Variants and Invariants:
The Logics of Manuscript Tradition

Alexander Kleinlogel

In my paper, I want to review some methodological aspects of recent developments in textual criticism and stemmatology. Much of what I am going to say has been sparked off by the discussion and the methodological innovations of the Amsterdam research team who over the past two decades have very successfully investigated manuscript traditions of mediaeval French, English and Oriental literature using various sophisticated computer based approaches. Reference will be made to some of these innovations only as a starting point for discussing the "state of the art" in general from the point of view of a classicist who in the face of the current methodological situation may feel he should ask himself not only "stemmata quid faciunt?" but also "instrumenta computatoria quid faciunt?"

For nearly a century now, mainly two objections have been repeatedly raised against the formerly authoritative stemmatic method associated with the name of Karl Lachmann and systemized by Paul Maas: on the one hand, it was suspected of granting the editor's subjectivity too much freedom in assessing variants as "significant errors" used by this method as basic arguments to uncover manuscript relationships, to represent them in the genealogical pedigree of the 'stemma codicum,' and to reconstruct an archetype or a text version coming as close as possible to the putative original; on the other hand, any such reconstruction was likewise suspected of being nothing but contamination producing texts that could not claim to have historically ever existed.

In the course of the controversy, two solutions were proposed that were intended to minimize or even eliminate the adverse effects of the common error method. The first consisted in renouncing completely any attempt at reconstructing an archetype and in resorting to what has recently been called 'best-text historical editing,' i.e., reproducing diplomatically the text of some prominent manuscript and letting the reader compose his own version from this text of reference and from the variants listed in the apparatus. This is what Joseph Bélier had recommended, and though it amounts to no less than an invitation to uncontrolled contamination it was and is still looked upon as more objective and is

3 Maas 1927 and 1945.
5 Bélier 1928.
frequently practiced, especially by editors of medieval and modern texts. Another approach emerged with the advent of computers when philologists in search of more objective methods of determining genealogical kinship of manuscripts became aware of the potential of numerical taxonomic procedures that had been developed for other scientific disciplines, particularly in the area of biological systematics. This methodological reorientation was largely motivated by what seemed to be a striking analogy between phylogenetic evolution and the branching process of manuscript traditions, but even more so by the expectation that numeric procedures could guarantee a superior level of objectivity as they allowed to renounce to the suspected 'error' criterion and to base the investigation on the 'variants' as neutral distinctive features without having to pass judgment on their originality or genuineness. These 'egalitarian' variants could then be used to calculate distances, similarities or correlations and to allocate the manuscripts like phylogenetic specimens ('taxa' as they are called by taxonomists) within a structure of mutual affinities. This, in turn, was assumed to constitute a more objective basis for editorial decisions. In the meantime, the dispute of 'error vs. variant' has been settled by what might be called a methodological compromise where, in a first step, numerical procedures are used to establish the network of mutual distances and a concatenated 'deep structure' and, in a second step, genealogically relevant variants or even significant errors serve to identify a point of origin by which the unrooted deep structure is transformed into a dendrogram, i.e., into a directed graph which will not only resemble the conventional 'stemma codicum' very closely, but is also intended to assume the rôle the stemma has played in traditional textual criticism.

The methodological procedure of splitting analysis up into concatenation and orientation in the manner described is nothing very new. It was first proposed in the twenties of the past century by Dom Quentin, and became something like a methodological standard ever since the late sixties, when Dom Froger published his treatise on the applicability of formal methods and computer aided automatization in the field of textual criticism. Though I assume my audience to be familiar with this procedure, I think presenting an elementary illustration will prove helpful for understanding subsequent argumentation. The example is more or less fictitious.

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6 These and other modern approaches (edition as a description of 'Werkgenese,' i.e., of the genesis of the literary work) are discussed in detail in Texte und Variationen 1971.
7 One of the first to apply such taxonomic procedures was Griffith 1968; others followed, see La pratique desordinateurs dans la critique des textes.
8 Dom Quentin 1926.
9 Dom Froger 1968.

