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THE HEURISTICS OF JULIUS CAESAR'S POTENTIALLY AMBIGUOUS CASE-ENDINGS

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If a computer is trying to translate Latin into English, what can it possibly do with the dative and ablative plurals, which are all identical? Or, if the text is prose and lacks the long marks, what is it to do with all those pesky first declension *-a*'s?

These are human problems, too, for we have all had the experience of having to slow down while we tried out the different possibilities on a final *-a*. So what's good for the computer is also good for the human's Latin reading speed, and the human's appreciation of good clear Latin style.

It may be apt to take a moment to relate how the computer gets into this in the first place. With all of Greek literature now machine-readable, and with Latin literature fast approaching that happy state, it seemed eminently sensible to start taking computer science courses, to be able to plug in. Then by early summer, 1981, it seemed clear that SNOBOL 4, better known as SPITBOL (the nomenclature of computer languages is traditionally whimsical), a Bell Telephone Labs product, was a powerful enough language to handle the translation of Latin into English. I decided to go at it.

Machine translation is usually attempted with, for a start, a lexicon. Seeing no charms in the chore of typing a lexicon into a terminal—that's a lot of typing—I decided to have at it structurally, and have the enjoyment, much like that of geometry, of teaching the university's computer to recognize a Latin clause, recognize Latin forms, and to transform the Latin syntax of suffixes into the English syntax of sequence, in short, to reprint Latin clause by clause with each word

(most of the time!) in the position it would have in English. Computer efficiency requires handling the high-frequency material first. Since the first thing that many people asked, on hearing I had started such a project, was “What are you going to do about the datives and ablatives?”, it was surprising how long the problem could be efficiently postponed. When it did become worthwhile to find a noncontemplative guide to the dative-ablative look-alikes, remembering my own recent annoyance at replowing Quintilian’s sentences to sort out the final *-a*’s, I added them to the investigation, too.

What follows, then, is what I had to find out to guide the program, and myself, through first declension *-a*’s, and the dative-ablative forms. Since I have been feeding the University of Nebraska Computer System Julius Caesar exclusively, the investigation was done in Caesar’s Latin. I presume resultant figures from other authors would differ slightly.

The procedure was to pull out all final *-a*’s in their context from a 2,000-word sample of Julius Caesar’s Gallic Wars, Book 5, and ask two questions of the resultant data: (1) was there a numerical preponderance which would make one case the likeliest choice to start with? and (2) were there any positional cues which would secure the choice without contemplative study of the entire clause? Of the sample text, 4.2% of the words were declinables in *-a*. Twenty-nine percent of these were immediately removable from the problem as components of absolutes—for the human, at least. (It may be of interest that watching for a *t* or double *-s* just before the *īs*, *ō*, or *ā* endings suffices to label correctly 90% of the absolutes.) This leaves only 6% loose ablatives, every single one of them an abstract noun, such as *naturā*, *memoriā*, *causā*. But 36% are nominative. The answer to the first question, then, is yes, there is a numerical preponderance making one case the likeliest choice. Outside of prepositional phrases and absolutes, call the word in final *-a* nominative. This will be the correct choice in a 6-to-1 ratio.

Further, are there any positional cues? Yes. Again, we first discount absolutes and prepositional phrases. If the word in *-a* is (1) immediately after the verb, (2) immediately after the conjunction, or (3) at initial position in its sentence or clause, it is nominative. This will be the

correct choice in a 13-to-1 ratio, leaving, in the event, only one double-take on a final *-a* in 2,000 words.

That one turned out to be, like the remaining 8% of final *-a*’s, a neuter plural, an *ea quae* . . . where the resolution of the *ea* was postponed to the end of the *quae* clause. What about the neuter plurals then? The general instruction has to be to call them accusative. All of them were, with the exception of two subject phrases. These are worth looking at:

est infinita multitudo creberrimaque aedificia fere Gallicis
consimilia.

In this one, the case of three neuter plurals cannot be mistaken: the *que* links them to the immediately preceding, and exclusively nominative, *multitudo*. *Loca sunt temperatiora* was the other one. Here, as soon as the reader hits the *sunt*, the accusative-nominative question is closed by the nature of the verb. Any further postponement of the verb would have been a postponement of the reader’s resolution of the case.

The procedure for the dative-ablative problem was exactly the same: pull every single one of them, in context, out of the same 2,000-word sample, and ask the same two questions of the resultant data: (1) was there a numerical preponderance which would make one case the likelier first choice? and (2) were there any positional cues which would settle it more or less on the spot?

I knew the answer to the first question before I started, for you deal with far more ablatives than datives. The surprise was just how rare the dative case is. Ablatives were 18.8% of the text. Datives were 1.65%, a 93–7 ratio. Uniquely dative forms like *sibi* and *huic* were more than one-fourth (27%) of the datives. This leaves a 95–5 ratio of ablatives to ambiguous datives, a marked preponderance: call it ablative on sight and be right at that ratio.

We can refine this further, and most efficiently approach 100, by a closer study of the datives. On our way to the question of positional cues, let’s look at the breakdown, for there were some surprises in it. Most (63%) of the datives were not indirect objects, but rather were the complements of special or compound verbs like *praefecit*, *imperat*, *satisfecit*, *favet*, each of which controls a dative. About a fourth of them

(27%) were uniquely dative, such forms as *sibi*, *cui*, and *huic*. These, of course, identify themselves, and are outside the problem. Next category, in descending order of frequency, is a set of nouns, exemplified by *praesidiō* and *auxiliō*, each of which in the dative also controls a dative complement (18%). Then come actual indirect objects (12%). Six percent of the dative words were controlled-by adjectives, such as *idoneus* and *similis*. This breakdown may be useful for adjusting the way or the sequence in which we present datives to our students.

But the pressing question for the programmer was, of course, how are the ambiguous datives resolved, and at what distance? Or again, are there positional cues? Yes, everywhere. In the largest category, that of special verbs, Caesar puts the dative directly in front of the verb, immediately closing the question.

A favorite technique of Caesar is in fact to answer before the reader can ask. Most of his uniquely dative forms he makes the first element of what would otherwise be an ambiguous dative phrase, e.g., *toti bellō imperiōque praefecerat*. Without the *toti* up front, the reader would be thinking “ablative” through the whole phrase until he reached the *praefecerat*. In like manner, Caesar puts the dative nouns *praesidiō*, *subsidiō*, *auxiliō* directly, with no word intervening, in front of the datives they control, so the reader’s question “Dative or ablative?” is resolved in advance. One third of the potentially ambiguous datives are so resolved, by the immediately preceding cue-word.

Another 49% of the potentially ambiguous datives are resolved by the immediately following word, such as—in descending order of frequency—a special verb, or another dative which settles the case of *praesidiō* itself, or a special adjective. Two-word dative phrases, plus the removal of unique datives as non-problematic, explain why this percentage of datives is less than the 63% listed above as being complements of the special verbs. In the case of the two-word phrase, the dative-ablative question passes on to the second word of the phrase before being resolved at the verb, e.g., *omnibus rationibus satisfacere*.

Adding up, we find that 82% of Caesar’s otherwise ambiguous datives (33% + 49%) are resolved at zero interval, i.e., with no word intervening. Add in the scattered occurrences of a one-word interval be-

tween dative and its resolution, and the potentially ambiguous datives are resolved, either in advance (43%) or in close subsequence (57%).

Generally, then, datives hardly exist in the first place, and the ones in *-ō*, *-īs*, and *-ibus* can be resolved in immediate juxtaposition. For efficiency, then, any loose *-ō*, *-īs*, or *-ibus* should be called “ablative” on sight, without waiting for the structure of the entire clause to fall into place. This will be right in a ratio to match the purity of Ivory Soap.

Being aware of the preceding material has already improved my Latin reading speed. Its application to the computer project will depend on whether it can be efficiently translated into SPITBOL and woven in, so to speak, to a larger program. Perhaps the principal application to the teaching of Latin is that the dative case could be efficiently postponed, and taught with primary emphasis on the special verbs, the special nouns, and the special adjectives which look to a dative to complete their meaning. Confusion will further be reduced if you add *scribere* and *dare*—the eponymous verb itself—to the standard list of “special verbs,” for any accompanying *-ō*, *-īs*, or *-ibus* is dative.

Finally, for the minority choices, it is striking that the nature of the verb is fully as useful for resolving the ambiguous case as a preposition: compound or “special” for the rare dative, and intransitive for the uncommon neuter plural nominative. Caesar juxtaposes these, and the ambiguity is gone. I cannot escape the impression that Caesar, at least, was consciously aware of the potential for ambiguity inherent in the paradigmatic system, and took deliberate steps to cut it short or forestall it entirely.