

WEEK 1 – How to be clear

three basic canons of rhetoric:

- invention (how to find what to say),
- arrangement (how to organize what to say)
- style (how to “dress ideas in words”)

Rhetoric is a neutral art, but it can be used both to manipulate and persuade.

The basic instructions: how to find good arguments, how to arrange them properly and how to choose the best style for your speech.

It's also important to know how to put the audience at the center of our attention, calibrating what we say on the basis of the "common ground" between all those involved in the communication process.

Invention (“Inventio”) is the first step in rhetoric: finding what to say to support our argument or more simply to create our communication. "Invention" is the action of brainstorming in order to find good ideas.

In order to make invention easier, ancient orators suggested thinking about 3 different aspects:

1. Ethos: the credibility of the speaker (speaker is the focus)
2. Pathos: effect on the audience (addressee is the focus)
3. Logos: acts about the “thing” under discussion

During the invention phase, it is useful to think about possible objections by the audience in order to be prepared to answer. Also, it's possible to select which objections to raise ourselves (without waiting to be asked) and which not to raise (and just be prepared to answer, if the case).

Another tip is to anticipate wishes, as what the audience is expecting or hoping for.

After brain-storming, brain-mapping should happen: organize elements of the speech into groups according to some criteria. One possibility could be to divide them following the triad “ethos, logos, pathos”, or in different groups more suitable for the topic you are dealing with.

The invention phase will most likely be revised more times during the creation of the speech.

Arrangement (“Dispositio”) consists in organizing the communication, putting in order the arguments that we intend to use. The different ways in which communication can be arranged depend on the context: oral or written communication? Will the communication likely be interrupted? Can we count on the continuous attention of the audience?

The Nestorian order: strong arguments at the beginning and at the end

- both in written and oral communication
- precondition: have the full and continuous attention by the audience (no interruptions or the reader will not skip to the end)

The descending climax: starting with strong arguments and then trailing off with ever less strong arguments, in order to catch attention at the beginning and not lose the opportunity to say the most important things.

The ascending climax: put our best arguments last, in order to have the last word.

- Precondition: continuous attention by the audience

Attention should be given to the beginning of the speech:

It's possible to start by trying to win the favor of the audience with a “captatio benevolentie”. This can happen in three ways:

- Praise the audience
- Show understanding towards the audience
- Be humble and/or self-ironic

About this “winning of favor” strategy, the lesson is: it works, most of the times, but it must be used carefully. The risk of “overdoing” and sounding inappropriate or even annoying is quite high, so it is important not to exaggerate.

Style (“Elocutio”) deals with “how to dress ideas in words”. The assumption behind this phase is this: that there are more ways in which we can express one idea, and the way we dress our ideas with words can make a difference.

“Elocutio” first and foremost reminds us that a good text has to be correct, clear and appropriate to the situation (3 “virtues” of style). The 4th virtue is then “ornament”, based on the famous “rhetorical figures”, that is, ways in which the normal use of language gets deflected and re-purposed to provide a vivid image of what the communicator wants to say.

- Metaphor: making reference to something by means of something else.
- Analogy: comparison meant to help the audience connect to an idea.
- Anaphora: the repetition of the same word/expression at the beginning of successive clauses.

A text can be either good or bad, depending on the addressee and what knowledge he shares with the sender, on what knowledge the sender can count upon. This is the topic of “**common ground**” in communication, the shared knowledge between the speaker and the listener.

Herbert Clark, from Stanford, defines common ground as “the collection of mutual knowledge, mutual beliefs, and mutual assumptions that is essential for communication between two people”.

Note that explanations and examples do not only in general make words clearer, but also help fully appreciating their real “value”, the world of knowledge and applications that lies behind them.

The two main possible mistakes with common ground:

- taking for granted that our audience speaks our language, knows what we know (and like what we like, think what we think, share our values etc. etc.).
- saying too much, teaching people what they already know, which is clearly annoying.

GOOD PLAGIARISM:

Don’t be afraid, it’s ok. And do be sure that I know that “real” plagiarism is bad. But it can also be used for the good, as in this exercise.

Cicero said that you learn by imitation. You find a report that according to you is well organized? Try to “copy” it, organizing YOUR report using that schema. You find an “introduction” paragraph that arranges arguments in a way you feel is effective?

Try to do the same for the introductory paragraph of YOUR scientific paper. And so on.

Week 2 – How to persuade

An **argument** takes place when two people have different opinions and support them in different ways.

