Diagnosis biases

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Diagnosis (from the Greek *dia-gnôsis* = through knowledge) is the identification of the nature of a situation, of a problem, through the interpretation of symptoms.

The diagnosis is sometimes confused with the prognosis, which is the hypothesis made about the way the situation is likely to evolve. The diagnosis therefore relates to the present and the prognosis to the future. In amenity arboriculture, assessment work is generally made up of these two pivotal threads: identification of the problem and then forecasting its evolution. Prognosis as well as diagnosis. This double challenge leads to the major difficulty of predicting the future. The room for error in this exercise is obviously large – huge! However, an assessor has to make their recommendations after taking into account, or not, this margin of error and struggling, or not, to get closer to the truth. But are we really capable of perceiving the truth about the present before we try to read the future?

Cognitive processes

The human brain is not a tool for reading reality; it is a tool for assessing reality. No one knows what is real and the understanding we have of it is only an approximation. Thus, our reality is shaped by a set of rules that are specific to us, called paradigms.[1] We are all capable of ignoring the fact that our own paradigms are just that, particular to each one of us, and instead we take them for reality. There is therefore not one truth, but as many truths as there are people. These cognitive mechanisms generally function very well and allow each of us to live in the relative psychological comfort required for the construction of an individual, cultural and social identity. Our brain is therefore constantly adapting to maintain this balance and limit cognitive dissonance, i.e. the gap between our paradigms and our observations, observations that may sometimes be in conflict with our rules. To limit this dissonance (and preserve our psychological and social well-being), our brain is capable of tricking us. It makes sure that we can get on with our lives without changing the rules every morning. We humans, to ensure our balance and mental security, are therefore naturally change-resistant.

Constructing beliefs, limiting knowledge

One way of limiting dissonance is to filter information so that only that which is in our favour is considered. Thus, we have a slight tendency not to behave like detectives (able to deduce and reason objectively according to the elements at our disposal), but more like lawyers, choosing only certain elements that correspond to our paradigms because we have already made up our minds about the conclusions.

Another way to limit dissonance is to have a change of mind. Whether we can do this is very much dependent on our own mental flexibility and whether we are attached to an opinion or to a particular method of reasoning. In the case of attachment to a method of reasoning, a change of mind may occur quite easily as a result of a sufficiently strong argument, an accumulation of arguments, or a new focus on previously hidden evidence. On the other hand, when one is attached, sometimes viscerally, to an opinion, it is very difficult to change one's mind, and the more entrenched the opinion, the more powerful the resistance and the biases will be. This bias is called 'motivated reasoning' in cognitive science. The French philosopher and epistemologist Gaston Bachelard said that the scientific process was, above all, a struggle against oneself. Thus, thinking (an elegant way of saying 'changing one's mind') makes it possible to rebalance dissonances, but it also imposes a certain mental flexibility, sometimes even to the point of a paradigm shift.

Paradigm shift

In medicine, a historical example of a paradigm shift began in the 18th century, when diseases were thought to be caused by a disorder of the 'humours'. Claude Pouteau, a French surgeon born in 1724, understood that in hospitals, infection was transmitted not only by air or changes in humours but also by direct contact with the surgeon's hands, bandages and instruments. It was established practice at the time that the surgeon should have a dirty apron and dirty hands, showing his commitment to his work. Throughout his life, Pouteau never ceased to wonder whether hospitals were more pernicious than useful to humanity, thus fundamentally questioning the medicine of the time. He set up a series of preventive measures in his hospital: do not reuse bandages; do not perform multiple surgeries in a row; and wash hands. Although these measures seem obvious today, and despite the convincing results at the time, his practices disappeared with him.

