

Applying Critical Thinking to Daily Clinical Decisions in Avian Practice

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Critical thinking broadly refers to the ability to think clearly and rationally. It includes the ability to engage in reflective and independent thinking. A person with critical thinking skills is able to 1) understand the logical connections between ideas, 2) identify, construct and evaluate arguments, 3) detect inconsistencies and common mistakes in reasoning, 4) solve problems systematically, 5) identify the relevance and importance of ideas, and 6) reflect on the justification of one's own beliefs and values. These clear and rational thinking skills are applied to “carefully and deliberately to determine whether we should accept, reject, or suspend judgment about a claim and the degree of confidence with which we accept or reject it”. In essence, critical thought processes involve the skilled application of interpretation and evaluation of information (evidence). Critical thinking is not however a matter of accumulating information. A person with a good memory and who knows a lot of facts is not necessarily good at critical thinking. A critical thinker is able to deduce consequences from what he knows, and he knows how to make use of information to solve problems, and to seek relevant sources of information to inform himself. Critical thinking should not be confused with being argumentative or being critical of other people. Although critical thinking skills can be used in exposing fallacies and bad reasoning, critical thinking can also play an important role in cooperative reasoning and constructive tasks. Critical thinking skills help us acquire knowledge, improve our theories, and strengthen arguments. Critical thinkers do not believe easily, when they take a position, they do it provisionally, and they defer to no sacred cows. In its application in avian medicine, critical thought processes can help us to avoid snap judgements, embrace uncertainty, communicate effectively, and deploy other skills that can profoundly impact the quality of the healthcare that we provide.

Understanding Meaning

In order to answer a question or evaluate a claim, we have to know what the question or the claim means. In order to communicate precisely and to avoid misunderstanding, we need to watch out for vagueness or ambiguity. There are many situations where it is particularly important to be able to think clearly and to understand meaning. In dealing with many abstract issues, the first task is often to clarify the relevant key terms or concepts. For example, when your client states that her parrot “hates her”, we first have to try to understand what exactly is meant by “hate”. The development of science involves the introduction of new scientific theories and concepts. We need to give these concepts adequate definitions in order to know how they can be used in scientific explanations and predictions. Society requires rules and regulations for the coordination of behavior. A good set of rules should be formulated clearly to avoid and resolve disputes, and so that people know what is expected of them. Good communication skills involve being able to convey messages with the right meaning, and being able to understand the meaning of what has been said, or what has been left unsaid.

The literal meaning of a statement should be distinguished from its conversational implicature - the information that is implicitly conveyed in a particular conversational context, distinct from the literal meaning of the statement. When we want to find out whether a statement is true, it is its literal meaning that we should consider, and not what it implies conversationally.

Lack of clarity in meaning can hinder good reasoning and obstruct effective communication. One way to make meaning clearer is to use definitions. A definition is made up of two parts - a definiendum and a definien. The definiendum is the term that is to be defined, whereas the definien is the group of words or concepts used in the definition that is supposed to have the same meaning as the definiendum. A reportive definition is sometimes also known as a lexical definition, and it reports the existing meaning of a term. This definition should capture the correct usage of the term that is defined. A stipulative definition is not used to explain the existing meaning of a term. It is used to assign a new meaning to a term, whether or not the term has already got a meaning. A precisising definition might be regarded as a combination of reportive and stipulative definition. The aim of a precisising definition is to make the meaning of a term more precise for some purpose. The use of precisising definitions helps avoid or resolve disputes that involve some key concepts whose meanings might not be clear enough otherwise. A persuasive definition is any definition that attaches an emotive, positive or derogatory meaning to a term where it has none.

Obscurity: Problems with our word choices and their use

"Obscurity" refers to unclear meaning. A concept or a linguistic expression can be unclear for various reasons. One reason is that it might be ambiguous, i.e. having more than one meaning. The other reason is that it might be vague. A term is said to be vague if there are borderline cases where it is indeterminate as to whether it applies or not. Finally, a term might also have an unclear meaning in that its meaning is incomplete.

Ambiguity

There are three different kinds of ambiguity: Lexical, Referential and Syntactic. Lexical ambiguity is a single word or term having more than one meaning in the language. As an example, "The bird tested positive for psittacosis" is ambiguous because what one colleague would envision that "positive" means is very likely different from the next. Referential ambiguity leaves it unclear which thing or group is being referred to. An example could have been the legislative argument that "Bird retailers can only sell weaned birds". What about precocial species that are not hand fed? What about the sale of un-weaned birds to experienced handfeeders? What types of retailers are we referring to? Syntactic ambiguity refers to having more than one meaning because there is more than one way to interpret the grammatical structure. What an "exotic" patient for one colleague is may be very distinctly different from what the next refers to in this sentence: "I had to do a procedure on a very exotic animal at work, today" When dealing with ambiguous language the thing to do is of course to clarify the meaning of the expression, for example by listing out all the different possible interpretations. The process of removing ambiguity is called "disambiguation".

Vagueness

A term is vague if it has an imprecise boundary. This means that there are cases where it is indeterminate whether the term applies or not. Vagueness should be avoided when we want to speak precisely, as vagueness decreases the informational content of a claim. There is a distinction between vagueness and ambiguity. A word can be vague even though it is not ambiguous, and an ambiguous term having more than one meaning would not be said to be vague if the different meanings it has are very precise. Vague terms can make a claim vague and impossible to confirm or disprove. Consider this example: "I think that this parrot is not sick".

Incomplete meaning

A term has an incomplete meaning if the property or relation it expresses depends on some further parameter to be specified by the context, either explicitly or implicitly. This includes terms such as "useful", "important", "similar" and "better". Saying that something is useful or important is empty unless it is made clear in what way it is so. This is also necessary if we want to evaluate whether what is said is true or not. As an example, the statement "A gram stain is an important and useful test as a portion of a routine laboratory evaluation of a bird" has incomplete meaning. A gram stain of what, specifically? Is this true for all birds? What data does a gram stain provide? How does this information prove to be important and useful?

Distortion

Distortion is a matter of using words in such a way that deviates from its standard meaning in an inappropriate manner. Many expressions in the language are not purely descriptive but carry positive or negative connotations. When using such terms, it is important to check whether the connotations are appropriate. As an example: "So, are you saying that you are willing to allow your patients to be at risk of this horrible disease, since you do not recommend the use of a polyomavirus vaccine?" In scientific contexts, one should of course try to describe and explain phenomena using factual language that is value-neutral as far as possible.

Empty content

An empty statement is any statement that is purported to provide information, but in reality it provides no information at all in the relevant conversational context. If we want to communicate information clearly and precisely, then of course we should avoid empty statements. On the other hand, there might be occasions where we want to be evasive and non-committal. In such situations, empty statements might be very useful. Example: Question: "What did you see when you examined the bird?" Answer: "It was a really busy day".

Analyzing Arguments

An important part of critical thinking is being able to give reasons, whether it is to support or to criticize a certain idea. To be able to do that, one should know how to identify, analyze, and evaluate arguments. An argument is a list of statements, one of which is the conclusion and the others are the premises or assumptions of the argument. To give an argument is to provide a set of premises as reasons for accepting the conclusion. This argument is not necessarily to attack or criticize someone. Arguments can also be used to support other people's viewpoints. Dogmatic people tend to make assertions without giving reasons. When they are criticized they often fail to give arguments to defend their own opinions. To become a good critical thinker, you should develop the habit of giving good arguments to support your claims. Giving good arguments is one of the most important ways to convince other people that certain claims should be accepted.

Identifying arguments

An argument may be identified by the presence of certain premise or conclusion indicators. For example, if a person makes a statement, and then adds "this is because ...", then it is quite likely that the first statement is presented as a conclusion, supported by the statements that come afterwards. Other words that might be used to indicate the premises to follow include: "since"; "firstly, secondly", "for, as, after all"; "assuming that, in view of the fact that"; "follows from, as shown / indicated by"; "may be inferred / deduced / derived from". Conclusions, on the other hand, are often preceded by words like: "therefore, so, it follows that"; "hence, consequently"; "suggests / proves / demonstrates that"; "entails, implies". In an argument presented in standard format, the premises and the conclusion are clearly identified. A conclusion however does not always need to come at the end of an argument, and a set of premises do not have to precede a conclusion.

Showing that an argument is valid

An argument is valid if and only if there is no logically possible situation where all the premises are true and the conclusion is false at the same time. The validity of an argument is not about the actual truth or falsity of the premises or the conclusion. Validity is about the logical connection between the premises and the conclusion. A valid argument is one where the truth of the premises guarantees the truth of the conclusion, but validity does not guarantee that the premises are in fact true. All that validity tells us is that if the premises are true; the conclusion must also be true. As an example, consider the following argument: "All these birds have tested positive for bornavirus. All birds with bornavirus infection have PDD. So, all these birds have PDD" Although at least one of the two premises of this argument is false, this is actually a valid argument. To evaluate its validity, ask yourself whether it is possible to come up with a situation where all the premises are true and the conclusion is false. This example tells us something very important: The validity and truth of an argument are two very distinct things.

