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On the Use of Tenses in Scientific Papers, English and Croatian

1. English has attained the status of a truly international language and is widely used as a second language in non-English communities. This is even more obvious in the world of science. In spite of the growing tendency of scientists in this country to publish in foreign languages of which English appears to be their first choice, Croatian should not be neglected as a tool of scientific communication. Investigations into the writer's mother tongue can point to the differences existing between the source language and the foreign language which he wants to use, and can help eliminate errors caused by negative transfer. Since the language of science in any idiom shows similarities in its rhetoric and arrangement of subject matter, a contrastive study promised to be of interest.¹ The present paper is limited to considerations of two topics which are the fields of frequent errors in scientific papers — the use of tenses in English and Croatian, and the choice of the active or the passive voice. The materials used in the analysis consist of original research papers in chemistry, biochemistry and botany, written by native speakers of English and Croatian respectively, and published in scientific journals, so that only one level of scientific writing has been dealt with.

1.1. Guide books on style for scientific writing in English are mainly concerned with general organization and style of scientific papers and are intended mostly for native speakers of English. The more recent demand for the teaching of scientific English to non-English students and scientists is being

¹ This study was undertaken within the general frame of the Serbo-Croatian English Contrastive Project, see: R. Filipović, "The Yugoslav Serbo-Croatian — English Contrastive Project So Far", in R. Filipović, ed., Zagreb Conference on English Contrastive Projects, Zagreb, 1971, pp. 31—80.

answered by an increasing number of textbooks on all levels of knowledge and for numerous specializations. In the U.S. a special programme in Technical Communication was set up at the University of Washington in 1967 "to provide advanced work in English for engineering students".² In Great Britain "practical considerations"³ prompted a syntactic study based on an analysis of scientific texts, one of the purposes of which was to help "those applied linguists who are concerned with preparing such (i. e. scientific English) courses".⁴

2. Choice of tenses in English

2.1. Recurring errors in scientific translations from Serbo-Croatian and Slovenian into English were observed by E. Tornquist who revised technical translations for a project of exchange of scientific information between the U.S. and Yugoslavia.⁵ Her recommendations are extremely useful and very much to the point. Granting that there are no general answers to the complex matter of grammatical choice in the use of tenses E. Tornquist has a "few rules of thumb" to offer emphasizing the main points of difference. The simple past should be used in describing an experiment, a case history or any process or event which has been completed. The present or the past should be used in reporting the results, and the choice of one or the other would depend on whether the authors consider them valid or not. In discussing other people's findings either the present, the past, or the present perfect can be used. The use of the present passive is recommended for a procedure intended for general use.

2.2. The teachers of FES⁶ (foreign engineering students) however are much more emphatic than E. Tornquist in pointing to the impact of generalization as an indispensable aspect in the correct choice of tenses in English technical writing. According to them the relatively rigid form of organization of technical prose, in which core ideas are stated in the form of generalizations, will bear on the grammatical choice within the

² J. E. Lackström, L. Selinker, and L. P. Trimble, "Grammar and Technical English", in R. C. Lugton, ed., *English as a Second Language: Current Issues*, Philadelphia, p. 105.

³ "A research project into the linguistic properties of scientific English (was) carried out at University College London in 1964—1967". R. D. Huddleston, *The Sentence in Written English, A Syntactic Study Based on an Analysis of Scientific Texts*, Cambridge, 1971, p. vii.

⁴ *Ib.*, p. 2.

⁵ Elizabeth Tornquist, "Problems in Scientific Translation — English Verb Tenses", in *Linguist* 7, Zagreb, 1963, pp. 14—16.

⁶ See Note 2.

paragraphs. "We will show a) that the choice of tenses in the written medium is dependent not on 'time lines' as most textbook presentations suppose but on rhetorical and subject-matter considerations . . .".⁷

While it is true that the notion "degree of generality" may be important in teaching the use of various tenses in English, it is probably only an additional reason for the choice of a given tense and never contradicts the choice of the common core grammar, i. e. the grammar of other varieties of English. Thus if the author of a paper claims that his information was true in the past, is true now and will be true in the future, he is most likely to choose the present, because "the present tense in technical English means 'generalization'".⁸ It is also true that the present tense means generalization in non-technical English, and not only in English but also in Serbo-Croatian.⁹ By choosing the preterite in conveying his information the author probably intimates that he has known only one instance of the event; he will use the present perfect if he reports several occurrences of a fact and is not sure that it can or will be repeated.

2.3. The analysis of our materials shows a great deal of standardization both in the format, i. e. the sequence of paragraphs and the choice of tenses in them. The introductory chapter which reviews previous experience may be considered a combination of general statements and single occurrences, and is therefore likely to employ a variety of tenses. The experimental work is described strictly in the past tense forms. The fact that these can be interpreted as standing for single occurrences and have been chosen on the basis of a low degree of generality, or as events completed in the past with the preterite chosen on the principle of time-tense relationship in agreement with traditional grammatical rules, may mean that both principles coalesce. In our opinion, each tense form from our materials could be attested either as chosen for purely grammatical considerations or in view of the subject matter organization. Since the two principles never seem to be incompatible, the additional stress on the subject matter is important and useful as a guideline for the non-English writer.

