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# Relative Clauses in Scientific Texts

**A Paper Submitted to the Council of English Department, College of Education for Human Sciences, University of Babylon as a Partial Fulfillment for the Degree of B. A. in English Language and Literature**


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**2023A.D**                                    **1444 A.H**

# بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا ۖ إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ ﴿٣٢﴾

**صدق الله العظيم**

**سوره البقره ايه(32)**

**Glory is to You, we have no knowledge except what " you have taught us. Verily, it is You , the knower , the Wise".**

**God Almighty has spoken the truth**

**Surat Al Baqara , Verses**
**Ali (2006: 32)**

## ACKNOWLEDGEMENTS

I owe gratitude to my family for being them with me throughout my studying years, to the teaching staff in the English department and to Prof.Dr. Iman Mingher Obied, (Ph.D) for consultation and guidance may God bless and reward greetings with full respect

# *DEDICATION*

***To Family***

***Whose support and intimacy grant me the impetus to go on
and on***

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## 1.1 Introduction

A **relative clause** is a clause that modifies a noun or noun phrase and uses some grammatical device to indicate that one of the arguments in the relative clause refers to the noun or noun phrase. For example, in the sentence I met a man who wasn't too sure of himself, the subordinate clause who wasn't too sure of himself is a relative clause since it modifies the noun man and uses the pronoun who to indicate that the same "man" is referred to in the subordinate clause (in this case as its subject).

In many European languages, relative clauses are introduced by a special class of pronouns called relative pronouns, such as who in the example just given. In other languages, relative clauses may be marked in different ways: they may be introduced by a special class of conjunctions called relativizers, the main verb of the relative clause may appear in a special morphological variant, or a relative clause may be indicated by word order alone. In some languages, more than one of these mechanisms may be possible.

**Scientific texts** are a part of informative texts as they provide information for their readers. The purpose of such texts is to. discuss a scientific problem which forms the subject of their study. We talk about scientific texts when we refer to all those written texts that contain information related to concepts, theories or other series of topics that are based on scientific knowledge, which is why they are written following a specialized technical language for the audience to which they are addressed. It is often a type of text that arises as a result of a research process, in which different data and related aspects are recorded. It is presented in an organized and systematic way in which conclusions, results, process descriptions, data, among other fundamental elements, are added.

### 1.2 Types of relative clause: Bound and free

A **bound** relative clause, the type most often considered, qualifies an explicit element (usually a noun or noun phrase) appearing in the main clause, and refers back to that element by means of some explicit or implicit device within the relative clause.

The relative clause may also function as an embedded clause within a main (or higher-level) clause, thereby forming a matrix sentence.The noun in the main clause that the relative clause modifies is called the head noun, or (particularly when referred back to by a relative pronoun) the antecedent.

**For example**, in the English sentence "The person whom I saw yesterday went home", the relative clause "whom I saw yesterday" modifies the head noun person, and the relative pronoun whom refers back to the referent of that noun. The sentence is equivalent to the following two sentences: "I saw a person yesterday. The person went home." The shared argument need not fulfill the same role in both clauses; in this example the same person is referred to by the subject of the matrix clause, but the direct object of the relative clause.

A **free** relative clause (or fused relative),on the other hand, does not have an explicit antecedent external to itself. Instead, the relative clause itself takes the place of an argument in the matrix clause. **For example**, in the English sentence "I like what I see", the clause what I see is a free relative clause, because it has no antecedent, but itself serves as the object of the verb like in the main clause. Alternatively, one could argue that the free relative clause has a zero as its antecedent.

### Restrictive and non-restrictive:

Bound relative clauses may or may not be restrictive. A **restrictive** relative clause is a relative clause that functions as a restrictive modifier. A non-restrictive relative clause is a relative clause that is not a restrictive

relative clause. Whereas a non-restrictive or non-defining relative clause merely provides supplementary information, a restrictive or defining relative clause modifies the meaning of its head word (restricts its possible referent). **For example**s:

● The person who lives in this house has not been seen for days. This contains the restrictive relative clause who lives in this house, which modifies the meaning of person and is essential to the sentence. If this clause were omitted, it would no longer be known which person is being referred to, and the remaining part would not really make sense.