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The numerical procedures applied have mostly been methods of cluster analysis of the single linkage type and capable of producing what is called an undirected connected acyclic tree, i.e., a graph joining all nodes -- in our case manuscripts -- by one single line and without closed loops. Starting from a collation of manuscripts listing all instances of variation, the distance between any two specimens can be defined as the number of places where the specimens offer different readings. Summing up these differences for all pairs will then yield a matrix of mutual distances from which the concatenated 'deep structure' or the underlying network is extracted by some clustering procedure. As regards these procedures, the so-called Wagner network algorithm has been shown by the Amsterdam research group to be particularly well suited, especially as it is capable of interpolating hypothetical internodes corresponding to what in traditional systematics are lost intermediaries. As there exist various implementations of this algorithm in computer programmes like MacClade (by Maddison and

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10 Steinhausen/Langer 1977, 76-78.
11 Figure 1, (1).
12 Figure 1, (2).
13 For a detailed description of Wagner networks see Salesman 1996, 60-70.
Maddison 1992) and PAUP (by D.L. Swofford 1991)\textsuperscript{14} concatenation can readily be achieved even for large sets of data. Once the undirected dendrogram is established, it is given an orientation by selecting a point of origin\textsuperscript{15} (or simply ‘hanging’ the structure from this point) and making all paths lead away from it.\textsuperscript{16} Evidently, this step of selecting the origin is of crucial importance as it is only after introducing orientation that the previously undirected tree may be interpreted as reflecting dependence or derived stages of development; more importantly, it may even claim to reflect ancestry provided the respective selection is based on data of genealogical purport, such as on conventional significant errors or on whatever information may be available to determine which of the nodes or internodes is nearest to the putative original. This decision, however, will always have to be made by the analyst for even though programmes like PAUP are capable of proposing an orientation its selection will be but a formal one and will be made (as is indicated by ‘parsimony’ in the acronym) with regard to minimizing the length of the tree (i.e., the sum of the branches weighted by their distances), however not with regard to genealogical considerations.

Thus, the genealogically indifferent character of the data used proves a serious drawback of any approach using numerical procedures. It is certainly not by mere coincidence that theoreticians of biological taxonomy, too, have always warned against interpreting findings from clustering procedures rashly as phylogeny (i.e., revealing ancestral relationships) instead of phenology (i.e., classification with respect to similarity without genealogical implications), especially when starting from data bases that consist exclusively of indifferent distinctive features and include no fossil evidence.\textsuperscript{17} It is worth noting that similar warnings came from philologists when applying clustering procedures to data derived alone from pure distances between variants, particularly in the presence of contamination and in cases where such secondary shifting might have outnumbered the ‘genuine’ ancestral features like the significant errors that Paul Maas had compared to the geologist’s fossil evidence.\textsuperscript{18} Recent methodology has become aware of the implications of this handicap and has attempted to circumvent it by restricting the data used for calculation to what was styled ‘genealogical variants’ or ‘genealogically relevant variants.’ With this restriction, it was hoped that results could be obtained that could be interpreted as indicative of manuscript descent and that, at the same time, the side-effects of ‘statistical noise’ caused by contamination, by polygenesis of errors (parallelsms) and the like, could be reduced. As a consequence, methodology was faced with the crucial problem of defining what was to be understood by this term and of specifying criteria and conditions with which variants had to comply in order to be qualified as ‘genealogically relevant.’ When reviewing the various definitions that have been proposed, we shall soon find that most of them postulate explicitly or implicitly that any such textual deviation or singularity has proved a stable element of the tradition, being of such kind as not to have provoked elimination by conjecture or spontaneous correction. This is exactly what, e.g., the notion of the genealogical quadruple or the type-2 variations of the Amsterdam team implies when postulating that the two variants be distributed on exactly two groups of at least two witnesses or when other rules stipulate that the respective variant fit well and inconspicuously in its context in order to have escaped alteration by conjecture,\textsuperscript{19} or that the reading has been protected as part of a rhyme, etc. These definitions clearly converge and can be subsumed under the proviso which Paul Maas stated in connection with his fundamental concept of ‘Leitfehler’ (significant errors, the word being coined in analogy to the geological ‘Leitfossilien,’ the guide fossils mentioned above).\textsuperscript{20} In this proviso he postulates that any such error, more specifically any separable error be (translation by Barbara Flower) “so constituted that our knowledge of the state of conjectural criticism in the respective period enables us to feel confident that it cannot have been removed by conjecture during this period.”\textsuperscript{21}

All of this may be considered a revival and even a rehabilitation of the ‘Lachmannian’ principles of traditional stemmatics. But it also rearticulates the old dilemma about the analyst’s subjectivity merely because it is again up to him to pass judgment on a variant’s genealogical quality and to decide, e.g., whether a variant is inconspicuous enough for not having provoked correction, or, more generally, because in assessing a variant’s usability for stemmatic purposes the analyst has to resort to his knowledge of the historical conditions of textual reproduction. Since such knowledge can be acquired only by successful elucidation of individual manuscript traditions which in turn will require making use of the expert’s experience and historical knowledge, reasoning is bound to become circular and may, indeed, become biased by subjective decisions as before. Though it is possible to base stemmatic research on circular reasoning and methods of such reciprocal illumination,\textsuperscript{22} this is certainly no way to overcome the dilemma. But is there any way out?