Argumentation theory identifies some strategies that could be used in an argument.

“Argumentum ad populum”: a fallacious argument that says that what most people think must be true. If most people think X, then X is true. Of course, something that most people think may be false and something that is true might not be thought by most people.

Argumentation theory in science:

- to show why the topic we are investigating is relevant.
- to persuade a potential partner to join our consortium for a project proposal.
- to be accepted for an internship.
- to persuade a reviewer to fund our project.

A **syllogism** is a form of reasoning of the type:

“All men are mortal,
Socrates is a man,
Socrates is mortal”

It consists, in order, of a major premise, a minor premise and a conclusion.

The discovery of an exception ruins the validity of the major premise.

Enthymemes are rhetorical syllogisms in which the major premises are statements that are generally, not invariably true, and are accepted and shared by the human community.

Another example:

"Everything that can cause damage should not be done, dyeing your hair with an extravagant color can cause damage, therefore, you should not dye your hair an extravagant color".	"Everything that can cause damage should not be done, driving is an activity that can cause damage, driving should not be done".
---	--

A way to go against an enthymeme is to use the show how, seemingly accepting the major premise, it is possible to reach an “absurd” conclusion.

In a discussion, it is important to do two things:

- identify major premises that are "strong" and shared with the interlocutor in order to build upon them and hopefully reach an agreement
- identify the major premises that our interlocutor uses to build his own argument, in order to decide whether we agree or not, and if not, challenge them

We often find ourselves, even in the scientific arena, using rhetorical syllogisms that are no less “rational” than scientific syllogisms.

It is often the case with enthymemes to leave some parts to the audience to infer, like the major premise or the conclusions. In fact, drawing the conclusions has the advantage of giving "satisfaction" to the interlocutor and making his adhesion to the thesis more solid.

Sometimes, the cause-effect argument is in some way taken for granted: the implicit way in which it is expressed makes it more difficult to discuss it and, if the case, to deny it. “Taking for granted” something can be used as a manipulative technique: you hide what you don’t want to discuss.

To support a thesis, it is necessary to collect what in ancient times were called "proofs", that is, basically, **facts and data**. Facts and data do not require any special oratory skill to be shaped, they only need to be found, collected, selected, and placed at the right moment of the speech, but are very important: when they are introduced in a discussion, they are like "big stones" that cannot just be ignored.

There are several ways to respond to an interlocutor who presents us with facts:

- Dispute the fact
- Challenge the relevance of the fact
- Dispute that the data and facts are partial and therefore not reliable
- Put on the table other data and facts that outnumber or make irrelevant the first

"Topoi" are patterns of reasoning or macro-schemas, strategies.

An example of "topos" is the one of **"the more and less likely"**:

"if the most likely thing does not happen, then the less likely thing will also not happen."

Another "topos" is the **topos from the contraries**, for example:

"Self-control is good, since lack of self-control is bad"

This topos is based on the principle of non-contradiction, for which A and non-A cannot co-exist.

There are dozens of topoi.

Another good way of "argumenting" is to make use of **examples**. Examples trigger an inductive form of reasoning of this kind: to support a specific claim, you introduce another claim, which in some way is similar to the first. By passing through an implicit generalization, the two are shown to be akin and then it is easy to say that what applies to one applies to the other and vice versa.

Examples are "arguments by analogy" that persuade due to the striking evidence of the second claim being called upon to support the first.

The **quasi-logic argument of reciprocity** is a kind of argument that works on the assumption of an existing symmetry between two situations, so that what applies to one must necessarily apply to the other as well. e.g. *"Do you get bullied at school? Then you beat them up!"*

The only way to respond is to negate the symmetry and point out that the two situations are actually different, under some essential respect.

The argument of reciprocity is akin to the rule of justice that says that two beings or situations falling under the same genre or category should be dealt with in the same manner.

Another argument is the **complex question**, that consists in taking for granted something that might deserve to be discussed.

The argument of **transitivity** states that $A:B=B:C$

A famous quasi logic argument is the one of *sacrifice*. It states that if something "costs" a lot, then it must be valuable. The amplitude of the sacrifice serves as a measure of the value of what we are making the sacrifice for; conversely, the absence of sacrifice shows how little interest we have into something.

This argument is linked to the **"argument of quantity"**, which is way more general and states that "a lot means good".

e.g. *Huge funding means that a stream of research is relevant*

The opposite argument is the **argument of quality**: less but of better quality might be more value than more of lesser quality.