● The mayor, who lives in this house, has not been seen for days. This contains a non-restrictive relative clause since this provides supplementary information about the mayor but is not essential to the sentence. If this clause were omitted, it would still be

known who is meant (the mayor), and the remaining part would still make sense.

In speaking, it is natural to make slight pauses around non-restrictive clauses, and in English this is shown in writing by commas (as in the examples). However, many languages distinguish the two types of relative clauses in this way only in speaking, not in writing. Another difference in English is that only restrictive relative clauses may be introduced with that or use the "zero" relative pronoun (see English relative clauses for details).

A **non-restrictive** relative clause may have a whole sentence as its antecedent rather than a specific noun phrase; **for example:**

● The cat was allowed on the bed, which annoyed the dog.

Here, which refers not to the bed or the cat but to the entire proposition expressed in the main clause, namely the situation of the cat being allowed on the bed.

**Finite and non-finite:**

Relative clauses may be either finite clauses (as in the examples above) or non-finite clauses. **An example** of a non-finite relative clause in English

is the infinitive clause on whom to rely, in the sentence "She is the person on whom to rely".

## 2.1 Formation methods

Languages differ in many ways in how relative clauses are expressed:

 1- How the role of the shared noun phrase is indicated in the embedded clause.

2- How the two clauses are joined together.

3- Where the embedded clause is placed relative to the head noun (in the process indicating which noun phrase in the main clause is modified).

**For example**, the English sentence "The person that I saw yesterday went home" can be described as follows:

1- The role of the shared noun in the embedded clause is indicated by gapping; that is, a gap is left in the object position after "saw", implying that the shared noun phrase ("the person") is to be understood to fill that gap and to serve as the object of the verb "saw".

2- The clauses are joined by the complementizer "that".

3- The embedded clause is placed after the head noun "the person".

**The following sentences indicate various possibilities (only some of which are grammatical in English):**

● "The person [that I saw yesterday] went home". (A complementizer linking the two clauses with a gapping strategy indicating the role of the shared noun in the embedded clause. One possibility in English. Very common cross-linguistically.)

● "The person [I saw yesterday] went home". (Gapping strategy, with no word joining the clauses—also known as a reduced relative clause. One possibility in English. Used in Arabic when

the head noun is indefinite, as in "a person" instead of "the person".)

● "The person [whom I saw yesterday] went home". (A relative pronoun indicating the role of the shared noun in the embedded clause—in this case, the direct object. Used in formal English, as in Latin, German or Russian.)

● "The person [seen by me yesterday] went home". (A reduced relative clause, in this case passivized. One possibility in English.)

● "The person [that I saw him yesterday] went home". (A complementizer linking the two sentences with a resumptive pronoun indicating the role of the shared noun in the embedded clause, as in Arabic, Hebrew or Persian.)

● "The person [that him I saw yesterday] went home". (Similar to the previous, but with the resumptive pronoun fronted. This occurs in modern Greek and as one possibility in modern Hebrew; the combination that him of complementizer and resumptive pronoun behaves similar to a unitary relative pronoun.)

● "The [I saw yesterday]'s person went home". (Preceding relative clause with gapping and use of a possessive particle—as normally used in a genitive construction—to link the relative clause to the head noun. This occurs in many Sino-Tibetan languages and possibly developed from "relative clause + noun" > "nominalized clause + noun" > "genitive construction".)

● "The [I saw yesterday] person went home". (Preceding relative clause with gapping and no linking word, as in Japanese or Mongolian.)

● "The person [of my seeing yesterday] went home". (Nominalized relative clause, as in Turkish.)

● "[Which person I saw yesterday], that person went home". (A correlative structure, as in Hindi.)

