie die Erde] erfuhr auch die Sprache: auch sie hat ihre fossilen organischen Reste, ihre Paläotherien, Anaplotherien, Megalonix, Mastodonten, Pterodaktylen, Ichtyosauren u. s. w. Trümmer von Sprachformen und Flexionen haben sich zerstreut und einzeln in Sprachen gerettet, die wieder andere Formen verloren haben: und Reste aus früheren Perioden sind stehen geblieben, unharmnisch und unsymmetrisch mit dem bestehenden Sprachbaue."

29) Friedrich Schlegel was the secretion theorist here ridiculed by name. Incidentally, he, too, had compared the formation of languages to the "innerem Bau der Gebirge" (1808: 166, 169).

30) When dealing with the same question in his *Lectures*, Müller's hope had been that the grammarian might eventually be as successful as the chemist in his analyses of complex forms (lecture No. 6 on comparative grammar).

31) In lecture No. 8, on morphological classification, Müller, wont to juggle metaphors with perhaps too great facility, used the image of language as a great river changing its colour—from white (radical stage) to red (agglutination) and blue (inflection)—as it was flowing through novel sedimentations of thought.

32) A fourth class, "infixing or incapsulating" (exemplified by Basque and American Indian languages) was only a modification of the agglutinative class.

33) Many others, notably James Burnett, had of course followed essentially the same method without being shown the way by geologists.

34) The existence of inflections in early Chinese was only argued for later, first by Karlgren 1920.

35) Whitney, incidentally, distinguished the question of the "historical beginnings of language" from that of the "origin of language"; the former was one for (uniformitarian) linguists, the latter one for (not so uniformitarian?) anthropologists to puzzle over.

36) To adapt a well-known quotation of John Playfair's (1805: 72), the companion of Hutton at the discovery of the unconformity at Siccar Point.

37) See in particular Diderichsen 1960 for a detailed account of Rask's intellectual upbringing.

38) James Burnett (1773) had been the first to accommodate, if unwittingly, non-native languages such as pidgins or trade jargons in a system of classification.

39) Gabelentz did not in fact claim priority for this insight: "Zu dieser Idee sind gewiss schon viele Andere vor mir gelangt,—ich weiss nicht, wer zuerst." He may still have been the first to state it expressly in print and fully to grasp its implications.

40) Gabelentz, too, did not necessarily wish to subscribe to uniformity of rate; in some languages the rotation, and especially the transition from isolation to agglutination, seemed to him to have been faster than in others.

41) Wilhelm Wundt (1904: 176–180) was perhaps the first author of note to take over Gabelentz's spiral image.

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