In argumentation, we can find **fallacies**, which are defined as arguments that are “apparently correct in form, but actually invalid”.

The “**Appeal to ignorance**”, in the sense of “lack of evidence” works as follows:

If a proposition has not been disproven, then it cannot be considered false, and must therefore be considered true.

e.g. “*Mom didn’t say I couldn’t take her car, so I thought it was ok and I took it*”.

The fact that someone is considered innocent until proven guilty is based on an argument of ignorance. It is faulty from a logical point of view but can be fine from an ethical point of view.

A quite clever fallacy that is often used is the “**straw man**” fallacy. It consists into deliberately modifying the interlocutor’s thesis turning it, let's say, from A to B and then into answering to B instead of to A. For it to work, B must be similar enough to A to deceive the addressee and the audience.

e.g. “I’m actually in favor of renewable sources. I think they can contribute to a nation’s energy demand.”
“Oh, but if we were to use renewable sources only, we could not do all the things that we do now, they are not constant and moreover they don’t generate enough energy!”

The position of the first interlocutor has been modified from “renewables sources COULD CONTRIBUTE” to “renewables sources should be the ONLY source of energy”.

The argument of “**irreparable direction**”, posing a choice as the only acceptable option, in “now or never” terms. The fallacy lies in the fact that being the last option does not mean that that option is good, advisable or appropriate.

The **argument from authority** takes place when authority is used to support a claim.

When the appeal is made to a false authority, then the invalidity is evident. But even if the authority is valid, still the argument is a fallacy: the mere fact that the authority X says that Y is true is not enough per se to conclude that Y is true.

Fallacies are errors in reasoning, not evil weapons, at least not all the times and not in all their possible uses.

Week 3 – Speak in public

Public presentations are lectures, speeches, calls, and, more in general, public events in which an audience is addressed.

How to improve in rhetoric:

1. learn by theory
2. learn by imitation
3. learn by practice

Context of the speech

The first and most important element is the audience, that is, the spectators at the public event, those who will “receive” our communication.

What are important are:

- The key messages to deliver to the audience
- The audience availability

The first thing to do is to identify the **key messages**. Then we need to ask ourselves how far the audience is with respect to them: is the audience already in line or has a negative attitude towards them?

Third, we have to identify the proper arguments and data to not only introduce our key messages, but also support them properly.

Targets	Ranking	Goals	Distance	Key messages	Content
The main targets who make up the audience	How relevant every specific target is	What to achieve?	How distant id the target from the goal?	what do you want that target to get, crystal clear?	what pieces of content may serve the purpose?
medical experts	1	Have them approve the project	3	Our diagnosis method is reliable and less-time consuming	Data on the efficiency of the method and prospects
Computer science experts	2	Have them approve the project	1	Our app is well performing and compatible	

Audience’s availability: Will our audience be free or captive?

we can say that a captive audience is an audience you may reasonably expect to stay until the end of the speech, a free audience can come and go.

This is definitely something that must be taken into account when organizing the presentation, especially considering the arrangement of the topics and the effort you need to make to engage the public.

Unforeseen events: Anything that may happen during a presentation that may distract the audience. The attention of the public might be taken away from the speaker.

Usually the most suitable strategy is to go with the distraction.

Another important element of the context is **space**. If possible, try to understand what the place where you are supposed to perform is like. For example, let us imagine you wanted to do some group-work but

benches are stuck on the floor. You need to know this in advance to re-plan your strategy. Another issue could be visibility: will people in the last row be able to read your slides?

It's crucial to make the best possible use of the **time** you are given.

1. Be sure about how much time is available
2. Make a plan about what to say, paying attention to making the key messages fit in
3. Rehearse

A common mistake concerning time is to try to squeeze too much content in the given time. It's better to make a wise choice of what to say and allow yourself plenty of time to say it.

Another quite typical mistake is to continuously make reference to all the things you could say if only time allowed. It's better to avoid doing so. Do not give your audience the idea they are missing something, which implicitly would mean admitting you organized yourself poorly, if something was important and you did not say it.

The last mistake we deal with here is the break of the implicit or explicit agreement about time you have with the audience.

Three tips on oral "style" derived from the book by Walter Ong on orality and literacy:

- 1) repeat yourself: in oral presentations, people cannot go back and forth. If something matters, like for example your key message, do repeat it, in different ways, do make sure people get it.
- 2) make the speech situational: if you can, introduce a short story, make reference to your own experience. People love listening to stories more than to abstract concepts.
- 3) interact with the public: an oral presentation is a face-to-face situation. Ask for feedback, ask questions, ask for sign of acknowledgement. Plan for interaction opportunities. You may want to use technology-based forms of interaction, like instant polls or quizzes, using the many apps that are out there for these kinds of activities.