Showing that an argument is invalid

Consider this argument that is used to help justify the empirical treatment of a group of birds for a contagious disease: "This macaw is ill with a contagious disease. Other birds have been in contact with this one that is ill. Therefore, this ill macaw has given the other birds its contagious disease." This argument is not valid, because it is possible that the premises could be true but the conclusion could be false. What if the other bird is not susceptible to that disease? What if there was no exposure? Does exposure necessitate infection and disease? The mere possibility of a situation where the conclusion may be false even if all premises are true is enough to show that the argument is not valid. These situations are called invalidating counterexamples to the argument. An argument can be invalid even if the conclusion and the premises are all actually true. It is also possible for a valid argument to have a true conclusion even when all its premises are false. As an example: consider this argument: "All birds with breathing problems are ill. All birds that are ill with breathing problems have Aspergillosis. Therefore, this bird with breathing problems has Aspergillosis". Not all birds that have breathing problems necessarily are ill, and not all birds with respiratory problems have Aspergillosis, but it may be true that this individual bird in question does have the disease. In summary, it is important to remember that: 1) The premises and the conclusion of an invalid argument can all be true. 2) A valid argument should not be defined as an argument with true premises and a true conclusion. 3) The premises and the conclusion of a valid argument can all be false. 4) A valid argument with false premises can still have a true conclusion. The concept of validity provides a more precise explanation of the logical flow for a conclusion to follow from the premises. In ordinary usage, "valid" is often used interchangeably with "true" (similarly with "false" and "not valid"). In reality, the term validity is restricted to only arguments and not statements, and truth is a property of statements but not arguments. We should avoid saying "this statement is valid" or "that argument is true". An example of an invalid argument: "This bird is infected with avian bornavirus. So, it has PDD". This is invalid, because there is not a logical guarantee that bornavirus infection always results in the development of Proventricular Dilation Disease (PDD).

Soundness of an argument

A sound argument is a valid one that has true premises and therefore its conclusion must also be true. An argument that is not sound is an unsound argument. If an argument is unsound, it might be that it is invalid, or maybe it has at least one false premise, or both. If you have determined that an argument is indeed sound, you can certainly accept the conclusion. In a valid argument, if the premises are true, then the conclusion cannot be false, since by definition it is impossible for a valid argument to have true premises and a false conclusion in the same situation. So given that a sound argument is valid and has true premises, its conclusion must also be true. So if you have determined that an argument is indeed sound, you can certainly accept the conclusion.

Inductive and deductive reasoning

Using inductive reasoning, if you believe that the premise is true, you probably will accept the conclusion as well. In other words, the conclusion is highly likely to be true given that the premise is true. Consider this example: Crackers is a pet adult Hyacinth macaw. Clinical beak and feather disease has not been described in the Hyacinth macaw. Therefore, Crackers will not develop beak and feather disease. Here, it is logically possible for Crackers to develop clinical beak and feather disease, therefore this argument is not valid. What if Crackers is to be the first clinical case to be identified and reported? What if there is such a large amount of viral exposure that Crackers is overwhelmed by the virus and develops disease? What if other cases have been seen, but not reported? But, using inductive reasoning, this is an inductively strong argument: The conclusion is highly likely to be true, given that the premises are true. With an inductively strong argument, although the premises do not logically lead to the conclusion (lack validity), they provide strong inductive support of it. There are at least three main differences between an inductively strong argument and a valid argument: 1) In a valid argument, the conclusion follows logically (deductively) from the premises, but this is not the case in an inductively strong argument. 2) Deductive validity is not a matter of degree. An argument is either deductively valid, or it is not. Inductively strong arguments are a matter of degree, depending on the probability of the conclusion being true given the premises. 3) Inductive strength is defeasible, whereas validity is not. If you have a valid argument, adding new premises will not make it invalid.

However, new information can be added to an inductively strong argument to make it weaker, or to an inductively weak argument to make it stronger.

What is a good argument?

For the purpose of providing a precise definition of what a good argument is, these criteria must apply: 1) A good argument must have true premises. Unless the premises of an argument are all true, we could have no reason to accept its conclusion. 2) A good argument must be either valid or strong. A good argument does not have to be valid, but if it is not, it must be inductively strong. 3) The premises of a good argument must not beg the question. When the question is begged, the conclusion also appears as a premise. As an example of this type of a circular argument, consider this: "Birds with Aspergillosis test positive", Therefore, birds with Aspergillosis will test positive" This is not a good argument, because it does not provide independent reasons for supporting the conclusion. 4) The premises of a good argument must be plausible and relevant to the conclusion. If the reasons for believing that the premises are true are not good, or the premises are not clearly related to the conclusion, the argument cannot be good. As an example, consider this argument: "Avian polyomavirus vaccine in the studied species has been shown to be immunogenic and safe. Therefore, avian polyomavirus vaccination is protective". This is not a plausible argument as-stated, because immunogenicity and safety have not been clearly linked with protectivity. Following are some examples of common mistakes in making good arguments: "The conclusion of this argument is true, so some or all the premises are true". "One or more premises of this argument are false, so the conclusion is false". "Since the conclusion of the argument is false, all its premises are false". "The conclusion of this argument does not follow from the premises. So it must be false".

Conclusions

It is hoped that through the practiced application of these methods of critical thought processes can help to improve the daily execution of the delivery of avian healthcare in practice. By working to understand, develop and apply these thought processes and skills, greater and more rewarding advancements in our science, skills clinical acumen and personal satisfaction should be expected.

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