● "[I saw the person yesterday] went home." (An unreduced, internally headed relative clause, as in Tibetan or Navajo.)

**3.1 Strategies for indicating the role of the shared noun in the relative clause**

There are four main strategies for indicating the role of the shared noun phrase in the embedded clause.These are typically listed in order of the degree to which the noun in the relative clause has been reduced, from most to least:

1-Gap strategy or gapped relative clause.

2-Relative pronoun.

3-Pronoun retention.

4-Non Reduction.

**Gapped relative clause:**

In this strategy, there is simply a gap in the relative clause where the shared noun would go. This is normal in English, for example, and

also in Chinese and Japanese. This is the most common type of relative clause, especially in verb-final languages with prenominal relative clauses, but is also widespread among languages with postnominal externally headed relative clauses.

There may or may not be any marker used to join the relative and main clauses. (Languages with a case-marked relative pronoun are technically not considered to employ the gapping strategy even though they do in fact have a gap, since the case of the relative pronoun indicates the role of the shared noun.) Often the form of the verb is different from that in main clauses and is to some degree nominalized, as in Turkish and in English reduced relative clauses.In non-verb-final languages, apart from languages like Thai and Vietnamese with very strong politeness distinctions in their grammars, gapped relative clauses tend, however, to be restricted to positions high up in the accessibility hierarchy. With obliques and genitives, non-verb-final languages that do not have

politeness restrictions on pronoun use tend to use pronoun retention. English is unusual in that all roles in the embedded clause can be indicated by gapping: e.g. "I saw the person who is my friend", but also (in progressively less accessible positions cross-linguistically, according to the accessibility hierarchy described below) "... who I know", "... who I gave a book to", "... who I spoke with", "... who I run slower than". Usually, languages with gapping disallow it beyond a certain level in the accessibility hierarchy, and switch to a different strategy at this point. Classical Arabic, for example, only allows gapping in the subject and sometimes the direct object; beyond that, a resumptive pronoun must be used. Some languages have no allowed strategies at all past a certain point—e.g. in many Austronesian languages, such as Tagalog, all relative clauses must have the shared noun serving the subject role in the embedded clause. In these languages, relative clauses with shared nouns serving "disallowed" roles can be expressed by

passivizing the embedded sentence, thereby moving the noun in the embedded sentence into the subject position. This, for example, would transform "The person who I gave a book to" into "The person who was given a book by me". Generally, languages such as this "conspire" to implement general relativization by allowing passivization from all positions — hence a sentence equivalent to "The person who is run slower than by me" is grammatical. Gapping is often used in conjunction with case-marked relative pronouns (since the relative pronoun indicates the case role in the embedded clause), but this is not necessary (e.g. Chinese and Japanese both using gapping in conjunction with an indeclinable complementizer).

**Relative pronoun type:**

This is a type of gapped relative clause, but is distinguished by the fact that the role of the shared noun in the embedded clause is indicated indirectly by the case marking of the marker (the relative pronoun) used to join the main and embedded clauses. All languages which use relative pronouns have them in clause-initial position: though one could conceivably imagine a clause-final relative pronoun analogous to an adverbial subordinator in that position, they are unknown.

Some languages have what are described as "relative pronouns" (in that they agree with some properties of the head noun, such as number and gender) but which do not actually indicate the case role of the shared noun in the embedded clause. Classical Arabic has "relative pronouns" which are case-marked, but which agree in case with the head noun. Case-marked relative pronouns in the strict sense are almost entirely confined to European languages, where they are widespread except among the Celtic family and Indo-Aryan family. The influence of Spanish has led to their adoption by a very small number of Native American languages, of which the best known are the Keresan languages.

**Pronoun retention type:**

In this type, the position relativized is indicated by means of a personal pronoun in the same syntactic position as would ordinarily be occupied by a noun phrase of that type in the main clause—known as a resumptive pronoun. It is equivalent to saying "The woman who I saw her yesterday went home". Pronoun retention is very frequently used for relativization of inaccessible positions on the accessibility hierarchy. In Persian and Classical Arabic, for example, resumptive pronouns are required when the embedded role is other than the subject or direct object, and optional in the case of the direct object. Resumptive pronouns are common in non-verb-final languages of Africa and Asia, and also used by the Celtic languages of northwest Europe and Romanian ("Omul pe care l-am văzut ieri a mers acasă"/"The man who I saw him yesterday went home"). They also occur in deeply embedded positions in English, as in "That's the girl that I don't know what she did",although this is sometimes considered non-standard.

Only a very small number of languages, of which the best known is Yoruba, have pronoun retention as their sole grammatical type of relative clause.

**Non Reduction type:**

In the non reduction type, unlike the other three, the shared noun occurs as a full-fledged noun phrase in the embedded clause, which has the form of a full independent clause. Typically, it is the head noun

in the main clause that is reduced or missing. Some languages use relative clauses of this type with the normal strategy of embedding the relative clause next to the head noun. These languages are said to have internally headed relative clauses, which would be similar to the (ungrammatical) English structure "[You see the girl over there] is my friend" or "I took [you see the girl over there] out on a date". This is used, for example, in Navajo, which uses a special relative verb (as with some other Native American languages).

A second strategy is the correlative-clause strategy used by Hindi and other Indo-Aryan languages, as well as Bambara. This strategy is equivalent to saying "Which girl you see over there, she is my daughter" or "Which knife I killed my friend with, the police found that knife". It is "correlative" because of the corresponding "which ... that ..." demonstratives or "which ... she/he/it ..." pronouns, which indicate the respective nouns being equated. The shared noun can either be repeated entirely in the main clause or reduced to a pronoun. There is no need to front the shared noun in such a sentence. For example, in the second example above, Hindi would actually say something equivalent to "I killed my friend with which knife, the police found that knife".

Dialects of some European languages, such as Italian, do use the non reduction type in forms that could be glossed in English as "The person just passed us by, she introduced me to the chancellor here."

In general, however, non reduction is restricted to verb-final languages, though it is more common among those that are head-marking.

## 4.1 Strategies for joining the relative clause to the main clause

 The following are some of the common strategies for joining the two clauses:

● Use of an indeclinable particle (specifically, a relativizer) inserted into the sentence, placed next to the modified noun; the embedded clause is likewise inserted into the appropriate position, typically placed on the other side of the complementizer. This strategy is very common and arguably occurs in English with the word that ("the woman that I saw"), though this interpretation of "that" as something other than a relative pronoun is controversial (see below). In the modern varieties of Arabic (using illi placed after the modified noun); in Chinese (using de placed before the modified noun).

● Use of a relative pronoun. Prototypically, a relative pronoun agrees with the head noun in gender, number, definiteness, animacy, etc., but adopts the case that the shared noun assumes in the embedded, not matrix, clause. This is the case in a number of conservative European languages, such as Latin, German and Russian. Many languages also have similar linking words commonly termed "relative pronouns" that agree in some way with the head noun, but do not adopt the case role of the embedded clause. In English, for example, the use of who vs. which agrees with the animacy of the head noun, but there is no case agreement except in the formal English contrast who vs. whom. Similarly, in Classical Arabic, there is a relative pronoun that agrees in number, gender, definiteness and case with the head noun (rather than taking the case role of the noun in the embedded clause). Languages with prototypical relative pronouns typically use the gapping strategy for indicating the role in the embedded clause, since the relative pronoun itself indicates the role by its case. (Classical Arabic, where the case

 marking indicates something else, uses a resumptive pronoun.) Some linguists prefer to use the term relative pronoun only for the prototypical cases (but in this case it is unclear what to call the non-prototypical cases).

● Directly inserting the embedded clause in the matrix clause at the appropriate position, with no word used to join them. This is common, for example, in English (cf. "The person I saw yesterday went home"), and is used in Classical Arabic in relative clauses that modify indefinite nouns.

● By nominalizing the relative clause (e.g. converting it to a participial construction). Generally, no relative pronoun or complementizer is used. This occurs, for example, in reduced relative clauses in English (e.g. "The person seen by me yesterday went home" or "The person planning to go home soon is my friend"). Formal German makes common use of such participial relative clauses, which can become extremely long. This is also the normal strategy in Turkish, which has sentences equivalent to "I ate the potato of Hasan's giving to Sina" (in place of "I ate the potato that Hasan gave to Sina"). This can be viewed as a situation in which the "complementizer" is attached to the verb of the embedded clause (e.g. in English, "-ing" or "-ed" can be viewed as a type of complementizer).

## 5.1 Position of the head noun with respect to the relative clause

The positioning of a relative clause before or after a head noun is related to the more general concept of branching in linguistics. Languages that place relative clauses after their head noun (so-called head-initial or VO languages) generally also have adjectives and

genitive modifiers following the head noun, as well as verbs preceding their objects. French, Spanish and Arabic are prototypical languages of this sort. Languages that place relative clauses before their head noun (so-called head-final or OV languages) generally also have adjectives and genitive modifiers preceding the head noun, as well as verbs following their objects. Turkish and Japanese are prototypical languages of this sort. Not all languages fit so easily into these categories. English, for example, is generally head-first, but has adjectives preceding their head nouns, and genitive constructions with both preceding and following modifiers ("the friend of my father" vs. "my father's friend"). Chinese has the VO order, with the verb preceding object, but otherwise is generally head-final.

Various possibilities for ordering are:

● Relative clause following the head noun, as in English, French or Arabic.

● Relative clause preceding the head noun, as in Turkish, Japanese, or Chinese.

● Head noun within the relative clause (an internally headed relative clause). An example of such a language is Navajo. These languages are said to have nonreduced relative clauses. These languages have a structure equivalent to "[I saw the person yesterday] went home".

● Adjoined relative clause. These languages have the relative clause completely outside the main clause, and use a correlative structure to link the two. These languages also have nonreduced relative clauses. Hindi, the most well-known such language, has a structure similar to "Which person I saw yesterday, that person

went home" or (without fronting of the relativized noun in the relative clause) "I saw which person yesterday, that person went home". Another example is Warlpiri, which constructs relative clauses of a form similar to "I saw the man yesterday, which he was going home". However, it is sometimes said these languages have no relative clauses at all, since the sentences of this form can equally well translate as "I saw the man who was going home yesterday" or "I saw the man yesterday when/while he was going home".

## 6.1 Conclusion

Finally, we know that a relative clause is a clause that modifies a noun or noun phrase and uses some grammatical device to indicate that one of the arguments in the relative clause refers to the noun or noun phrase. For example, in the sentence I met a man who wasn't too sure of himself,types of relative clause, Bound For example:"The person whom I saw yesterday went home",. Free For example:  "I like what I see", . Restrictive For example: The person who lives in this house has not been seen for days. Non-restrictive For example: The cat was allowed on the bed, which annoyed the dog. Finite and non-finite.
Formation methods:

Languages differ in many ways in how relative clauses are expressed: Strategies for indicating the role of the shared noun in the relative clause:There are 4 strategies, 1-Gap strategy or gapped relative clause 2-Relative pronoun 3- Pronoun retention 4- Non Reduction.
Strategies for joining the relative clause to the main clause: also there are four strategies: 1-Use of an indeclinable particle (specifically, a relativizer) inserted into the sentence, 2- Use of a relative pronoun. Prototypically, a relative pronoun agrees with the head noun in gender, number, definiteness, animacy, 3-Directly inserting the embedded clause in the matrix clause at the appropriate position, with no word used to join them. 4- By nominalizing the relative clause (e.g. converting it to a participial construction). Generally, no relative pronoun or complementizer is used. finally, Position of the head noun with respect to the relative clause: The positioning of a relative clause before or after a head noun is related to the more general concept of branching in linguistics.

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