Tools

With "tools" we mean anything that may support a presentation.

Nowadays, slides are probably the most used form of support, but there are others, like index cards, flipcharts, blackboards (that in turn need chalks or markers),

Using supports is fine, but there are three things that need to be done.

1. carefully plan what you mean to use and in deciding what to use, do not make the mistake of considering the most advanced "technology" to be the best.
2. check that what you mean to use actually works, in the actual situation, if possible.
 - a. Check everything beforehand
 - b. be sure to arrive at least half an hour before, to set up.
3. bring back-ups

The most used and maybe most useful tools are **slides**.

It's important to considerate the context of the slides: will they be used during a public speech or just be uploaded on some websites? In the first case, keywords on them may be sufficient, while in the second it's important they can be understandable even without a speaker explaining them.

Another dimension to consider is the purpose of the slides. Are they meant to help the speaker remember what to say or the audience to take notes?

The third dimension is the speaker's confidence. A quite confident speaker can usually afford very visual slides, with just a few key-words.

Some tips on technical slides:

1. do not overcrowd your technical slides with too many graphs, calculations and similar things. Do not exaggerate with too much content, as people reading and trying to understand will not listen to you.
 2. there are two possible uses of, so to speak, “technical slides”:
 - a. you show it quickly, you don’t go through details, and the message is just that “the data proving this exists”
 - b. you go through all the details giving time to the audience to digest and appreciate everything, like in a lesson
- Do not use hybrid approaches.
3. summarize the main assertion of the technical slide in plain words and put it crystal clear on it

Non-verbal communication

During the delivery of a public speech, voice, gestures and movements play a crucial role into making the performance lively, meaningful and entertaining.

The **voice** is our main communication tool.

Volume can be used to broadcast, stating loud and clear the crucial points. Loud voice makes you sound assertive and self-confident and people get immediately in the state of mind that you are actually saying something fundamental, indisputable, incontrovertible.

Or we can use the trick of lowering the volume, so that people really need to focus their attention if they want to grasp your words. This will also add the flavor of something being said in confidence, that you are entrusting people with.

Another device is the register. The register used can be the “modal”, the normal register, or it is possible to say something in falsetto, or speaking deeply.

Prosody consists of the patterns of stress and intonation in a speech. Prosody contributes to convey a number of meanings including the emotional state of the speaker, the difference between a statement and a question, irony, jokes, etc.

Pace is the speed at which we talk. Sometimes it is good to change pace, as a way to keep people’s attention. Slowing down means “I really want you to pay attention to this”. We may also want to have a bit of silence here and there, as if leaving time to people to digest what we are saying.

Possible flaws in the use of voice:

- “crutch sounds”: all those sounds, like “mmm”
- Sayings like “Basically”, “you know what I mean?”, ...

Better a short silence than a crutch sound, always!

Another issue is repetitive prosody patterns, for example pronouncing every sentence as if it were a question.

Generally speaking, using gestures is ok, better than not using them (Do not exaggerate). Gestures are the physical counterpart of the vocal strategies, they help adding emphasis and can actually contribute to meaning-making and memory.

Just like gestures, also movements can help underlying a meaning. For example, you may want to move from one side of a room to another when you present two different points of view over the same topic. Another reason to move when you give an oral presentation is to keep people’s attention.

What it really means to listen

In Latin, there are two similar verbs: "Silere" and "Tacere". The first describes the silence of what at most could make a noise, but not talk, like for example a wood at night; the second describes the silence of those who could talk, but leave room to the words of the speaker.

The listener understandings are always influenced by his personal frames of reference. And the listener also has a degree of flexibility: how much is he willing to give up his frame of reference once something unexpected occurs.

People build and create a world in their heads, and love what they do and stick to it, and if they are flexible then they will destroy everything and start anew when needed, but not all are willing to do so.

It's important to understand that:

- Those who listen are not passive, but quite active;
- They create interpretations of the message based on their assumptions, knowledge, experience, tastes.

This may cause misunderstanding if the two "interpreters" (the expressive and recipient) do not match; - They may be vulnerable to manipulation, since they are 100% busy into interpreting what is being said, not in detecting if something is wrong.

The apparently passive listener is not our recipient, but our team-mate in the meaning-making process.

Week 4 - WRITE A PROJECT PROPOSAL

Presenting project proposals: an activity that accompanies scholars, but also professionals, in their entire working life.

Two extremes must be considered:

- research proposals
- market-oriented proposals, like for example proposals for creating a start-up

In the case of research proposals, what is important is showing to: be visionary, be creative, be unique, that you significantly advance the knowledge of the sector.

In the case of market-oriented proposals, the watchword is: this can be done. Our idea, our service, our product, can go on the market, soon, find its market share, win the competitors and work. It is not necessary, as with research proposals, to prove the absolute novelty or innovativeness of what you have in mind. Being feasible becomes the important factor.

First of all, we will talk about what happens when an innovation is introduced in society, making reference to the so-called “diffusion theories”. It is important to realize these dynamics to fine-tune the message we convey with our proposal: how we want to look, what we mean to do, what impact we foresee to have.

We will then devote specific attention to a text that is almost always required: the executive summary. It is generally the shortest but most important text of a proposal.

We will then deal, in two lessons, with the basic elements which are to be found in practically all project proposals. There are some particularly important topics that are always to be found in a proposal:

- the opportunity, the starting point, from which the proposal springs
- the goal and the objectives. What does the proposal aim to achieve?
- the state of the art, the situation on which the proposal intervenes

If we are making a research proposal, the state of the art is going to be about the research on our specific topic. If it is a more market-oriented proposal, it's going to be the market situation with respect to the “product” that we are working on and for which we ask for funding.

There are also some aspects that show that the proposal is “concrete” and that you have clear ideas about what to do, once it's been approved.

- the method: from Greek literally means “the way through which you get somewhere”
- the resources necessary to lead the project, which you will need to specify in terms of person-months and finances.
- the temporal plan of the work, with the main milestones that will mark the progress of the activities and the “deliverables” you will be able to produce along the way
- information regarding the proposer, or the proposers, in the case of a consortium: it must be shown that the team is actually able to carry the work out.

Diffusion of innovations theory

Diffusion theories are theories that try to explain, make sense of what happens when an innovation is introduced in society.

The diffusion of an innovation can be seen as the introduction of a new species in an ecosystem, changing the balance of it, whatever the species added.

When the cell phone was launched, it changed completely the ecosystem of communication. Telephone boxes, for one, almost completely disappeared and gained a different role, more traditional. Another element that completely changed was the landline, not being anymore for collective use, but with cellular phones the “landline” (the phone) is personal and belongs to a single person.

Whenever you write a project proposal, you must be aware that you are entering an ecosystem and you must be aware of what kind of impact you want to have on it. Then you have to show awareness of how the ecosystem is organized and take a decision about the role you want to play in it. Then you also have to

show awareness of the critical aspects that your introduction in the ecosystem is going to bring, and of how to cope with it. You may also talk about the benefits for the ecosystem of your introduction.

The executive summary

A typical reading scheme by a reviewer of project proposals might be: description of the project, financial part, who are the proponents. Which means: is it a good idea? But how much money do they ask for? And who are these people? Can they actually do the project? Of course, this really depends on the reviewer. In any case, the linear reading, from first to last page, is quite rare.

This means that we must try to ensure that the proposal is comprehensible from whatever point you start it, and that you should not be afraid to repeat the key concepts several times, to be sure that the reviewer gets them.

The executive summary must be short. In general, it should not exceed 10% of the text that it sums up, as length.

You must also pay attention to the editorial format required.

The summary must provide the general framework of the proposal. This is a delicate point, because while on the one hand the summary has to frame the proposal, on the other it must not be, in the most absolute way, an introduction. The goal is the one of offering the reader or the reviewer an effective synthesis of the document.

The summary must entail the essential elements of the proposal in a brief but clear way: what is the issue, what is the state of the art, which method you mean to use, what you aim to get.

An executive summary is generally written at the end, when the document is ready.

You must make sure that the summary presents “the best” of the proposal (which is not the same as the essential elements).

In short, the summary is a text addressed to a busy reader and must go straight to the point, without consuming too much time.

Starting point, goal, state of the art

There are three elements that are found in almost all cases:

- The “starting point” of the proposal. What it stems from.
- The goal. What the proposal aims to achieve.
- The state of the art on the topic, which basically means acknowledging there is a world out there doing something related to what you mean to do.

Please mind that these are not, necessarily, paragraphs’ titles: they are topics.

The **starting point** is about where does the proposal starts from. Starting points can be of different kinds: for example, you can start from an issue and later show how to solve it. Another possible starting point, similar to the first but less “dramatic”, is the identification of a gap to fill. A possible starting point could also be an opportunity to exploit.

Another point: the **goal**. What we aim at with our project. The goal is linked to the concept of relevance: What good am I bringing to you, if you listen to me? It must not be taken for granted that everybody can see the relevance of the work presented.

Relevance can be seen as a series of concentric circles. The circle closest to our activity will be the relevance for that specific sector, then going from the scientific sector to industrial applications and up to why the object of the proposal matters to society.

The risk in specialist studies is to lose sight of the overall picture and focus on the details. The reason why something is done must not be forgotten, and this also helps talking to non-technical readers.



The **state of the art** part is about showing that we have looked around, we know there is a world out there and we are connected to it. First, we must make sure that nobody has already done or discovered what interests us. Then we must check what is most similar to what we mean to do. We must show that we know how to “position” ourselves with respect to the world.

The state of the art for a market-oriented proposal will say: we know that there are these services, these products, these companies.... They are all fine, but there is still something that could be improved, a market share that has been neglected this far, and we will be working on it. In short, we must show that we know how to fit in the “ecosystem”.

Method, Plan, Resources, Proponents

“Method” comes from Greek, and it means “following what way” you mean to investigate something. In all the proposals, you must explain what method you will follow to achieve what you are proposing.

There are two extremes: on one side, you can be very detailed and say what will be done each month, while on the other side you can be quite vague. Some programs ask you to be very detailed, but this clashes with a research activity, especially if it is very innovative research, as it is impossible to pre-determine what will be found and discovered. On the other hand, being very vague gives the idea of not having a clue about what to do. There are only a few cases in which a vague idea may be ok, for example for venture capitalists. Another important factor would come into play: who you are. If you are very famous, very credible, or if you belong to a very credible institution, your vague idea does have a chance of being financed. If you are completely unknown, it is of course more difficult.

The method issue goes together with how you sketch the temporal plan of the project. You may not know how much time it will take to realize the project, but still, if you are asking for money for it, you have to say something about your temporal plan. The best approach is usually to see how much time is given to you in the program you are applying to and fit your schedule into it.

How many resources do you need to carry on your project? This is one of the most relevant parts of a proposal. There are 3 main points you have to consider:

- You have to fit the proposal into the available budget. Although in principle you should decide what you mean to do, see how much it would cost and calculate how much you need, in practice (most of the times, of course) you would do the opposite. You have to see how much the available budget could be and decide what you can do based on that. Then, when you write the proposal, you kind of “go back to the theory”: you state what you want to do, you calculate how many resources you need, and that is your budget. Which, this way, corresponds to the available budget.
- Pay attention to the “value for money” issue. If you ask too much for doing too little, you are not credible and you look greedy. If you ask too little for doing too much, you are not credible either. Make your request consistent with what you mean to achieve.
- Mind that the operational plan of the project is actually consistent with the budget you are asking for. Remember that human resources are usually the highest cost. For how long? Make your budget request consistent with your plan

The last aspect is the **proponent**, writing the proposal. The reviewer reading the proposal will want to be sure that you can do what you promise to do. Introduce yourself as someone credible: if you have done something that anyone can acknowledge as particularly good, mention it, even if not strictly relevant. Introduce yourself, and your group or your lab, as experts or at least knowledgeable in the field of the proposal. List previous experiences, publications, anything that may prove it.

A tip: write yourself your own review, in the proposal. You need to know or fathom the criteria the reviewer will have to evaluate your proposal based on.

It is even better if you know the keywords: if there are key words in the call, do use them. They will tell at first glance that you are in line with the call.

Then you can, for example, highlight in bold a series of sentences that “answer” the reviewer’s questions.

If you have the success criteria clear, you can “write your own review” and use it to improve your work from the point of view of the reviewer.

Week 5 – How to write a scientific paper

Scientific writing is how scholars show the significance of our job and share with the scientific community the results of our research.

The audience is of specialists (otherwise we would be doing “science writing”) and the purpose is to allow our colleagues to learn from what we have done and possibly replicate our actions and experiments, to further push the state of the art.

There are various kinds of scientific contributions, the main ones are:

- original research
- literature review
- case-studies description

Original research papers are usually defined as “primary literature” and deal with experiments and experiences where (usually) data are gathered and analyzed.

Literature review is “secondary literature” and consists in a critical scanning of existing literature on a topic.

Case studies are generally a qualitative description and analysis of something that cannot be generalized but is still interesting, in some respects.

A possible macro-schema for scientific publications is the “hero journey”, a schema used in storytelling and screenwriting: there is an issue, someone (the scientist) takes on the challenge of solving it. He reports the “journey” to the scientific community, to show how he made it and, eventually, in what sense the world benefited from his effort. There is an issue to solve, ways of solving it, challenges, benefits deriving from the solution, etc.

Main sections and the abstract

The **abstract** is the very first thing the reader bumps into. It is the marrow of your work and should be self-contained, in the sense that it can be read independently of the paper. The abstract is usually a quite short text, where you find all the relevant elements of the study.

The schema could be:

1. what the paper is about
2. what the goal of the work presented, plus the overall significance
3. what was the method used
4. the main results
5. the discussion or conclusions

If there really isn't enough space, you can skip the method.

Note that the abstract is not an introduction and neither an index.

The real beginning of a scientific paper is the **introduction**. In the introduction, you have to state what the question you deal with is, why it is relevant and in what sense the study will contribute to understanding the question. You also have to frame it into a context, by which I mean a theory or a scientific field or a trend of research.

In some cases, the introduction may also entail a sort of “index” of the paper.

After the introduction, we usually find the **method** of the study, where you explain how the study was undertaken. Your concern in this paragraph must be to provide all the elements to allow the reader to replicate your study. You have to make sure to include all the elements that were crucial for the experience, without taking things for granted.

The final paragraphs of a paper are “**results**” and “**discussion**”. Sometimes results and conclusions are combined. The results section is where you present your data, maybe exploiting graphs and tables, boiling

down data to the relevant ones. Also, if any of the collected data was eliminated, say it and explain for what reasons. Also, anecdotes may be useful, to convey the flavor of an experience and its outcomes. In the discussion or conclusion section, draw lessons out of your results. The lessons must be in line with the stated goal of the study. It may be useful to favor the connections by recapping, better is with the same words, the stated goals and complement them with the corresponding results.

There can be something unexpected as well, something that you had not foreseen at first: do include it and make it clear that that was not expected but still it is an interesting additional result, and under what respects.

You also have to make reference to the field of study, highlighting in what sense you are contributing to it and advancing it (as you should have “promised” in the introduction).

Eventually, make sure to discuss limitations and weaknesses of the results and implications for future research.

Abstract	the marrow of your work
Introduction	what you did and why
State of the art	
Method	how the study was undertaken
Results	what you found out
Discussion/conclusion	what you learnt from what you did
References	

The **state of the art**, which we will discuss in another lesson, can be found in different positions. The most typical ones are after the introduction or right before the discussion.

Finish with **references**: the publication venue will provide guidelines on how to handle them, but usually it is a good idea to include every citation in text, and vice versa.

Don't forget to thank, in the acknowledgement section, anyone who should be thanked: the agency that funded the research, any colleague that provided advice, any user who volunteered to undergo your experiment, any collaborator who did not sign the paper and yet was helpful.

Last thing: if there is any additional material you deem useful – and there is room for it – add it: figures, questionnaires, “raw” data, etc.

The introduction

The introduction of a paper is where we present the issue we deal with, we put it into the proper context and we state in what sense it will contribute to the scientific field, or even to society or to humanity. In other words, the introduction is the place where we say what we do and why it makes sense.

It's possible to start with a field of interest and an issue in it, leading to the paper aim as the solution to this issue, but in any case, it's important to give some space to the broad vision, the big picture, around the topic of interest.

Another way might be to have a descriptive, almost educational, approach, introducing the core issue faced in the paper after an explanation of the topic.

A historical perspective can also be used to lead step by step the reader towards the topic, assuming the reader interest.

But do we want or need to raise the reader's interest?

Descriptive/educational approaches take it for granted that the reader is interested and that all that needs to be done is just describe the work. What we may call “problematic” approaches take the burden of raising the reader's interest and showing why the work is beneficial. The simplest way is to identify a gap in the literature, showing that this gap must be filled. Problematic approaches are meant to “gain the reader

to the cause". To take a broader perspective, you can start from a social issue. Another way of gaining the reader's interest is by showing that your work is a good opportunity. Another way of gaining the reader's interest is by showing that your work is a good opportunity. The last option, untypical for scientific writing, is what we may call the "situational incipit", where you start with a short story or an anecdote, thanks to which the reader slowly discovers the issue dealt with and gets interested and even affectionate in it. This style is common in magazines

The state of the art

The first thing to do when writing this section is to ask ourselves what the purpose of our paper is. Sometimes, the same experiment, the same experience, can give vent to different research questions, and we need to have clear in mind what question we chose, and we want to answer.

So, we stick to the literature that is as close as possible to this specific topic and show in the background that we are also familiar with the broader picture. But most importantly, we know everything about the limited subject of interest of the paper.

A state of the art should be as to the point as possible.

Advice number 1: when you investigate the state of the art of a new field, start from repositories like Google Scholar, or ACM digital library or IEEE digital libraries... looking for quite recent papers on the topic you are interested in. Read the state of the art section of 3-4 recent papers. If they come from authoritative venues, they should be well done. And therefore, you should be able to identify the authors that are points of reference in the field, since they will be quoted by most. This can be a good starting point. In addition, of course, check in the same repositories what the most cited papers on your topic are.

Advice number 2: when you aim at publishing at a conference or journal you are not familiar with, make sure you explore thoroughly that venue, with regard to your topic. Check if there is anything that has been published before close to what you are doing by searching the proceedings of previous years.

How to review a paper

Being part of a scientific community also means helping conferences or journals in the review process of scientific papers.

Reading the paper from the beginning to the end is not necessarily the best strategy, particularly in the technical-scientific literature (which tends to be well organized and structured).

Start from the abstract, asking yourself these questions. What is the paper about?

Secondly, we need to ask ourselves if the abstract is clear and entails all the main elements of the article.

Finally, we must ask ourselves whether the goal of the article is relevant. Is it worth reading it? You can find well-written articles that are fragile from the point of view of relevance.

After looking at the abstract, a good thing could also be to go directly to the conclusions. Are the results relevant? This is the fundamental question. A good research question is not enough, the results must also be important for the paper to be worth publishing.

The next question is: are the results original? Do they advance the state of the art on the subject?

The last question concerns the "cohesion" of the paper, instead: are the results in line with the abstract?

A technique that is typical of a completely different sector, that of screenwriting, is the one called "set-up / pay-off". When an element is inserted (set-up), this must have its own "outcome": an explanation, a conclusion, a development. If the article proposes two research questions, then the two research questions must be taken up in the conclusions and addressed properly. Sometimes conclusions entail other results and issues, which have been discovered on the way. This is fine of course, but the two research questions must not be forgotten.

After having seen the abstracts and conclusions, it is necessary to identify the section where the goals of the work are expressed. Similar questions are asked again: are the goals relevant? Are they clear? And are they consistent with the abstract?

We then move on to evaluating the actual work. This is the heart of the paper and can be entailed into one or more paragraphs. The questions are: - Is the work sound from a scientific and technical point of view? - Was the method used appropriate? - Was the work done easy or difficult? - If there is data analysis, is it correct?

The last section of the paper to look at could be the one on the state of the art. The amount of literature now available on any subject makes an accurate evaluation very difficult. Therefore, the main thing to look at is the focus: does the state of the art take the right focus on the theme? Is it too wide or too narrow? A common mistake is to make this section too large and thus useless and missing the point. You must also verify that it is in line with the objectives.

Finally: communication quality. Is the paper well structured? It is useful to read the sequence of paragraphs without reading the text, to see if they are coherent and convey the development of the reasoning. Is the text accurate? Are there any errors? Are the figures readable? Even if you print in black and white?

If abstracts and conclusions are excellent, then there is a strong possibility that the paper is excellent. The section on the work carried out should be verified so as not to be "cheated".

If abstracts and conclusions are bad, you can generally avoid reading the rest.

Remember to make constructive and not rough criticisms: do not offend the authors. At the same time, don't be too scrupulous: the reviewer's main role is to guarantee the scientific quality of what is published. What to say to the scientific committee? It is often a separate field in the review form, which the authors do not see. My advice? Tell the truth.

Conclusion – The relevance of relevance

In communication, **relevance** is how well your communication fits with the implicit or explicit question it is meant to answer: the better – the more relevant.

There are further lessons to draw: first, the fact that there are many options. Humans are creative, we have got a thousand ways to react to situations. Second, that we happily break the hypothetical rules of communication (that is why it is not easy to teach a chatbot how to speak): it may be that the best reply to a question is another question. Third and final, that the verbal component of the communication is not the only player. The hidden part is also there (like the hidden part of an iceberg) and you have to be aware of it in order to be relevant. It is so important that sometimes the verbal part is just an excuse for hinting at what really matters and is not spoken aloud.