2.4. It may be more difficult to account for the choice of tenses in reporting events of apparently the same degree of generality, such as:

⁷ *Ib.*, p. 104.

⁸ *Ib.*, p. 108.

⁹ T. Maretić, *Gramatika hrvatskog ili srpskoga književnog jezika*, Treće neprom. izd., Zagreb, 1963, p. 602.

- 1) In studies of the organic products ... W. and co-workers *observed* isomerization ...
- 2) From a similar study ... McC. et al. *have shown* ...
- 3) In a related study on the γ -radiolysis ... McC. and S. *state that* ...
- 4) Similarly, in the γ -radiolysis of ... W. *found* ...

All these tense forms appear in that order within one introductory paragraph and their diversity should probably be attributed to the author's conscious or unconscious wish to avoid repetition of the same usage and monotony. Needless to say all the mentioned varieties comply with the usage described in grammars.

2.5. A slightly different view may be taken in respect of the following accounts of previous investigations, both found in the same paper, though not within the same paragraph:

- 5) H. and W. *determined that* ...
- 6) E. and W. *have developed* a kinetic theory ...

The preterite in 5) may have been chosen as convenient for a past time event, or because it was taken as one individual finding. The present perfect in 6) may have been prompted by the idea of theory, which may be of greater significance than a single finding and thus of a higher degree of generality. The choice also complies with the generally accepted usage of the present perfect for a non-definite past event.

2.6. Phrases of a more impersonal character, that is those quoted without names, tend to be in the present perfect, obviously because, by their indefiniteness, they include the idea of indefinite past, and because their lexical meaning conveys a certain plurality of events and thus a higher degree of generalization:

- 7) Studies *have shown* ...
- 8) It *has been suggested* ...
- 9) There *have been* different opinions ...
- 10) Several researches *have been devoted to* ...

2.7. Descriptions of figures, tables and diagrams are typically in the present. This hardly needs special explanation. The trap for the speaker of Serbo-Croatian here may be the tendency to use the progressive form of the present tense as the equivalent of the Serbo-Croatian imperfective verb. Progressive forms were rare in the texts we examined: of 1.165 finite verbal forms in our material the progressive was found in 4 instances only, two in the present and two in the preterite.

2.8. The distribution of tenses in our materials was a follows:

in the present	723
preterite	284
present perfect	59
pluperfect	4
future	27
future in the past	4
conditional	59
past conditional	1
imperative	2
subjunctive	2
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Total:	1,165

The number of papers examined and of verbs counted is too small to allow any safe conclusions as to the distribution of tenses. It shows, however, that situations requiring the present are by far the commonest. Although in our counts the preterite comes second, it would be dangerous to draw any generalizations as to the frequency of the preterite in scientific writing. A longer or a shorter experimental section which is typically in the preterite would upset any relations set up on the basis of the above counts. The insignificant number of the forms of the future in the past indicates a disregard for the sequence of tenses; the use of the present in subordinate object clauses after the preterite in the main clause has been noticed in a number of cases. The validity of the statement implied by the present in the subordinate clause is obviously stronger than the "rule" requiring the sequence of tenses:

- 11) It *was assumed* that all electron transitions following conversion of the 49-kev nuclear jump *are completed* before the 37-kev decay *occurs*;
- 12) These data *suggested* that there *must* be internal transfer of electrons from the CH₃ to the Br prior to fragmentation and that the molecule *breaks* up by Coulombic repulsion of the redistributed charges.

It would, indeed, be difficult to have the present forms of the 11) and 12) shifted into the preterite.

3. Choice of tenses in Croatian

3.1. The contrast with Croatian and therefore the most likely source of errors is to be found in the area of the present perfect in English which may be used erroneously instead of the preterite for the Croatian perfect because a) it may denote

of passive clauses in his corpus as 26.3.¹⁵ The ratio of passive and active verbs in our English and Croatian material was:

	Active	%	Passive	%	Total	%
English	752	64.5	413	35.5	1,165	100
Serbo-Croatian	457	61.3	289	38.7	746	100

It showed unexpectedly a slightly higher percentage of passives in Croatian. A more detailed examination of the passive forms would indicate that a considerable number of those should perhaps be considered apart as expressions of state, i. e. the stative (or statal) constructions as opposed to actional (or agentive) passive constructions. Mihailović points out that the statal passives "are characterized by a tense shift and an aspectual (perfective) component".¹⁶ The main difference according to Lackström et al.¹⁷ is that statal constructions are not processes (while actional passives are). This can be proved by testing a given statal passive in a progressive tense form:

17) The molecules *are distributed* evenly . . .

*The molecules *are being distributed* evenly . . .