In 1824, one century later, Ignatius Semmelweis introduced his hygienic hand-washing theory, supported by spectacular figures showing an abnormal death rate in

Illustration by Benoit de Reviers (2022)

** Translated from French by Olivier Dambezat.*

1. We use the word paradigm here as defined by Kuhn (1962), who describes paradigms as a general conceptual framework reflecting a set of beliefs and values recognised by a community and accepted as common to all individuals in the group. The paradigm is therefore a vision, a logic for interpreting the world and the observations that can be made in nature. It is also a way of being in a community which shares its history, its definition of knowledge and its ethical principles.

a maternity hospital where young medical students were delivering babies and also practising cadaver dissection. Despite this numerical evidence, Semmelweis was unable to convince the medical community, and for reasons of their convenience he was persecuted and interned in a psychiatric ward by his colleagues, where he died in terrible conditions.[2] It was only a few years later that Louis Pasteur succeeded in changing practices.

Why all these difficulties, all this wasted time and probably all these deaths? To answer this, we need to empathise with the fact that for the surgeons of that time, these were marginal and controversial theories, challenging the foundations of their work, their training and their beliefs. Even worse, these theories made them responsible for the deaths of many of their patients. This is obviously a gaping cognitive dissonance and a very good reason to behave 'like a lawyer', seeking to defend and justify one's position rather than to reason.

Returning to arboriculture, when new concepts are developed (models, methods, risk management, terminology, etc.), resistance to change is expected and usually raises reactions and questions that are comparable to those raised against the hygienic theory: 'Are you suggesting that we could have cut down trees for the wrong reasons?'

Countless biases

It is possible to understand not only the reasons why we act or decide, but also why others do. Edgar Morin, a philosopher, sociologist and theorist of complex thought, believes that this means integrating complexity and understanding other people's paradigms. Failing to integrate this complexity and the various paradigmatic approaches can be a cognitive bias that will influence the diagnosis. Depending on whether we come, for example, from a forestry, landscape or ecology background, our approaches and reasoning will be framed by different rules and will make us act in ways that are sometimes incomprehensible to those who do not have the same rules. Other biases can, of course, distort diagnoses. The table below lists a number of biases that can lead to misdiagnosis. It is obviously not exhaustive.

Some biases that can lead to diagnosis errors in amenity arboriculture

Anchoring	Tendency to remain focused on a non-analytical first hypothesis without integrating the analytical process, or integrating it only partially
Confirmation	Tendency to seek only elements that confirm a hypothesis not disprove it (usually a survey focused on identifying defects, not adaptations)
Immediacy	Tendency to seek an immediate response, encouraging decisions to be made despite a misreading of the dynamics and on the basis of a single observation
Result	Tendency to prioritise a diagnosis validating the need for intervention in order to justify one's service
Confidence in equipment	Tendency to rely on a measuring device on its own in the decision-making process, without weighting
Scientific	Tendency to prioritise measurement-based diagnoses to validate a certain idea of the scientific approach and rigour of the evaluator
Pressure	Tendency to be influenced by the manager's objectives at the expense of the expected impartiality of a diagnosis
Influence	Tendency to be influenced by a previous diagnosis
Paradigm	Tendency to be influenced by one's background culture
Pessimism	Tendency to underestimate the resilience and bio-mechanical response capabilities of trees
Defensive practice	Tendency to protect oneself to avoid possible legal action
Excessive generalisation	Tendency to treat information dogmatically by over-generalising

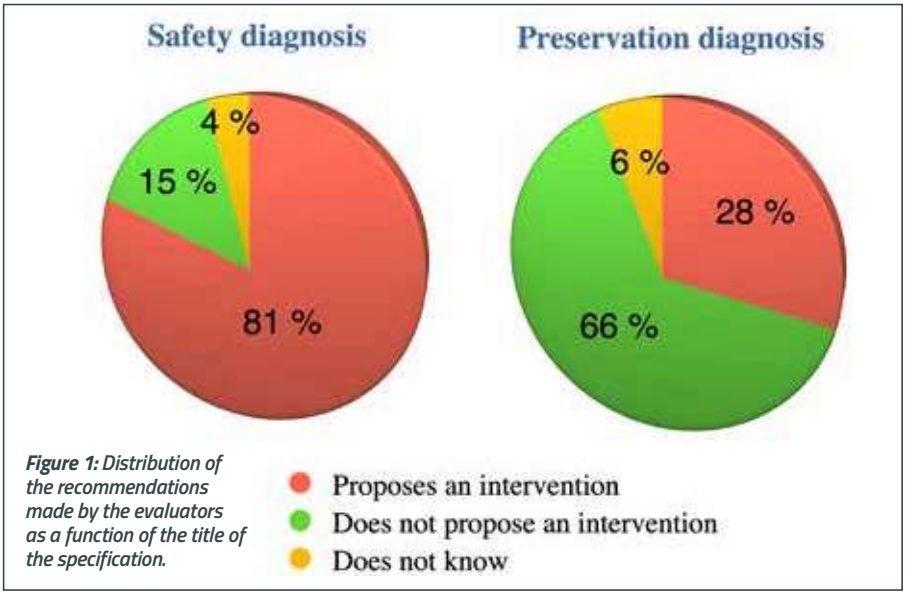

***Figure 1:** Distribution of the recommendations made by the evaluators as a function of the title of the specification.*

Anchoring bias, pressure bias

Anchoring and pressure biases can be quite powerful influencing factors. When we specify survey or inspection work in amenity arboriculture, whether as an operator, manager or consultant, the title of the specification seems to influence the diagnosis and the results, in terms of whether intervention is recommended. For example, it seems logical to focus on risk when a specification is entitled 'Safety Diagnosis'. However, in urban contexts, where security is necessarily integrated into assessments, the methods used and the approach taken should not vary particularly depending on the name given to the specification. If the evaluation processes are identical, the results should be the same regardless of the title. However, the influence of the title of the specification seems to direct the results by focusing the surveyor/inspector on what they think is expected.

To check the possible impact of these biases, with the help of fellow trainers we conducted an experiment in the winter of 2021/22 in three training centres with students in arboriculture. Unaware that they were part of an experiment, they were divided into two groups looking at test trees, with identical tasks and methods, but with specification titles that were oriented intentionally: one group with a 'safety diagnosis' specification and a second one with 'preservation diagnosis'. The pie charts in Figure 1 show the results.

In this experiment, it appears that when the title of the specification mentions safety, 81% of the evaluators propose relatively important interventions (bracing, pruning, felling, etc.) as opposed to 15% who do not intervene, or intervene only a little (taking out some dead wood, moving the targets, etc.). The ratios are reversed when the title influences towards passive management, with 66% of evaluators choosing to intervene little or not at all compared to only 28% proposing intervention. Anchoring and pressure biases thus seem to corrupt diagnoses to very significant degrees. It should be noted that this experiment was carried out on a small sample and on a group of people in the process of training who were not experienced and therefore certainly very sensitive to influences. But it should also be noted that relatively similar experiments were conducted by Norris in 2007 that showed equally significant results, even in experienced and methodical audiences.

2. Semmelweis' hygienic theory is often used as an example of a situation where scientific progress has been held back by the inertia of established professionals.

Doubting oneself

Identifying and understanding cognitive biases does not allow us to escape them, but at best to doubt ourselves. Doubts about oneself and one's abilities encourage reflective professional practice, leading arborists to continually improve our approach, methods and skills, being aware of the biases and margins of error that affect our practice.

Although uncertainty tends to make the processing of information less dogmatic, the downside of this uncertainty-based approach is that we may no longer dare to take a position, or we may even start doubting everything: 'Doubting everything, or believing everything, are two equally convenient solutions, both of which exempt us from thinking' (Henri Poincaré).

In order to limit biases, what solutions for improvement are available to evaluators?

- Reflexivity, i.e. analysing one's own work.
- Using methods that reduce subjectivity and influence biases.
- Being aware of one's own paradigms and seeking to understand those of others.
- Moving professionally towards evidence-based practices.
- Doubting oneself and believing in collective intelligence.

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