

## ON THE EXPRESSION OF TEMPORAL AND SPATIAL DEIXIS IN SCIENTIFIC TEXTS

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### Abstract

Mazkur maqolada lokal va temporal deyksislarning ilmiy matnda ifodalanish holatlari, ularning lingvistik va pragmatik xususiyatlari bo'yicha bayon qilingan. Shu bilan birgalikda, ilmiy matn mazmun tarkibida lokal va temporal deyktik birliklarning muloqot muhitini yaratishdagi vazifalari keng ko'lamda oydinlashtirib berilgan.

**Keywords:** Deixis, temporal deixis, text, scientific, indication, adverb, contextuality, deictic pronoun, time, place.

В данной статье рассматриваются случаи выражения локального и временного дейксиса в научных текстах, их лингвистические и прагматические характеристики. Одновременно подробно разъясняются функции локальных и временных дейктических единиц в создании коммуникативной среды в содержании научных текстов.

### Introduction

It is widely acknowledged that spatial and temporal pronouns like here/there, now/then are found in texts of various contents. However, the scope of use of these pronouns in scientific texts and their function and meaning have not been studied separately. The feature of implicit reference to the speaker puts place and time pronouns like here/there, now/then on a par with demonstrative pronouns like this/these, that/those. They are used as a means of indicating the location of an event and object in space and time relative to the subject of speech. E. Benvenist proposed including these deictic pronouns in the group of units "indicating the connection of speech with separate, that is, individual events" [1; 314]. The central category of deixis is the speaker's relationship with the categories of space and time, which is carried out on the basis of the principle of proximity/distance. After all, an event in reality takes place in a certain space and time, and the same sign is reflected in speech activity. The pronouns now/then and here/there, which are part of the general system of subjective demonstrative means [4; 167-168], differ in the sign of "proximity-distance" in relation to the speaker [3; 291-294]. In particular, the "contextually bound" [8; 94] pronoun here denotes a space close to the speaker, there distant from him [6; 166], while now requires coincidence in time with the speech process [7; 253], then, in turn, indicates the moment of action. The adverbs of this group are used in a scientific text with a specific meaning and function. Demonstrative words that convey the meaning of place participate in the deictic system of the language in terms of the accuracy of the fact. In this case, the participants in the speech activity can serve as a reference point in space [5; 64]. In a scientific text, the activation of the "locality" of the adverbs here/there and the "temporality" of the adverbs now/then ensures that the meanings of space and time are manifested in the context of a specific speech environment. In this case, it is important to know what units these adverbs are related to in the text.

Usually, a scientific article presents specific arguments. In this case, the author, using words with a specific demonstrative meaning, tries to "bring" the reader closer to the research process, creating a

dialogue situation. For these words, rather than highlighting the object, it is important to indicate the subject and addressee of the speech. In his statement, the author feels as if the subject and the addressee are at a close distance and calls the interlocutor to direct communication and cooperation.

These demonstrative words are characterized by a high level of generality and abstraction of lexical meaning. This greatly expands their scope of application. Therefore, while now can equally express a moment or duration of time, then can equally be associated with the past and future. Similarly, different parts of the text can be related to each other through here/there. The here preposition expresses the meaning “in this study, in the article” and serves as a tool for the text to find its content:

e.g. At present, we believe that the model is one of the most successful scenarios and therefore deserves further detailed investigations as described here.

e.g. We discuss here from a numerical analysts point of view some properties of ergodic three-dimensional...

At the same time, in a scientific work, only a certain element of the text can be an antecedent of the there structure:

e.g....which is a typical signature of classically chaotic systems. There also exist regular eigenfunctions, whose amplitude concentrates along a short or long diagonal of the polygon.

Here/there adverbs can appear at the beginning, middle and end of a sentence, acting as locative cases: Here I propose a new method to derive the lower limit of the mean density of the universe using the maximum temperature of the X-ray emitting hot gas in clusters of galaxies.

e.g. We can simulate this procedure here by simulating a field data, set without lens,...

The adverb here can be used to highlight a particular word in order to draw the reader's attention to it: e.g. The results reported here are based on one detector and one scan mode.

As a result of this type of emphasis, a whole group of words can acquire additional meaning:

e.g. ...results of the first two methods here, leaving the modeling for a more thorough discussion by Ress. The anaphoric use of the here/there adverbs, which replace the spatial component in the previous sentence, is typical of scientific texts:

e.g. ...plotted against density for temperatures between 100 and 800 K. Here, we have considered only spontaneous emission of the radio lines...

The antecedent here or there can be expressed not only by a single word or group of words, but also by non-linguistic means (such as a picture, table, mathematical formula):

e.g. This the photometry of BD+31°643 in the literature must include both the A and B components. Here we examine...

e.g. The stellar populations in M81 have been analyzed... and a CMD morphology similar to M33. There now exist several precise methods for measuring relative distances to galaxies.

In such cases, the here/there adverbs form the connection between sentences in the construction of the text. It should be noted that the scope of application of the adverb here is wide and diverse. The introduction of the demonstrative word here into the text allows the author to solve a number of pragmatic problems. For example, a clear and understandable statement of the idea is achieved by clearly delimiting the scope of validity of the described phenomenon, the results of the research:

e.g. Here we adopt a general form for the energy loss rate due to the dominant cooling process...

The author can clarify the statement in this way and distinguish this research from his other works or the research of other scientists:

e.g. The observations... are found here to be consistent with h, b, but do not prove it.

It is worth noting that the predominant use of the here preposition in scientific texts in the sense of indicating a place or location weakens the activation of its “presentation” semantics [2; 116]. Because this semantics indicates an object that exists in a situation related to dialogic speech. When this meaning is present, if expressed with a possessive noun, the adverb here always comes at the beginning of the sentence:

e.g. Alivisatos et al. have demonstrated the use of DNA as a rigid template to direct the spatial disposition of nanoclusters. Here DNA does not fulfill a biological role as a carrier of information, which direct the cluster to the desired site via sequence specific hydrogen bonding interactions.

e.g. Particles like this have never seriously been looked for...Here is another direction for experimental research that lies far from the higher energy frontier.

It is noteworthy that such use of the preposition here is often observed in articles of a debatable nature that assume the reader’s response. Here, the conjunction here serves to evoke in the reader the “impression” of a direct participant in the speech situation being described.

In scientific texts, the scope of use of the preposition there is limited compared to the preposition here. This situation can be explained by the following reasons.

First, the ambiguity in the lexical meaning of the preposition there, the fact that it can indicate any point in space located far from the speaker, contradicts the characteristics of the scientific style, such as a clear and objective description of the statement. According to these features, the place of scientific research should be clear, and the text should clearly indicate the source of the research, country, laboratory, research area, types of equipment, parts, etc. Secondly, since the deictic adverb there indicates a point in space where the communicants are not present, it distances the message from the reader and thus cannot create an atmosphere of communication. Therefore, the deictic adverb there, when used independently in its lexical meaning, does not ensure the achievement of the pragmatic goal pursued in scientific communication. Therefore, only one of the here/there pairs (here) is characteristic of the scientific style.

According to the features noted above, the deictic adverb here is used as an element that connects sentences in different meanings in the structure of scientific articles.

Adverb of time now, demonstrative here and other demonstratives of the studied group, the demonstrative now does not perform the function of a placeholder in the text; it expresses the time that corresponds to the speech situation. The use of the now deictic in the text of a scientific article directly “ties” the described events to the context of the article:

e.g. Given these results for the simulated lensity case, we now proceed to compare the two methods as a function of sample size, and discuss the robustness of our results.

As noted above, the period of time expressed by the deictic now can have a variety of scales, from a short moment to a long period, even lasting several years. This meaning is manifested in connection with the role of the adverb now in a certain context:

e.g. For  $j = 0.1$ , we see that the surface behavior remains almost the same as in the previous cases, whereas the core spins now switch cluster wise as can be seen in the fourth picture of Fig.5.

The word now is often used in texts that generally cover the state of research in a particular field. The author’s use of the deictic adverb now, which has the semantic meaning “at the moment” in its semantic structure, directs the reader’s attention to an event that has occurred before.

In English scientific texts, the deictic word now is limited to expressing only the part of the sentence that refers to the state, the situation. This adverb, which has a rich functional content, performs the function of a connector, that is, it can be a means of connecting parts of a sentence or an entire independent sentence in a complex syntactic whole. In this case, its original lexical meaning is diluted and various connecting semantics come to the fore. For example, the adverb now can express a transition to a new stage in scientific reasoning:

e.g. We now turn to a discussion of superfluidity, a phenomenon that manifests itself in many related ways, including, dissipationless flow, quantized vortices, reductions in the moment of inertia, and the existence of persistent currents.

e.g. Let us now analyze the following example:  $n=2$ ,  $\beta>0$  and  $\beta/\alpha=10^{-10}$ .

The adverb now is also found in cause and effect sentences that provide the logical construction of the text. This word is used to construct a sentence that indicates the cause of events that will occur later:

e.g. The nature of explosive nuclear burning under conditions of extreme electron degeneracy is now an old problem, but one still debated.

In scientific texts, the word now often connects a sentence that expresses the result, the consequence, arising from a previous situation:

This makes it necessary for us to adopt a procedure combining trial and error and successive approximations.

e.g. We now present a summary of the results obtained.

The connection between the ideas and concepts being explained in the chain of the author's reasoning can be achieved with the help of the adverb now, which acts as a free connector. Usually, the word now separates not individual words, but a series of communicatively important sentences. In this case, the reader's attention is drawn not to the time of occurrence of the described action, but to the action itself as a specific event.

Textual analysis shows that the activation and function of the adverb of time now in a scientific text depends on the communicative goals set by the author. This conclusion also applies to the temporal adverb then. In this case, it has the following semantic structures: "at this time, at that time", "then, later", "in addition, also", "then, in this case", "so, thus", etc. The use of the adverb of time then in a sentence indicates the presence of an antecedent of the previously mentioned time. Thus, the adverb of time then, unlike the adverb of time now, always has an anaphoric appearance, performing the function of location in relation to the time date expressed in the previous text. The general characteristics of a scientific text affect the function of the adverb of time then in its content. For example, in this text, the adverb of time then "at that time" semantic structure is practically not realized. The reason for this, as mentioned above about the place adverb there, is that the events are not typical of the environment described in the text and the ambiguity of the reference. For the reasons indicated, the adverb of time then is used in a different sense in scientific texts. For example, this adverb can also perform the function of a connective, but in this case the sema "at that time" almost disappears and instead of it, semas that serve to connect subordinate clauses such as "to enumerate", "to conclude", "to create", "opposite", "cause", "result" are activated. There are many examples in scientific literature confirming the activation of these semas. For example, if we compare sentences with the then adverb with the sema of enumeration:

e.g. The images were corrected for bias and then flat-fielded using normalized continuum lamp exposures. Cosmic-ray events were removed and the stellar spectra were then extracted.

In these cases, the conjunction then connects some parts that represent successive actions. In the following example, the adverb then creates a contrastive relationship between the parts of the sentence expressed by nonverbal means:

e.g. Finally, it is possible that the X-ray spectrum of NGC 4.261 contains a strong soft component that is absorbed in our data by the H<sub>2</sub> column implied by the CO absorption but then the strength of that soft component and the column density in H<sub>2</sub> are required to be in coincidental balance.

However, the conjunction then is usually part of the structure of the contrastive content and connects several sentences:

e.g. On the other hand, standard such as our synthetic sulphides,...provide spectra very quickly and fitting these should incur very little error; but it is then necessary to have...

There are cases in scientific text where the adverb then, which creates a concluding connective, is logically highlighted. In this case, the adverb then, which usually occupies an intermediate position, is placed at the beginning of the sentence:

e.g. In contrast, the EMP... must either be restricted to relatively abundant elements or be used with a wavelength spectrometer... Even then it cannot approach 1ppm sensitivity of the PMP

The emphasis on one or another element of the text always fully interacts with the meaning of the whole main text and is a key tool in understanding this text. The conjunction then allows the reader to the phrase is drawn to the information expressed by a certain syntactic unit, the importance of the author's conclusion is emphasized.

The study of the semantic elements and functions of the adverbs of place and time here/there and now/then in a scientific text provides a basis for concluding that these adverbs, in addition to their main functions, that is, indicating space or time, can also perform a connecting function. In the above cases, the content of persuading the addressee to accept the author's point of view is formed. With the help of these adverbs, the author forms the most important subject-events related to the research topic, as well as the sequence and interrelation of events.

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