At a previous stage something, or somebody, might have caused the molecules to distribute, but that process is not what the author is saying. He describes the present state, which may be the result of a past process, though not necessarily so.

4.3. It is important to clarify that point from the Croatian side.

18) *Uzorci su izmjereni* . . .

and

19) . . . *i dugoljaste forme često su i gusto raspoređene* . . .

are identical in their morphological structure, both consisting of a present of the verb BITI and the passive verbal adjective, as that form is called. Example 18), however, can be interpreted as the result of passive transformation: *Netko je uzorke izmjerio* → *Uzorci su /bili/ izmjereni*, with the meaning of the past action, while with Example 19) this rule does not apply: **Netko /nešto/ je dugoljaste forme često i gusto raspoređio /rasporedilo/*. Another constraint can also be imposed in Croatian to

¹⁵ R. D. Huddleston, *ib.*, p. 127.

¹⁶ V. Ivir, "Lj. Mihailović: Upotreba pasivnih glagolskih oblika u savremenom engleskom jeziku", in *Studia Romanica and Anglica Zagabiansia* 23, Zagreb, 1967, pp. 215—217.

¹⁷ J. E. Lackström et al., *ib.*, p. 125.

prove that the statal passives should not be considered identical with those indicating past actions. Passive meaning in Croatian is often expressed by a kind of medial voice (the forms might perhaps be called ergative) consisting of active verbal forms followed or preceded, as the case may be, by a quasi-reflexive pronoun *se*. Statal passives cannot assume this form: **dugoljaste se forme često i gusto rasporede*, but it is possible to say: *Uzorci se izmjere . . .* A native speaker of Croatian will use these forms correctly by intuition, but when he comes to express himself in English, identity of verbal forms for two distinct syntactic functions will be reflected in the erroneous use of the passive present or the present perfect in English instead of the preterite for a past process or action.

The situation is more complicated because not even grammars are unanimous as to whether the construction

pres. BITI + passive verbal adjective (also in reversed order) should be considered as the present or the past /perfect/ passive. Maretić lists those forms twice, first for the present passive and then as one of the possible forms of the passive "for the past";¹⁸ other grammars have them as "perfect passive" only.¹⁹ It can be argued that the construction should be considered as referring to the past by analogy with the active perfect which is, in Serbo-Croatian, formed from the pres BITI + active verbal adjective, and also because it is used in reference to past time, as can be seen in the Experimental sections of the papers examined.

4.4. The quasi-reflexive verbal forms amount to 160 of the total of 289 passives in our Croatian texts, which means that over 55% of the passives appear as active forms with the pronoun *se*, which we have called the medial voice. The use of reflexive verbs has long been recognized as an expression of the passive in Serbo-Croatian and it comes in handy in scientific writing:

20) *Usporedi li se ova brzina s interplanetarnim udaljenostima, to se mora zaključiti . . .*

¹⁸ T. Maretić, *ib.*, p. 298.

¹⁹ I. Brabec, M. Hraste, S. Živković, *Gramatika hrvatskoga ili srpskoga jezika*, Zagreb, 1952, p. 104; J. F. Florschütz, *Gramatika hrvatskoga ili srpskoga jezika*, Zagreb, 1940, p. 93; M. Stevanović, *Gramatika srpsko-hrvatskog jezika za više razrede gimnazije*, Cetinje, 1962, p. 211; S. Težak, S. Babić, *Pregled gramatike hrvatskosrpskog jezika za osnovne i druge škole*, Zagreb, 1969, p. 116.

Obviously it is not only preferable but also the preferred structure in Serbo-Croatian. The ratio in favour of the medial is probably higher in other varieties of Serbo-Croatian.

5. Conclusion

5.1. The analysis of scientific papers has shown that three tenses in English (present, present perfect and preterite) are matched by two tenses in Serbo-Croatian (present, perfect) and that in both languages they amount to over 90% of all finite verbal forms. It is natural to expect interference in this area, not only because three tense forms in English cover the situations described by two tense forms in Serbo-Croatian, so that there is no one-to-one correspondence in the usage, but also because the morphological similarity may lead to erroneous interpretation of the function of e. g. the English present perfect which is similar to the Serbo-Croatian perfect.

5.2. The sequence of tenses, which does not exist in Croatian in the way it functions in English, often seems to give way to the idea of validity of the statement introduced by a past tense verb, so that the statement remains without a shifting of the verb form.

5.3. The percentage of the passive forms was roughly the same in both languages, which is surprising even if we keep in mind the fact that the passive can be expected with higher frequency in scientific language where it seems to perform the function of convenient impersonality, common in technical rhetoric. The distinction between the statal and the actional passives has been found to exist in both languages, the danger for the Serbo-Croatian speaker of English being in the morphological identity of the two structures. It may be useful to remember that the structure considered as the "passive for the past" in Serbo-Croatian expresses either a past action or a present state, which may, through negative transfer, result in erroneous choice of the present passive instead of the past passive to express a past action in English.