An alternative solution will become discernible when we consider that manuscript transmission can be viewed either as a succession of states of a text or as a genealogical branching process of its records. It is for this reason that a basic distinction is to be drawn between a text as a text version, i.e., a linguistic or mental phenomenon, and a text in any recorded form (‘codex’ or ‘witness’).\textsuperscript{23} Accord-

\textsuperscript{14} PAUP: acronym for Phylogenetic Analysis Using Parsimony.
\textsuperscript{15} Figure 1, (3).
\textsuperscript{16} Figure 1 (4) for point of origin 02 in (3) and (5) for point of origin 01 in (3).
\textsuperscript{17} Sokal and Sneath 1963, Principles, 227-235.
\textsuperscript{18} Griffith 1979, 86; Galloway 1979, 91-92.
\textsuperscript{19} See Salesman 1996, 19 (type-2 limitation), 6 (inconspicuousness).
\textsuperscript{21} Maas 1956, trans. Barbara Flower 1959, 27.
\textsuperscript{22} Uthemann 1996, ‘Which Variants Are Useful,’ 252.
\textsuperscript{23} Kleinlogel 1979, ‘Fundamentals,’ 194-195; see also Girk 1974, 340-343.
ingly, all features which serve as arguments in establishing manuscript relations may be classified as either ‘codicological’ (external evidence) if due to peculiarities of material transmission (gaps, transpositions of pages and quires, addition of marginal notes and commentaries, joint transmission in a corpus combining it with other texts etc.) or ‘textual’ (internal evidence) if due to linguistic changes (like omissions, variations, interpolations, semantic shifting, orthographical and linguistic updating, or contamination by horizontal transmission etc.). Now, the historical process of manuscript transmission is primarily one of codicological character in that it was not normally only the text as an isolated text version that was copied but a codex in its entirety, including all of its additional and secondary components or even its defects caused by material damages and the like. In other words, it is not the succession of states of a text that is to be elucidated by genealogical analysis but the branching process of its carriers. And with the emphasis being upon this branching process, analysis will have to use as its primary evidence any specific peculiarity or innovation that has proved constant and irreversible under the process of successive copying, a property that can be best described as ‘hereditary,’ as a ‘constante de la tradition verticale’ as Jean Irigoïn has styled it or, using for the pun’s sake a mathematical synonym, as an ‘invariant.’

Returning to Maas’ proviso and to the rules for identifying variants as genealogically relevant that appear to be converging towards this proviso, it can readily be shown to coincide with our conclusion if we rephrase its double negation as a positive statement postulating that in order to be genealogically relevant the respective feature or peculiarity should have proved stability and continuity under the process of transmission rather than ‘not having been eliminated by conjecture’ or having ‘escaped correction by passing unnoticed.’ In fact, whenever doubts have been raised about the argumentative value of any ‘significant variant’ or ‘significant error,’ or corroboration attempted, the discussion would focus upon the conditions which might decide on the variant’s or the error’s stability and irreversibility in the course of textual transmission, thus implicitly analysing its property of being hereditary or an ‘invariant.’ However, when we are to escape the dilemma about subjectivity in assessing variants we cannot let things rest with the irreversibility and invariance of errors, i.e., components of the linguistic level of the ‘text,’ but must extend the proviso’s purview to all aspects of manuscript transmission that may have proved hereditary and invariant, in other words, we must generalize Maas’ proviso and include what the taxonomists and Maas meant when alluding to ‘fossils,’ namely: all material and codicological singularities or peculiarities of manuscript transmission such as the ones adduced above when making the distinction between text stages and witnesses, for the simple reason that these elements of the tradition showed much stronger a tendency to become and stay ‘invariants’ as the following examples will demonstrate:

1. The so-called alphabetic plays of Euripides are mainly transmitted by two manuscripts L (Laur. 32,2) and P (Conv. soopr. 172) where for a long time it could not be decided whether they are entirely independent of each other or whether for certain parts P is to be regarded as a copy of L. Both manuscripts exhibit a number of conjunctive errors, the most absurd being a completely nonsensical punctuation mark, a colon, followed by an unusually large space in the middle of a sentence in verse 95 of the play Helena. When on June 3, 1960, Günter Zuntz25 and the librarian of the Laurenziana checked the passage of L under the quartz lamp and the librarian ran her hand across the passage, the ominous colon disappeared, and a tiny bit of straw stuck to her finger that had come loose by the heat of the lamp. What had happened was obviously this: When the scribe of L incurred the obstacle of the paper he simply skipped it and left a space after it; the scribe of P, however, mistook it for a punctuation mark and faithfully reproduced it together with the space. Thus, a bit of straw furnished the proof that P had been copied from L and settled the dispute once and for all.

2. The manuscripts of the Athenian historian Thucydides have been enriched several times by abundant marginal commentaries that were referred to the words or the passages they explained by reference marks such as numbers (letters of the Greek alphabet) or symbols. When working on models containing these scholia the scribes frequently copied the respective reference marks together with the text and with the marginal apparatus leaving them unchanged as, on the one hand, this was a safe method not to disturb the coordination of text and scholia, and as, on the other hand, these marks, due to their purely functional and asemantic character, did not provoke changes by semantic shifting and the like. The remarkable thing about them, however, is the high degree of stability they have proved in this particular case: Although the manuscripts F (Munich, Mon. gr. 430), M (London, British Library, Add. 11727) and the corrector C1 of C (Florence, Laur. plur. 69, cod. 2) derived their secondary material (scholia) from models that were separated by at least four stages of intermediaries and though some of them had been subject to intensive contamination these codicological elements have remained ‘invariant’ and provide a convincing proof of the genealogical kinship of the texts involved.

I am fully aware that by adducking these and any other examples I have been telling nothing astonishingly new, nor has this been the point I wish to make. What I have found astonishing instead was the fact that many of the scholars who rely on computer based procedures to extract genealogical information from their collections of variants though they acknowledge by principle the argumentative potential offered by codicological features, they nevertheless show great

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reluctance to take advantage of it and in most cases restrict themselves to 
adducing codicological and external evidence merely as a confirmation of the 
results obtained by numeric analysis. Stemmatic research, however, should pro-
cede the other way around and base investigation primarily on codicological 
evidence, even if numerical procedures are envisaged.

This methodological reorientation seems more than justified when we con-
sider its benefits:

1. Analysis of manuscript relationships can now argue by stringent logical infer-
ence from factual evidence rather than from probabilities and possibly subject-
ive judgment such as the assessment of a variant’s genealogical relevance. 
Even if we must make allowance for the investigator’s subjectivity in diagnos-
ing and evaluating codicological evidence, a higher level of certainty and ob-
jectivity will at any rate be obtainable by basing argumentation on ‘invariants’
instead of on indifferent ‘variants.’

2. The results obtained by codicological analysis will enable the investigator to 
more reliably assess the status of the individual variant and to decide whether 
it is to be regarded as hereditary, hence genealogically relevant, or as secondary 
and due to conjecture, correction or contamination. In fact, whenever con-
taminated traditions have been successfully disentangled in the past, the cru-
cial arguments for distinguishing the different layers and for identifying their 
possible sources came exclusively or nearly so from codicological evidence.

3. It is, therefore, primarily by codicologically oriented research that we will be 
able to acquire and expand our knowledge on the conjectural or, more gener-
ally, philological capabilities of different periods, of different centres of 
transmission, and of important historical personalities, etc., as implied and 
stipulated by Maas’ proviso and that we can do so without running the risk of 
getting caught in circular argumentation.

4. It is only when based on codicological analysis that the ‘recensio,’ the eluci-
dation of manuscript tradition and eventually its visualization by means of a 
stemma, can serve as a firm basis for editorial decisions by ‘selectio’ or ‘emendatio,’ and it is, indeed, only by a methodological reorientation as im-
plied by the proposed codicological generalization of Maas’ proviso that we 
can comply with Lachmann’s famous postulate ‘recensere sive interpretatione et 
possumus et debemus.’

So far, I hope that the question of stemmata quid facianti could be given a satis-
factory answer. As concerns the other question instrumenta computatoria quid 
faciant? one important conclusion should have emerged from what we have dis-
cussed: Computer programmes and numerical procedures do not by themselves 
eliminate the analyst’s subjectivity or guarantee more objective results. When 

26 Lachmann 1842, Novum Testamentum græce et latine, praef. v.
Articles:


