Workshop Scientific Writing:

Style, Positioning, and Argumentation

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Scientific Writing

1. Introduction

1.1. General introductions

What are your experiences with writing scientific texts in English? What kinds of texts are you most likely to write in English and why? Are there any specific problems or difficulties that you are currently facing and which might be addressed in this workshop?

1.2. About this course: topics and issues

What is style? What is scientific style? What do you consider good/bad style in your discipline?

Task 1: Read the following text samples and make note of anything that strikes you as specific to scientific English.

Interwoven Artifacts – Coordinating Distributed Collaboration in Medical Care

Jakob E. Bardram & Claus Bossen, 2004

CSCW has witnessed a range of studies of how professionals augment their computer systems with non-electronic artifact in order to do their job. For example, Luff & Heath [6,7,8] report how medical practitioners continue to use the more traditional paper medical record despite the widespread introduction of a computer system. They show us that this resilience of paper documents is not simply a consequence of an impoverished design, but rather a product of the way that the record is handled and used in practice at the consultation. Similarly, we have shown in a previous study that medical secretaries, despite the use of a computerized scheduling system, still apply a wide range of supplementary paper-based schedules and wall-size boards to help them coordinate work at a surgical department [2]. Hence, despite the success of personal computers in an office environment it seems like non-electronic artifacts have affordances and a tangibility to them that in some situations enable them to support work processes better than computers. This is also reflected in the plethora of different non-electronic artifacts that are part of almost any work setting and which play different roles and facilitate different functionalities.

Why is this? Is it because software engineers brush away these insights and regards them as neglectable or irrelevant in the light of the computational powers of electronic systems? Well – it is not always easy for the software engineer to model real-world artifacts and 'put them into' the computer without losing some of the benefits and 'nice feature' of such real-world objects. The computer is simply a different medium. This seems to be true especially when looking at paper but also the use of mundane objects like whiteboards, tables, and walls. Hence, when a paper-based schedule is modeled in the computer it cannot be removed from the many different places that it appears outside the computer without losing effect. For example, the schedule for an operation theater must be large and visible for everybody to function as a coordination mechanism [2, 14]. These are some of the reasons why computer systems are often augmented by complementary real-world, analogue systems used basically as a way of getting the object 'back out' of the computer. Therefore, as often argued in the CSCW community, we can learn a lot from paying attention to the

usage of non-electronic artifacts in their work setting and use them as a resource for the design of new systems.

This is becoming even more pertinent since we are now witnessing the emergence of a new area of computing where computational support moves back out of the computer and into the environment again. This notion of 'Pervasive Computing' covers that interactive computing power is becoming an embedded part of people's everyday environment, including cars, buildings, streets, home appliances, hand held devices, construction materials, clothes, paper, etc. [3].

The promising part of Pervasive Computing is that we (finally) can move away from the client-server computer architecture where computer systems are divided into personal clients located on desktops and servers as a data distribution layer. We can begin to make intelligent devices and embed them in the context where people need them and make the interaction suit this context. For example, an intelligent hospital bed would know the patient and can recognize the physician, and thereby provide him with relevant information about this patient.

The challenges to Pervasive Computing are clearly that it opens up a vast amount of new design dimensions. In the good old days (i.e. now) you would, as a software designer and engineer, 'only' have to consider how a system should be implemented in the classic client-server model. This is of course a quite difficult task, but it is small as compared to how you would go about and designing fundamental new embedded technology in a complex organizational setting.

If – as argued in CSCW – it is important to look at the contextual, everyday use of artifacts in real work in order to design 'classical' computer system, we will argue that it is being considerably more important when addressing the design of Pervasive Computing systems. If we want to create new intelligent devices within a hospital – the intelligent hospital bed for example – it is absolutely critical

to know how such 'devices' is used and how is relates to other 'things'. Pervasive computing entails the development of systems that integrate a variety of different artifacts that have different functionalities which are to become integrated into work processes rather than put on the table or on the wall.

In continuation with previous studies of medical work [1, 2] this paper looks at coordination of clinical care at a modern Danish hospital. We want to analyze how coordination is achieved by applying not just one artifact, like the schedule, but several heterogonous artifacts, like schemas, charts, lists, whiteboards, etc. All these artifacts all play a multitude of different roles, but are at the same time highly interwoven. We use this as an example of the challenges of designing Pervasive Computing systems because such a web of intelligent artifacts is exactly what might constitute a Pervasive Computing environment.

The paper starts by looking at related literature on coordination and coordination mechanism within CSCW. We then go on to present the specific case and tries to describe how the daily work of caring for patient at a medical ward uses a rather complex set of interrelated artifacts, each playing its part in the web of coordination. If the complexity of the network of artifact and their use makes the reader loose breath, this is in part intentional. We then move on to analyze our observations before we outline the design implications of our case, and finally we conclude the paper.

Top-Down Design of Collaborating Processes by Julius Köpke, Johann Eder, and Markus Künstner

1. INTRODUCTION

Technical support for the interorganizational cooperation between different organizations requires the integration of business processes. Web technologies [11, 28, 2] and SOAbased protocols [1] are a good basis for the implementation of such interorganizational processes which can be realized in form of choreographies or orchestrations [23]. We specifically address choreographies that allow a fully distributed operation without the need for a central coordinator.

In this paper we focus on the top down part of forming cooperating processes: transforming some given global process to a set of collaborating distributed processes that realize the interorganizational process which currently is still a tedious and error-prone mostly manual task. We aim in automating this step with a model-based view approach.

Process views [6, 24, 8, 2, 21, 26, 7] allow to represent the externally observable behavior of business processes and to balance the request for privacy and loose coupling between processes with the communication demands for collaboration. Most approaches for process views such as [8, 2, 21, 24, 26] follow a bottom up or - in analogy to the role of views in federated databases [25] - global as view approach. A view is derived from a private process definition, which is actually instantiated and executed in a process engine at runtime. The integration of such cooperating views constitutes an interorganizational business process.

Views can also be used the other way round - to distribute the steps of a global process definition. In this top-down or local as view approach, first, a global interorganizational process is defined as an abstract process. The activities contained in this process definition are then distributed onto the involved partners. Since the process definition is abstract, it means that none of the steps are executed globally, since there is no global or central component. Each step which is defined in the global process is executed by one of the participating processes.

The projection of the global process onto a particular participant defines a view, i.e. a (local) workflow derived from the abstract global process. Such a local process specifies the obligations of a particular partner (execution of steps defined in the global process) and the externally observable behavior of the private processes. So a local process is also a view on the private process which is actually executed by a partner. The local process hides the parts of the private process which are confidential or not relevant for the collaboration.

The p2p approach presented in [32, 29] is an example for such a top-down modeling approach. As the construction of views on a global process by projection requires the introduction of communication steps and the distribution of data, in particular data needed for control flow decisions it is quite different from the construction of views on local processes which only abstract from the process by deletion and aggregation of steps [8, 2, 21, 24, 26].

In this paper, we present an automatic process partitioning algorithm that can be used in a top-down development approach. Starting with a global process each step of the process is assigned to one of the partners. In a next step the global process with partner assignments is partitioned fully automatically into views for each partner. Finally, the partners can use the generated views to create new or adopt existing processes according to their views.

We have already presented the general idea of the projection approach in a short paper [19]. Here we present the following novel contributions:

• A complete partitioning algorithm (Section 4).

• An algorithm to merge a set of generated views to reconstruct the global process (Section 5.1).

• A formal proof that the partitioning algorithm returns views that correctly specify the distributed execution of the input process (Section 5).

"Pervasive Healthcare and Wireless Health Monitoring" by Upkar Varshney

1 Introduction

The introduction of telecommunications technologies in healthcare environment has led to an increased accessibility to healthcare providers, more efficient tasks and processes, and a higher overall quality of healthcare services [1–6]. However, many challenges, including a significant number of medical errors [7, 8], considerable stress on healthcare providers, and a partial coverage of healthcare services in rural and underserved areas, still exist worldwide [9, 10]. These combined with an increasing cost of healthcare services, such as the cost of healthcare services reaching to 15% of Gross National Product for U.S. [1], and an exponential increase in the number of seniors and retirees in developed countries [11] have created major challenges for policy makers, healthcare providers, hospitals, insurance companies and patients. One challenge is how to provide better healthcare services to an increasing number of people using limited financial and human resources. The current and emerging wireless technologies [12, 13] could improve the overall quality of service for patients in both cities and rural areas, reduce the stress and strain on healthcare providers while enhancing their productivity, retention and quality of life, and, reduce the long-term cost of healthcare services [51, 53]. Many medical errors occur due to a lack of correct and complete information at the location and time it is needed, resulting in wrong diagnosis and drug interaction problems [7, 8]. The required medical information can be made available at any place any time using sophisticated devices and widely deployed wireless networks.

While wireless technologies cannot eliminate all medical errors, some of the informational errors can certainly be eliminated by such access to medical information. The wireless technologies can be effectively utilized by matching infrastructure capabilities to healthcare needs. These include the use of location tracking [27–30], intelligent devices, user interfaces, body sensors [31–33, 38], and short-range wireless communications for health monitoring; the use of instant, flexible and universal wireless access to increase the accessibility of healthcare providers; and reliable communication among medical devices, patients, healthcare providers, and vehicles for effective emergency management. In the long term, affordability, portability, and reusability of wireless technologies [18] for health monitoring and preventive care will also reduce the overall cost of healthcare services [12–15].

In this paper, we present a vision of pervasive healthcare that includes applications and requirements of pervasive healthcare, wireless networking solutions and several important research problems. We define pervasive healthcare as "healthcare to anyone, anytime, and anywhere by removing locational, time and other restraints while increasing both the coverage and the quality of healthcare". This includes prevention, healthcare maintenance and checkups; short-term monitoring (home healthcare monitoring), long-term monitoring (nursing home), and personalized healthcare monitoring; and incidence detection and management, emergency intervention, and, transportation and treatment (Fig. 1). The pervasive healthcare applications include pervasive health monitoring,

intelligent emergency management system, pervasive healthcare data access, and ubiquitous mobile telemedicine. The wireless networking solutions include use of wireless LANs, ad hoc wireless networks, cellular/GSM/3G infrastructure-oriented networks and satellite-based systems. Many important research problems have been identified and discussed for future work.

2. Elements of English scientific style

Earlier on we identified some of the most striking characteristics of scientific English, now it is time to look at these traits in more detail and, specifically, distinguish scientific English from scientific German, French etc.

2.1. English vocabulary strata – formality and informality

One of the most frequently noted difficulties for non-native speakers of English is that of adequately judging and modulating the degree of formality in language. This issue is especially relevant for scientific texts, which need to balance clarity and precision of expression with formality. The English language is indeed somewhat unique in this respect insofar as it offers a wider more notably demarcated range of *strata of formality* than, for example, German. In contrast to German, *grammatical structures* contribute relatively little to the differentiation of informal and formal language in English. It is vocabulary (including idiomatic expressions and standing phrases) that provides English with such an extensive resource of modulating formality.

	Minimal/everyday vocabulary	Total vocabulary
German	≈5.000	≈35.000
English	≈2.000	≈50.000

In case of the English language, this peculiar makeup of the total lexicon of words has its reasons in language history. Multiple influences throughout the centuries, brought about by missionary activity, military conquest and other factors, have led to layers of vocabulary which, like sediment, have remained more or less prominent. Most notably among these influences, the first and second Latin influence and the Norman/French influence have left a layer of vocabulary with distinct spelling and pronunciation – but also with specific degrees of formality.

Everyday words and their scientific uses

Many words in scientific English appear to be the same as everyday vocabulary, but they are often used with a slightly different, specialized meaning. Consider, for example, the terms *discipline*, *underline*, or *solid*. Beyond this, scientific language is often considerably more formal than everyday language; knowing whether an expression is formal or just neutral can be crucial.

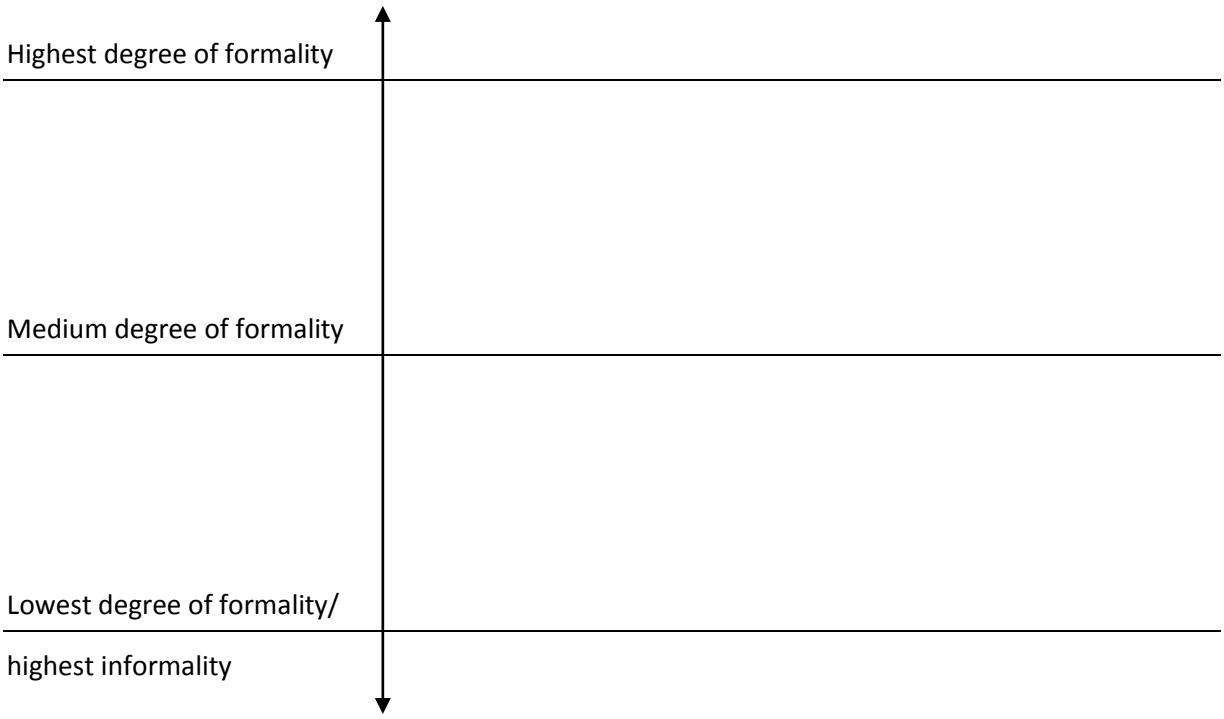
For an illustrative example, consider the word “secret”, for which the OED lists more than 10 synonyms, among them: covert, surreptitiously, clandestinely. All three are more formal than “secret”, but matters are complicated by the fact that – like most highly formal words – they also have a more specialized meaning and thus only a narrow field of application. See the table below for a few more common words and their neutral/formal counterparts.

neutral	*more formal*	*neutral*	*more formal*
in short, briefly, basically	in sum, to sum up, to summarize	try	attempt
only	sole(ly), exclusively, merely	mainly, mostly	primarily
almost, more or less	virtually	typical of	characteristic of

While a monolingual or synonym dictionary is often the first step towards judging and/or modulating the formality of an expression, it should therefore not be the final one. Collocational dictionaries provide the necessary elaborations and examples in use in order to adequately use more formal, less familiar vocabulary. It is the non-native speaker's most common mistake in aiming for formal language to use vocabulary that is out of place.

Task 2: Go through the following word list and see if you can correctly judge the degree of formality for all items included and place them on the continuum below. You may also add additional items provided they are synonymous with any of the items already included.

big, large, many, numerous, vast, a lot of, loads, a great many, enormous, stupendous, large numbers, multiplicity, great, grand, ample, sizable, capacious, multitudinous



2.2. Active/Passive voice

Most writing guides advise against using passive voice in scientific English. This is sound advice, but with an important limitation. First, let's look at why the passive voice can be of a disadvantage in scientific English. Consider the following example:

"The data obtained through the methods specified in section 2, after having been compiled and rigorously tested, was analyzed according to specifications."

The main clause here is the passive statement "The data was analyzed" – a perfectly clear and understandable sentence. However, sentences in scientific writing tend to be longer and more complex than that (even if they are kept shorter in scientific English than in most other scientific languages). And longer, more complex sentences inevitable mean that the main verb in a passive sentence comes very late, almost at the end of the sentence. For your readers, that means that they have to keep reading until they reach the key part of the sentence. Therefore, the longer the sentence, the more difficult it becomes to understand if it is in the passive voice. The same sentence in active voice, while it would still get more difficult to understand the longer it gets, would be much easier to read.

This makes considerations of clarity and understandability important arguments against using the passive voice. However, the example above can also serve to illustrate the two reasons why the passive voice can be very useful and, indeed, better suited to your needs in scientific writing. First, it allows you to move the object of an action into subject position at the beginning of the sentence – which might be preferable for a number of reasons: connecting to the previous sentence, emphasis, or foregrounding in a list. Second, the passive also allows you to drop the subject of an action, which is frequently an "I" or an undefined group of people.

To summarize, we can say that the passive voice should be used carefully and not randomly, but that it cannot and should not be avoided completely.

2.3. Nominalization and compounds

The term "nominalization" refers to changing another type of word into a noun – in English, this most often involves a verb or adjective such as "clear" → "clarity" and "understand" → "understanding". While English is not a language that encourages nominalization and compounding of nouns, scientific English in particular features a significant number of nominalizations. As with the passive voice, writing guides generally warn you not to use to many nouns, because nominalized processes are more difficult to process cognitively for the reader than verbalized processes. In other words, actions that are expressed through verbs are more easily understood than actions contained in nouns.

However, there is a reason why scientific English relies on nominalization in the first place, and that reason cannot simply be ignored: concept building. It is difficult to build scientific concepts with verbs only. As writers, we need our language to contain complex and abstract notions as neatly and clearly as possible. And sometimes, using a noun instead of a verb is the best way to achieve that goal.

English words, particularly adjectives and nouns, can be combined into **compound** structures in a variety of ways. And once they are formed, they sometimes metamorphose over time. A common pattern is that two words — fire fly, say — will be joined by a hyphen for a time — fire-fly — and then be joined into one word — firefly. In this respect, a language like German, in which words are

happily and immediately linked one to the other, might seem to have an advantage. There is only one sure way to know how to spell compounds in English: use an authoritative dictionary.

There are three forms of compound words:

- the closed form, in which the words are melded together, such as firefly, secondhand, softball, childlike, crosstown, redhead, keyboard, makeup, notebook;
- the hyphenated form, such as daughter-in-law, master-at-arms, over-the-counter, six-pack, six-year-old, mass-produced;
- and the open form, such as post office, real estate, middle class, full moon, half sister, attorney general.

Modifying compounds are often hyphenated to avoid confusion. The New York Public Library's Writer's Guide points out that an old-furniture salesman clearly deals in old furniture, but an old furniture salesman would be an old man. We probably would not have the same ambiguity, however, about a used car dealer. When compounded modifiers precede a noun, they are often hyphenated: part-time teacher, fifty-yard-wide field, fire-resistant curtains, high-speed chase. When those same modifying words come after the noun, however, they are not hyphenated: a field fifty yards wide, curtains that are fire resistant, etc. The second-rate opera company gave a performance that was first rate.

Comparative and superlative forms of adjectives are hyphenated when compounded with other modifiers: the highest-priced car, the shorter-term loan. But this is not always the case: the most talented youngster. Adverbs, words ending in -ly, are not hyphenated when compounded with other modifiers: a highly rated bank, a partially refunded ticket, publicly held securities.

Sometimes hyphenated modifiers lose their hyphens when they become compound nouns: *A clear decision-making process was evident in their decision making* and *The bluish grey was slowly disappearing from the bluish-grey sky*.

2.4. Wording and specific types of text: abstracts

What is the function of an abstract? In what respect is it different from a general introduction? Are you aware of different kinds of abstract, i.e. the term being used to refer to what are really different types of text?

Task 3: Reading the following example abstracts, what can you note about the style and structure of this specific text type?

Sample abstract 1

"The role of ecological theory in microbial ecology" (Nature Reviews Microbiology 5, 384-392 (May 2007) | doi:10.1038/nrmicro1643)

Microbial ecology is currently undergoing a revolution, with repercussions spreading throughout microbiology, ecology and ecosystem science. The rapid accumulation of molecular data is uncovering vast diversity, abundant uncultivated microbial groups and novel microbial functions. This accumulation of data requires the application of theory to provide organization, structure, mechanistic insight and, ultimately, predictive power that is of practical value, but the application of

theory in microbial ecology is currently very limited. Here we argue that the full potential of the ongoing revolution will not be realized if research is not directed and driven by theory, and that the generality of established ecological theory must be tested using microbial systems.

Sample abstract 2: “Top-Down Design of Collaborating Processes“

Interorganizational business processes aim to integrate local processes to support the seamless cooperation of organizations. Process view approaches are an adequate method balancing the communication requirements for enabling collaboration and the required privacy hiding internals of private business processes. We focus on a top-down scenario for the development of interorganizational processes, where first an abstract global process is designed. Then each step of the global process is assigned to one of the partners and a local process is generated for each partner as a view on the global process. Finally, the partners implement or adopt their processes based on their views. We present an algorithm for the fully automatic generation of views for any block-structured input process with arbitrary partner assignments, provide a method for merging the partner’s views to reconstruct the global process and prove the correctness of the view generation method.

Sample abstract 3: “Logical Invalidations of Semantic Annotations”

Semantic annotations describe the semantics of artifacts like documents, web-pages, schemas, or web-services with concepts of a reference ontology. Application interoperability, semantic query processing, semantic web services, etc. rely on a such a description of the semantics. Semantic annotations need to be created and maintained. We present a technique to detect logical errors in semantic annotations and provide information for their repair. In semantically rich ontology formalisms such as OWL-DL the identification of the cause of logical errors can be a complex task. We analyze how the underlying annotation method influences the types of invalidations and propose efficient algorithms to detect, localize and explain different types of logical invalidations in annotations.

Sample abstract 4: “Augmented Reality Based Museum Guidance System for Selective Viewings”

There have been several museum and exhibition guidance systems that are based on RFID and visual tags. Using these systems, additional information on the paintings and exhibits may be provided in the forms of text, image, speech, and video. However, at museums and exhibitions, many tourists are often interested in exhibits of some particular style, authors, or coteries. Previously developed guide systems do not provide such functionality to the best of our knowledge. The proposed Augmented Reality based guidance system may guide the users to exhibits of their interest for selective viewings. Location of the next exhibit of interest may be informed to the users as well as additional multimedia information on the exhibits of interest. Such information is shown on the Augmented Reality views of the user's display device. The proposed system is composed an Ultra-Mobile PC (UMPC), an inertia tracker, and a camera. In the beginning, the user may select his/her preference on the exhibits from the menu, and then the system starts guiding by showing the relative orientation, distance, and visual cue to find match. When the user finds and locates the matching visual cue within a matching box of the display screen, the system provides multimedia information on the exhibit. According to

the preliminary user test, the proposed system is convenient and useful for navigating through large-scale exhibitions.

The vast majority of abstracts follow a structure described by the CARS model (Create a Research Space) by Swales/Feak.[1] It describes abstracts in terms of "functions" or "moves":

Function or "move"	**Realization**
Establish a research territory	• claiming centrality, and/or • placing your research within the field, and/or • reviewing items of previous research
Establishing a niche	• counter-claiming, or • indicating a gap in current research, or • question raising, or • continuing a tradition
Occupying the niche	• outlining purposes, or • announcing present research • announcing principle findings • indicating research article structure

2.5. What's in a title?

Abstracts have been called "extended titles"

Task 4: Reformulating Titles: What do typical titles in your discipline look like? Choose the best and the worst example from the following list of titles (disregarding the topic).

1. Discrete Sliding Mode Control of Piezo Actuators in Nano-Scale Range.
2. Modeling and Analysis of an Electromagnetic Non-destructive Testing Sensor.
3. Open Innovation in the software industry: Chances and risks for start-ups.
4. Interwoven Artifacts – Coordinating Distributed Collaboration in Medical Care
5. Computer Assisted Living Using Smart Sensor Networks.
6. How to improve Computer Assisted Living.
7. Logical Invalidations of Semantic Annotations
8. Top-Down Design of Collaborating Processes
9. Implementing Projections of Abstract Interorganizational Business Processes.

[1] John M. Swales and Christine B. Feak (2000): *English in Today's Research World. A Writing Guide*. University of Michigan Press.

2.6. Common mistakes: articles, practical English usage and word order

The use of articles

- Indefinite articles - a and an

A and **an** are the indefinite articles. They refer to something not specifically known to the person you are communicating with. **A** and **an** are used before nouns that introduce something or someone you have not mentioned before.

- Definite article - the

You use ***the*** when you know that the listener knows or can work out what particular person/thing you are talking about. You should also use ***the*** when you have already mentioned the thing you are talking about. We also use **the** before certain nouns when we know there is only one of a particular thing (the rain, the sun, the economy).

- Words without article

The is not used with non-countable nouns referring to something in a general sense. Abstract entities, universal principles and things you refer to "in general" need no article (freedom, fraternity, liberty, justice, equality, inflation, people), unless you are talking about a particular kind of, e.g., freedom as "the freedom to do whatever you want".

- General vs. specific

A, **an**, and **the** can all be used to indicate that a noun refers to the whole class to which individual countable nouns belong. This use of articles is called generic.

"**A** tiger is **a** dangerous animal." (any individual tiger)
"**The** tiger is **a** dangerous animal." (all tigers: tiger as a generic category)

The difference between the indefinite **a** and **an** and the generic **a** and **an** is that the former means any one member of a class while the latter means all of the members of a class.

The omission of articles also expresses a generic (or general) meaning:

No article with a plural noun: "Tigers are dangerous animals." (all tigers)
No article with a non-countable noun: "Anger is a destructive emotion." (any kind of anger)

Also, **as well**, and **too**

Also, *as well*, and *too* have similar meanings, but they do not go in the same positions in clauses. *Also* usually goes with the verb, in "mid-position"; *as well* and *too* usually go at the end of a clause. *As well* is less common in American English.

[1] The results of our research are not only interesting; they *also* suggest new directions for further research.

[2] The results of our research are not only interesting; they suggest new directions for further research *as well*.

[3] The results of our research are not only interesting; they suggest new directions for further research, *too*.

Also can be used at the beginning of a clause to refer to the whole clause, creating a similar effect as *What is more.*

[4] The results of our research are interesting. Also, they suggest new directions for further research.

In a formal or literary text, *too* can be placed directly after the subject.

[5] The results from experiment no.25, *too*, indicate the relevance of parameter B.

[6] Economics, *too*, is interested in statistical data and social developments.

 **Task 5:** Consider the following sentences in active voice with *also* in different positions.

[7] We also examined data set B for inconsistencies.

[8] Also, we examined data set B for inconsistencies.

[9] We examined also data set B for inconsistencies.

[10] We examined data set B for inconsistencies, also.

Consider the following sentences in passive voice with *also* in different positions.

[11] Also, data set B was examined for inconsistencies.

[12] Data set B was also examined for inconsistencies.

[13] Data set B was examined for inconsistencies, also.

[14] Data set B also was examined for inconsistencies.

Still, **yet** and **already**

Still, *yet* and *already* can all be used to talk about things which are going on, or expected, around the present. We use these words to indicate where/when something is in relation to the present moment.

Still is used to say that something is in the present, not the past – it has, perhaps surprisingly, not finished.

[1] The global financial crisis is *still* not over.

Not yet is used to say that something which is expected is in the future, not the present or past.

[2] A solution to the global financial crisis has *not* been found *yet*.

[3] Alternatively, this can be phrased as: A solution to the global financial crisis has *yet* to be found.

Yet is normally used in affirmative questions and negative sentences, but it is also used in affirmative sentences in a formal style – with a similar meaning to *still*.

[4] We have *yet* to complete our analysis of the data.

Already is used to say that something is in the present or past, not the future. It may express some surprise – for example, because something has happened sooner than expected.

Already and still usually go in "mid-position". *Already* is not usually put with time adverbials such as *when* or *after… Already* can also go at the end of a clause for emphasis. *Yet* usually goes at the end of a clause, but it can go immediately after *not* in a formal style.

 **Task 6:** Consider the following sentences in active voice with *already* in different positions.

[5] Already, the E.U. has increased funding for the research program substantially.

[6] The E.U. already has increased funding for the research program substantially.

[7] The E.U. has already increased funding for the research program substantially.

[8] The E.U. has increased already funding for the research program substantially.

[9] The E.U. has increased funding for the research program already substantially.

[10] The E.U. has increased funding for the research program substantially already.

Consider the following sentences in passive voice with *already* in different positions.

[11] Already, funding for the research program has been increased substantially.

[12] Funding for the research program has already been increased substantially.

[13] Funding for the research program has been already increased substantially.

[14] Funding for the research program has been increased substantially already.

Still, *yet* and *already* can all be used in various tenses, referring to a moment as relative present that has by now become the past. In BE, perfect tenses are common with *already* and *yet*, in AE past tenses are more common.

[15] The results have *already* been presented. (BE)

[16] The results were *already* presented. (AE)

2.7. Punctuation

Comma usage is in some respects a question of personal writing style: some writers use commas liberally, while others prefer to use them sparingly.

- Use a comma before a co-coordinating conjunction that joins independent clauses (unless the independent clauses are very short):

  "I wrapped the fresh fish in three layers of newspaper, but my van still smelled like trout for the next week." (commas with two independent clauses)

  "She invited him to her party and he accepted." (comma unnecessary with short clauses)

- Use a comma after an introductory adverb clause and, often, after an introductory phrase (unless the phrase is very short):

  “After the hospital had completed its fund-raising campaign, an anonymous donor contributed an additional $10,000.” (after introductory adverb clause)

  “From the east wall to the west, her cottage measures twenty feet.” (after introductory prepositional phrase)

  “In the bottom drawer you will find some pink spandex tights.” (no comma with short, closely related phrase)

- Use a comma to separate items in a series:

  “Playing in a band can be exciting, but many people do not realize the hardships involved: constant rehearsals, playing until 2 a.m., handling drunken audience members, and transporting heavy equipment to and from gigs.” (the comma preceding "and" is optional unless needed to prevent misreading)

- Use commas to set off **non-restrictive elements** and other parenthetical elements. A **non-restrictive modifier** is a phrase or clause that does not restrict or limit the meaning of the word it is modifying. It is, in a sense, interrupting material that adds extra information to a sentence. Even though removing the non-restrictive element would result in some loss of meaning, the sentence would still make sense without it. You should usually set off non-restrictive elements with commas:

  “The people of Haiti, who for decades have lived with grinding poverty and mind-numbing violence, are unfamiliar with the workings of a true democracy.”

  A **restrictive modifier** is a phrase or clause that limits the meaning of what it modifies and is essential to the basic idea expressed in the sentence. You should not set off **restrictive elements** with commas:

  “Those residents of Ottawa who do not hold secure, well-paying jobs must resent the common portrayal of the city as a land of opportunity.”

  Note that you can use two other punctuation marks to set off non-restrictive elements or other **parenthetical information**: **parentheses** and dashes. Enclosing parenthetical information in parentheses reduces the importance of that information:

  “Mr. Grundy's driving record (with one small exception) was exemplary.”

- Placing parenthetical information between dashes has the opposite effect: it emphasizes the material: “Mr. Grundy's driving record -- with one exception -- was exemplary.”

  Nevertheless, you should usually set off parenthetical information with commas.

2.8. English tenses

Present tense (present simple)	*I go.*	In most languages this is used for most present indicative uses. In English, it is also used to express habit or ability (*I play the guitar*).
Present continuous	*I am going.*	This form is prevalent in English to express current action.

Present perfect	*I have gone.*	This form is used to describe an action in the past that still affects the present.
Present perfect continuous	*I have been going.*	I have been (and still am)…
Past tense	*I went.*	Past tense is used to describe actions that lie in the past.
Imperfect	*I used to go.*	The English construction *I used to go* has a very restricted use, compared to the imperfect tenses of other languages, which often translate better as *I was going*, *I would go*, or even *I went*.
Past continuous	*I was going.*	Like all continuous tenses, the past continuous describes on extended action that is ongoing with respect to a relevant point in the past.
Past perfect	*I had gone.*	This expresses a past action that was completed before some other past event.
Past perfect continuous	*I had been going.*	
Future	*I will go.*	This can be used to express intention, prediction, and other senses.
Future continuous	*I will be going.*	
Future perfect	*I will have gone.*	This expresses a future action that will be completed before another future action.

3. Structure in English scientific writing

Scientific texts are highly structured, with specific types of texts following specific conventional structures. Some of these structures are language-specific and/or discipline-specific, while others are not. In virtually all cases, however, scientific texts are also structured explicitly, i.e. with the help of meta-communicative comments that work like sign-posts: “The following discussion focuses on…” or “As indicated in section 2, …” Such previews and summaries of parts of the text within the text help to keep complex and long texts readable.

Paragraph structure

Having well-structured paragraphs is seen as a very important quality in English writing (more so than in German, for instance). For cultural rather than linguistic reasons, English texts written by native speakers follow a standard paragraph structure. This so-called “canonical” or “standard” paragraph is taught to children at the age of six and they keep practicing it through primary and secondary education. By the time a native speaker reaches tertiary education or university, that structure is an almost automatic pattern for writing and reading texts. While this norm is certainly limiting (one instead of many structures), it also provides a very clear and recognizable pattern – it is one of the reasons why English scientific texts are characteristically easy to follow.

For building a paragraph in English, this is the prototypical sequence: 1) Topic sentence/General background. 2) More specific. 3) More specific. 4) Most specific. 5) Conclusion and/or example. As

you can see, this (admittedly rather rigid) model only allows you to link each paragraph with the adjacent paragraphs (before and after) in the topic sentence or the conclusion. Indeed, this works rather well in practice, since both include the crucial points of your paragraph whereas the more specific middle does not (though it is of course important for you to get to your conclusion in the first place).

 **Task 7**: Reading the text sample provided below, try to identify the structure of the paragraph. Does it correspond to the canonical sequence or does it deviate from it?

> […] Conceptual tools for describing this interaction are "social metabolism" on the one, and "colonization" on the other hand (for more detail see Fischer-Kowalski & Haberl, 2007, Fischer-Kowalski & Weisz, 1999; 2005).
>
> *Social metabolism* draws on an organismic analogy by claiming that any social system not only reproduces itself culturally, by communication, but also biophysically (such as its population, built infrastructure, artefacts and livestock) through a continuous energetic and material exchange with its natural environment (and eventually with other social systems). Social metabolism can be quantified in terms of energetic and material flows per time period, usually a year. The size of the flows required depends, on the one hand, on the size of the biophysical structures (stocks) of the social system (i.e. the size of the human and animal population, and infrastructures) and, on the other hand, on the sociometabolic regime. Different sociometabolic regimes have substantially different *metabolic profiles* (i.e. quantity and quality of materials and energy used, see in more detail below). Metabolic profiles can be expressed as total quantities for a complete social system (a society, a community, or, for example, a household), and they can, for reasons of comparability, be referred to the number of the human population the social system sustains, and calculated as *metabolic rates* (in terms of energy or materials required per person and year). The higher the metabolic rate, the more resources per inhabitant have to be extracted or imported and the more outflows of wastes and emissions are produced, therefore the higher is ceteris paribus the impact upon the environment. Once adequate boundaries of the social system are defined (and this has received a great deal of methodological attention by a number of researchers, see for example (Fischer-Kowalski & Hüttler, 1998; Matthews et al., 2000; Schandl et al., 2002), biophysical structures (stocks), flows, metabolic profiles and metabolic rates can and be measured or estimated in a comparable way for a number of social systems (communities, societies) on various scale levels across history (for an overview see Fischer-Kowalski & Haberl, 2007).
>
> The second concept employed for characterizing the respective society-nature interaction is *colonization*. […]
>
> Fischer-Kowalski et al (2010): "Sociometabolic regimes in indigenous communities and the crucial role of working time: A comparison of case studies. Social Ecology Working Paper 121." IFF Vienna.

3.1. Sentence and clause structure

The average length of a sentence in English scientific writing is difficult to determine. It is clearly less than in German or French, but it equally clearly more than in everyday English. Besides, an average is

probably not the ideal model – what we should be interested in instead is an optimum, and that depends on several things:

- Text type
- Type of publication
- Target audience
- Subject matter
- Personal style

Leaving all of these variables aside for the time being, we can begin by saying that no sentence should be longer than it needs to be. Clarity is a virtue in scientific English, and not a sign of weakness or lack of competence. If you notice one of the following things, you should work on shortening your sentences:

- your sentences are made up of two or more full clauses, which could easily be complete sentences on their own;
- your sentences are frequently longer than 3 lines (about 50 words, depending on formatting);
- you have difficulty understanding your own text when you are proofreading it;
- you often have to write a second sentence in order to explain what the first sentence was actually supposed to mean.

3.2. Connecting sentences: the "red thread"

There are numerous ways of connecting and structuring your text, making it more than a simple sequence of unconnected sentences, paragraphs or sections. These relations exist equally on the level of sentence, paragraph and larger text segments such sections.
To name but a few:

- the simple progression of factual information as in a list
- cause and effect
- general to specific
- excursus
- concession or elaboration
- temporal sequence (before and after, simultaneity), etc.

Thematic progression, from sentence to sentence (given – new)

Each sentence should begin with something known, agreed on or already established and move from there to something new (and relevant). Your sentences, however, should also connect with each other. A simple formula for this structure is to have a LINK at the beginning of sentences that need to be connected. Referring to what has been said before can be done in many ways. The use of pronouns such as "it", "this", "these", etc. is one way; personal pronouns such as "he", "they", or "we" also serve this functions. In case of these, always make sure they refer to one thing only!

If you need to be more explicit, you can write "the above-mentioned", "the … mentioned above" etc. Most argumentative markers also have a linking function as you have seen: "since", "therefore", "however" don't make sense without something outside that sentence to refer to.

 **Task 8**: Try to recognize and mark transitions and breaks in the following excerpt, paying attention to the sentence level.

Over the last two decades, internet technologies have continued to develop rapidly and thus the sheer volume of information has also grown. Within a short span of time, our ability to grasp the most important and needed information has reached its limits. Filtering systems have fast become a buzz word and demand for them has also grown. Alongside many traditional filtering systems, the concept of *collaborative filtering* was developed, tested in research, and first applied in practice in 1992 in an email filtering system called Tapestry. The many potential applications and advantages of this system were recognized and put into practice. In the beginning, the fields of application were not used commercially, but today one looks mostly toward its commercial application in such areas as eCommerce. There is a simple reason for this: the competition between eCommerce companies is getting rougher and each new customer means increased profits for the company. So companies strive to gain and keep new customers. In order to gain and keep customers, which are very demanding these days, companies must employ one-to-one marketing tools in order to operate successfully in markets where competition is wholesale. These tools have the advantage of addressing each customer individually. This approach is pursued by large and successful companies such as Amazon.

To summarize: There are numerous ways of connecting and structuring your text, making it more than a simple sequence of unconnected sentences, paragraphs or sections. These relations exist equally on the level of sentence, paragraph and larger text segments such sections. The following table lists the most common words and phrases used to realize the various types of connection within and between sentences, paragraphs or sections.

Types	**Conjunctions & Phrases**
list/enumeration	First(ly), For one, To begin with, In the first place, First of all, First and foremost, Furthermore, Moreover, Further, In addition, Additionally, On the one hand…,
succession/ sequence	Subsequent(ly), Following, Ensuing, For the time being, As a start, For now, Initially, …
Simultaneity	Meanwhile, Simultaneously, At the same time, Concomitant(ly), Coincidental(ly), Concurrent(ly), …
contrast/concession	Although/though, Even though, However, While, Notwithstanding, Anyhow, Nevertheless, Nonetheless, Still, Yet, All the same, Even so, For all that, Having said that, Despite of, Albeit, In spite of, Neither/nor, …
Elaboration	To elaborate (on) something, focus, detail, dwell on, explore in detail, to be more specific, specifically, …
Excursus	Incidentally, Parenthetical(ly), By the way, As an aside, to mention in passing, to digress, …
Consequence	Thus, Hence, Therefore, Since, Consequently, So, Because of, Due to, On the basis of, On grounds of, As a result of, By reason of, By virtue of, On account of, Accordingly, Correspondingly, …

4. Positioning in scientific writing

4.1. Quoting, paraphrasing, summarizing, and referencing sources

The term “perspective” is, of course, a metaphorical borrowing from the field of visual perception where it denotes the field of vision as determined by the physical, three-dimensional relationship between the viewer and the object seen. It is the relational, changeable and fluid properties of visual perception that make it a fitting metaphor for perspective in language, specifically in scientific writing. As authors, we are always present in our texts, whether it is a very personal or impersonal text, and we always relate not only to our readers, but also to the things we write about.

In scientific writing, then, this relationship includes not only the subject matter, the “topic” of our research, but also the so-called research landscape or field that exists beyond us as an international scientific community to which we must relate ourselves and our work. Negotiating all of these relationships is a demanding task – made all the more challenging by writing in English as a foreign language. Most non-native speakers tend to restrict themselves to a very narrow range of formulations and expressions when realizing perspective, out of fear of making mistakes, meaning that they do not make full use of the potential options offered by scientific English. The results are stiff, repetitive, overly cautious texts that are neither very convincing nor well-argued. Our aim today is to explore those options and gain more confidence in using them.

Think of controversial positions that you might find expressed in scientific texts. How could you relate to such positions? What kind of language or phrases do you know that might be useful under such circumstances?

4.2. Personal point of view and the use of “I” in English

Many writing guides refer to a taboo on the pronoun “I” in scientific writing: Is there such a taboo in your scientific field? Try to think of situations and/or places in which you may include a personal perspective.

In comparison to many other scientific languages, such as German or French, scientific English allows for the relatively frequent use of the personal pronoun “I” in all its forms: I, my, mine, me. However, even in scientific English, these are rare compared to everyday language use. While other scientific languages including German use “It” phrases and the passive voice to avoid the use of “I”, using these frequently is considered bad style in English scientific writing. Instead, an alternative strategy developed in scientific style: the expanded use of metonymy.

Metonymy

By definition, metonymy is the substitution of an active subject or actor through a substitute that is either a part of that subject (“my hand”, “my mind”) or created and controlled by it. It is the latter which is used as a form of distancing in English scientific writing.

Example: The following table gives an overview of the most important facts and figures.

Semantically, although not grammatically, such pseudo-active substitutes are strongly restricted in other scientific languages, but less so in scientific English. In practice, most but not all actions that would require an "I" in an active voice sentence – such as argue, present, discuss, analyze, etc. – can be substituted with the metonym appropriate in the given context: chapter, paragraph, pages, section, table, list, project, research, discussion etc. Importantly, in scientific English that also includes actions that clearly require a thinking, human mind, such as: analyze, discuss, compare etc. If you are ever in doubt whether a given verb can be used metonymically, you can always run a quick web search and see if you find a significant number of occurrences in scientific texts.

4.3. Reporting Verbs and Performative Verbs

In the following list, verbs are one of three word types that can be used to relate to a topic in the form of an evaluation. Doing so with reporting verbs or performative verbs is the most elegant style of writing in most instances – rather than using nouns or adjectives.

Type	Words and phrases
Nouns	guesswork, advantage, disadvantage, success, failure, attempt, innovation, breakthrough, watershed, milestone, …
Verbs	accept, reject, show, suggest, find, suggest, believe, dismiss, criticize, claim, prove, …
Adjectives and Adverbs	well argued, badly argued, haphazard, inconclusive, good, excellent, solid, thorough, clear, plausible, obvious, self-evident, problematic, pivotal, …

 **Task 9**: Find more examples for nouns, verbs and adjectives that you like to use/have used to relate to published work or your own work.

Using verbs to introduce quotations, paraphrases, summaries or general references allows us to indicate to our readers the position we (will) take in relation to the referenced content/ statement/ approach. A word like "prove" indicates that you agree with what your reference, take it to be an established fact, a valid theory or approach. By comparison, a word like "claim" indicates strong distance or carefulness regarding the cited content.

 **Task 10**: Try using the verbs listed above (including the ones you added) in a controversial sentence such as "Miller (2002) … that you can learn everything there is to know about scientific English in a day." How do different verbs change your outlook on Miller's position? How do they affect what you can do in the rest of your text?

Reporting verbs and long phrases

In reviewing and discussing the literature, nouns are often used instead of reporting verbs to head long phrases such as the following.

1. Morton **provides <u>an explanation</u>** <u>as to how information technology is changing</u> society.
2. Schmidt **gives <u>a description</u>** <u>of the process of language change</u>.

3. Kon's **suggestion** that poets are influenced by their childhood is uncontroversial.
4. Lee's **statement** that problems arose earlier than previously thought has been challenged.
5. Uvarov's **claim/assertion/contention** that the cause of the revolution can be traced back to the 18th century is worth considering in some depth.
6. Van Ek's **implication** that other historians have misinterpreted that period has caused some controversy.
7. Patel's **argument** that governments should continue to fund space research is convincing.
8. Greenberg's **emphasis/stress on** the importance of taking a liberal approach is not new.
9. Levack's **observation** that there are contradictions in Day's interpretation of the poem has been supported by a number of other scholars.
10. Kim's **demonstration** of the way in which Bach's music draws on the work of earlier composers is fascinating.
11. Gary's **proof** of the link between obesity and genes is of considerable interest.

 **Task 11**: The first two of the examples above contain the substitute verbs "provide" and "give". In English, long phrases based on reporting verbs require a substitute verb, but are limited to a few verbs, with each long phrase being compatible with a different set. Going through the other examples above, try to come with a list of all substitute verbs available.

Hedged Performatives

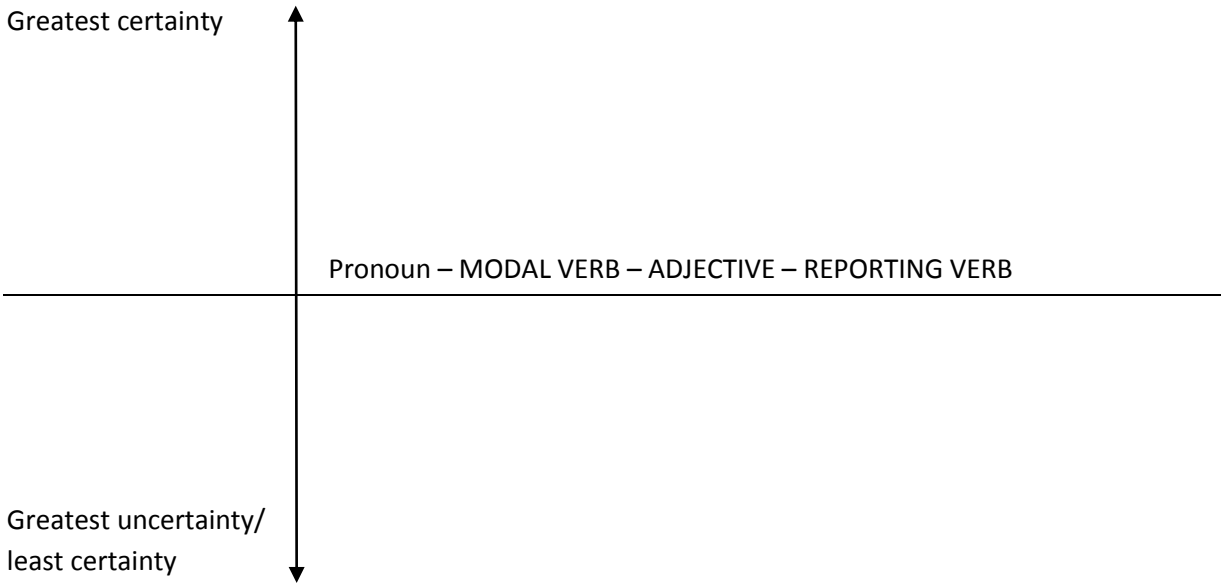
Hedged performatives – phrases such as "it might be argued that" – are also called "immunization strategies" since they are used to reduce the degree to which an author can be identified with the points he or she makes. Saying "x might also been seen this way" allows you to say something while it does not put you on the line as much as saying "x is this way" would.

Examples: "It might be concluded that it is one of the most important advantages of the newly developed system that it addresses several problems at once."

"It might be seen as one of the most important advantages of the newly developed system that it addresses several problems at once."

"The fact that the newly developed system addresses several problems at once might be seen as one of its most important advantages."

The three-part structure of hedges in English comprises the following, after a noun/noun phrase: PRONOUN – MODAL VERB – (ADJECTIVE –) REPORTING VERB. All three can be modified, see if you can play around with them, modulating the degree of distance/certainty for each of the three components. You can place all modal verbs and other components and the following scale:



Task 12: Complete each of the following sentences so that they relate to the literature of your field as evaluation, as an opening statement, or as a review.

1. The first comprehensive survey of …
2. Fundamental problems exist in current theories …
3. A ground-breaking discovery has been made in research …
4. Important new information about … has been gained.
5. The search for … is misguided.
6. Current responses to … are inadequate.
7. It is noteworthy that …
8. It is worth recalling that …
9. We should recognize/acknowledge that …
10. The results are borne out by two other studies …
11. In his seminal work, …
12. Akira challenges current techniques, revealing flaws …

5. Argumentation in English scientific writing

5.1. Describing, explaining, demonstrating and arguing in scientific English

The four above-mentioned "actions in language" are distinct ways of creating a relationship between you, your text, and the reader. Each has its function and place in a scientific text, but also its own linguistic means of realization. Confusing any of these - function, place or linguistic means – may

confuse the reader and make your text less convincing and accurate.

 **Task 13**: In order to define argumentation, we must begin by distinguishing argument from description and explanation/explication (or justification). What do you typically include in a description, an explanation and an argumentation? What is the communicative goal of a description – in other words, what are you trying to achieve (for your readers) by describing something – compared to an explanation and argumentation?

	Information to include	Communicative goal
Description		
Explanation		
Argumentation		

5.2. Argumentative vocabulary and phrases

In argument-driven texts, establishing an argument is all about arguing for or against – not simply accepting or dismissing a claim. In addition to conjunctions of causality, contrast and concession (see above), you will need other vocabulary to reference your own argumentation (see below).

What you are defending/attacking: a **thesis**, **position**, **claim**, **view**, **line of argument/thinking**, **account**, **opinion**, **perspective**, **approach**

How you are defending/attacking it: with an **argument**, with **interpretations** and **facts**, **evidence**

A solid position/approach is: **justifiable** or **justified**, **defensible**, **well supported**, **sound**, **strong**, **tenable**, **robust**, **viable**, **feasible**

A weak position is: **unjustifiable** or **unjustified**, **indefensible**, **poorly supported**, **unsound**, **weak**

Positions in between may be: **arguable**, **tentative**

Some additional useful turns of phrase: **premise**, **conclusion**, **argument**, **valid**, **invalid**, **sound**, **unsound**, **induction**, **deduction**, **fallacious**, (dis)**advantage**, **shortcoming**, **strength**, **weakness**, **caveat**

Those who support a position (or subscribe to it) are its **proponents**

In supporting a position one **advances** it

Those who reject a position are its **opponents**

They **contend** or **claim** that their views are well supported

A bad argument should be **rejected**, **disregarded**, **dismissed**

There are **objections** to particular views

One way to answer arguments is to **rebut**, **reject** or **dismiss** them (on grounds of ...)

People can **hold** and **maintain** positions; **feel** and **believe** are very weak; **suggest**, **propose** or **offer** are intermediate/tentative actions

One can **resist** conclusions or **tend** or be **inclined** to believe them; we should **arrive at conclusions**, not **jump to a conclusion**

Positions should be **coherent**, **without inconsistencies** or **contradictions**

Conclusions may need to be **qualified**

5.3. Argument structure

Establishing an argument is all about arguing for or against – not simply accepting or dismissing a claim. In developing your argument, the sequence of arguments and claims/theses is crucial. There are several standard ways of doing so, each with its own advantages.

(a) Claim raised & accepted	**Claim raised**	**Claim raised**	**Question posed**
counter-argument 1	pro-argument 1	counter-argument 1	…
counter-argument 2	pro-argument 2	pro-argument 1	…
counter-argument 3	pro-argument 3	counter-argument 2	
pro-argument 1	counter-argument 1	pro-argument 2	
pro-argument 2	counter-argument 2	counter-argument 3	
pro-argument 3	counter-argument 3	pro-argument 3	
Restated claim, conclusion	**(b) Claim rejected**	**(c) Claim accepted**	**(d) Qu. answered**

The structure that you set up might be a reflection of the way these things are structured in the real world, for example the way one thing happens after another in a time sequence. The structure may also be based on your own interpretation of the real world, for example the way you think one thing is more important than another.

5.4. Invalid argumentation

Post-hoc-ergo-propter-hoc arguments

In case of post-hoc-ergo-propter-hoc arguments the temporal sequence of events (following each other or occurring simultaneously, A preceded or coincides with B) whose relationship is not known or knowable is mistaken for a causal relationship (A causes B).

Ad hominem/Ad personam arguments

This type of argument aims not at a position taken by someone else, but at the person who presented it. Ad hominem arguments are thus intended to weaken or destroy the credibility of said person or cast his/her character in a doubtful light. This type of argument is obviously misplaced in any scientific context, though one might expect it to occur quite frequently in other domains such as politics.

Some scientific texts feature ad hominem arguments when the authority of an author or his/her ability to speak on a given subject is questioned or denied in a general sense and irrespective of any

actual argument. This is sometimes the case when proponents of a particular "school" of thought are dismissed simply on the basis of their association with that school. It is also the case when an author is dismissed on the basis of his/her age, gender, ethnicity or nationality.

Argument by authority

An authority (be it a person or institution) is appealed to or taken as guarantor of the truth. No critical attitude is maintained towards claims or suggestions made by this authority.

Ignoring counter arguments

The deliberate and willful ignoring of arguments that run counter to your line of argument is also considered to invalidate the point you are making. Creating a convincing argumentation is not about having only arguments in favor of your conclusion; it is about recognizing, acknowledging and considering any relevant argument. Counter arguments need to be discussed and, if possible, shown to be not applicable or of less weight than the arguments in favor. For your conclusion to be well-founded, you need to show that you have considered all arguments before reaching a conclusion.

Circular arguments

In case of circular arguments the conclusion to be drawn from your arguments also figures as part of the argumentative basis from which it is supposed to be deduced. While this seems an obvious mistake that anybody would immediately notice, it does happen in complex texts – especially if you rely heavily on sources where the argument/conclusion occurs in different formulations.
Circular arguments also occur in papers reporting empirical research when the research question is too narrow and no alternative hypotheses are discussed. Proving something specifically that is already generally assumed can also be considered a circular argument, unless the whole point is to study the specifics of those conditions.

Arguments by proxy

Arguments by proxy occur when one argues against a position without seriously engaging with it: the opposite position is presented in an overly short or distorted version so that it can be easily dismissed. This type of invalid argumentation is frequent in politics and the mass media. However, arguments by proxy need not be intentional; they also occur in scientific texts when the opposite argument has not been read and discussed in full. You can avoid an argument by proxy by using a direct quote that you can then discuss in your own text to show you have meaningfully engaged with the source.

 **Task 14**: Building an argument: In the early 21st century, English has become the dominant language of the global scientific community. Positions differ, however, on the issue of whether it should be and what the advantages and disadvantages of using English instead of many other languages are. Read the following arguments for and against English as a global language of science and form your own opinion. Next, team up in pairs to discuss the statements to identify the arguments and how they relate to each other.

Gnutzmann (2004)

Apart from the fact that limited language skills mean that scientists around the world who are not English native-speakers communicate (read, write and speak) at a disadvantage compared to native speakers, this often means they will be excluded from high-level participation in scientific discussions or publications. In effect, it also brings with it an economic disadvantage: non-native speakers need to spend time, resources and effort to acquire the necessary language skills as best they can, but may still feel the need to pay for proof-reading or translation services.

Burns (2006)

Language barriers are often decisive factors in excluding the work, results and insights of scientists from international recognition, effectively hindering scientific advances and their individual careers. In fact, this may put whole research programs or even nations at a disadvantage. But language barriers come in many forms – scientists who do not know English at all or know and use it imperfectly. Regrettable as this situation may be, trying to push back English as the de-facto global language of science and bring back French, German or Russian as international scientific languages will only make matters worse. At the beginning of the 21st century, in a globalised world, multi-lingualism is the only viable approach for scientific exchange.

Hofer (2003)

In many disciplines and academic fields there no longer exists the English norm of a British or American native-speaker, but a kind of "basic scientific English" sometimes also referred to as "Globish". It is a form of English without native speakers, reduced grammatical complexity and limited vocabulary. It is, quite clearly, not the English of Shakespeare, but something much more easily mastered (assuming that "mastery" is even a valid goal today). This development gives an entirely new perspective to claims made about the "language imperialism" of English, if not in general or in terms of culture, at least in the area of the sciences. The supposed disadvantage of non-native speakers of English is thus much reduced in reality; in fact, arguments can be made that native-speakers of English are similarly at a disadvantage, because they are not native-speakers of Globish. Their English is too complex, subtle and colourful for the kind of scientific communication taking place in many disciplines today.

Smith (2009)

The use of English allows scientists across the world to gain access to crucial research in order to continue and improve their own work. It is the basis for global scientific exchange today. In the case of the natural and technical sciences, which deal less with cultural and social phenomena than with universal phenomena and technical innovation, there is no need to fear that the use of English will have a negative impact on our ability to deal with our subjects. In the social sciences and humanities, the situation is of course different: historical and culture-specific things are often difficult or near impossible to discuss in a foreign language. In this situation, national languages as languages of science need to be maintained.

Alexander (2001)

Perhaps the most severe danger of universally accepting English as global scientific communication is that research, i.e. discoveries, insights and developments will no longer be published in the respective national languages, e.g. German, Japanese or French. Many terms will no longer be coined in or translated into the respective national languages. Anyone in the general populace not able to

read English will not have access to any of it. In effect, this development will mark a return to the situation that once existed with Latin in Europe: only an educated elite had access to scientific research.

Lee (2007)

Societies which do not promote the popularization of research results in their respective national languages run the risk of domain losses, for example, by failing to coin German expressions for anglicisms, which may be perfectly comprehensible for specialists because there is no German alternative in specialized communication, but which are incomprehensible for a non-specialist audience. Societies in which this happens are in danger of excluding the majority of the population from what happens on the research front. Appropriate steps need to be taken by existing government agencies and educational institutions, but new institutions may also need to be established to ensure the survival of German as an academic language.

Merrian (2006)

Currently the phenomenon known as “domain loss” of the mother tongue leads to an increasing inability of some people to communicate their scientific results to laypersons in their own countries and own languages. This alienation from their home culture has already begun to seriously impact the way scientific knowledge is, or rather is not, spread among the people. This communicative inequality is obscured when English is referred to as a “lingua franca”, a concept that appears to assume communicative equality for all, but in reality excludes or marginalizes those who are not either native-speakers or part of the educational elite.

Ehlich (2005)

The situation we are facing is not the introduction or rise of a new “lingua franca”, but the replacement of fully developed and independent national languages of science through a supra-national language of science. In truth, this language – English – is also a national language of science. The term “Globish” is sometimes used to obscure that fact, but a reduced English is still English.

Intemann, Janßen & Nübold (2004)

A survey on English as a scientific and academic language found that the vast majority of all 2291 participants (60%) were in favour of the swing to English, 37% remained neutral and only 3% expressed a negative attitude to the increasing influence of the English language

Thielmann (2007)

In order to express new thoughts, suggest new developments that are often controversial, we need a language that we can trust and that we can use fluently. Any insecurities or mistakes may mean we will fail to convince those opposed to our ideas or simple show the truth of our arguments.

We also need to learn from history: the change from Latin as a supra-national language in Europe to several national or nation-based languages of science did happen of or by itself; it was not compelled by nature or happen by itself; rather, it was the outcome of political and social developments. We need to recognize that the rise of English is similarly the outcome of political, economic and social developments outside science.

Amren (2004)

Especially in disciplines where insights and developments need to be published rapidly or run the risk of being outdated a few months later, the use of English as an international language is essential. Without it, the publication of research would be delayed unnecessarily.

Miller (2011)

In the present day and age, it would be irresponsible to tell our students and young researchers that they should not learn English and use it as a global language of science to the best of their abilities. Universities have the responsibility to help them do so and they need to be pragmatic about it. To suggest that we should avoid English would be to ignore the known facts, however much we might regret the decline of national languages of science.

6. Resources and further reading

British National Corpus/Corpus of Contemporary American English: http://corpus.byu.edu/bnc/

Collocational Dictionary: http://www.linguee.de/

English for Academic Purposes Website: http://www.uefap.com/

Gruber, Helmut/ Huemer, Birgit/ Rheindorf, Markus (2009): Wissenschaftliches Schreiben: ein Praxisbuch für Studierende der Geistes- und Sozialwissenschaften. Wien: Böhlau/UTB.

Huemer, Birgit/ Rheindorf, Markus/Gruber, Helmut (2012): Abstract, Exposé und Förderantrag: Eine Schreibanleitung für Studierende und junge Forschende. Wien: Böhlau/UTB.

Mautner, Gerlinde (2011): Wissenschaftliches Englisch: Stilsicher Schreiben in Studium und Wissenschaft. Konstanz: UKV-Verlag.

Phrasebank der Univ. of Manchester: http://www.phrasebank.manchester.ac.uk/

Swales, John/ Feak, Christine (2005): Academic Writing for Graduate Students: Essential Tasks and Skills. A Course for Nonnative Speakers of English. Ann Arbor: Univ. of Michigan Press.

Swales, John/ Feak, Christine (2005): English in today's research world. A Writing Guide. Ann Arbor: Univ. of Michigan Press.