

# Clinical Reasoning. Gut Feeling vs. Scratching Your Head

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In the realm of small animal veterinary medicine, experience is our most valuable asset. Yet, amidst the hustle of daily practice, it's easy to overlook the mechanics of how we think and reason through cases. Why should seasoned veterinarians bother delving into the nuances of clinical reasoning? The answer lies in the potential to elevate our diagnostic skills and, crucially, in our ability to mentor and guide younger colleagues.

Understanding the intricacies of clinical reasoning isn't just about refining our own abilities; it's about unlocking untapped potential. By peering into the underlying processes of intuition and analysis, we can better navigate the complexities of our field, making clearer and more precise decisions.

Clinical reasoning in small animal veterinary medicine refers to the cognitive processes used by veterinarians to gather and interpret clinical information, formulate differential diagnoses, and make decisions regarding patient care. It involves integrating knowledge of animal physiology, pathology, pharmacology, and clinical experience to arrive at the most likely diagnosis and appropriate treatment plan for each patient.

## **Types of Clinical Reasoning**

*Type 1 Reasoning* also known as intuitive or heuristic reasoning, involves rapid, unconscious processing of information based on past experiences and acquired expertise. It operates automatically and effortlessly, often leading to quick decisions without conscious awareness of the underlying thought processes. Type 1 reasoning is associated with a relatively low cognitive load since it relies on automatic processes and stored knowledge. Veterinarians draw on their extensive training and clinical experience to recognize familiar patterns and make rapid judgments without the need for conscious deliberation.

Heuristics are mental shortcuts or rules of thumb that simplify decision-making by allowing individuals to quickly assess situations and generate solutions based on limited information. Type 1 reasoning relies heavily on heuristics, such as recognition-primed decision-making, where veterinarians intuitively match current clinical presentations to similar cases encountered in the past.

While Type 1 reasoning is intuitive and heuristic-driven, it still involves some degree of analytical reasoning. Veterinarians may unconsciously analyze subtle cues and clinical patterns, drawing on their knowledge of anatomy, physiology, and disease processes to make rapid assessments and decisions. To build pattern recognition which leads to type 1 processing, this skills require seeing many, many patients and many, many presentations

of different disorders. Type 1 reasoning is typically faster but may be prone to errors due to reliance on heuristics and limited cognitive processing. Veterinarians often rely on intuition to recognize subtle clinical signs, anticipate complications, and make quick decisions in emergency situations. Intuitive reasoning is particularly valuable when faced with time constraints or incomplete information. Human emergency physicians generated 25% of hypotheses before meeting the patient and 75% of hypotheses in the first five minutes of the clinical encounter. On the other hand, novice veterinarian often have to use type 2 clinical reasoning for the first few years of their practices.

*Type 2 Reasoning*, also known as analytical or deliberate reasoning, involves systematic, conscious processing of information to arrive at decisions through logical deduction or induction. It requires effortful cognitive engagement and deliberate evaluation of evidence, often leading to slower but more accurate judgments. It is associated with a higher cognitive load compared to Type 1 reasoning. It requires active attention, working memory, and mental effort to gather, analyze, and interpret clinical data, formulate hypotheses, and weigh the evidence in support of different diagnostic and treatment options. While Type 2 reasoning may involve the use of heuristics to some extent, it relies less on automatic processes and more on deliberate analysis and decision-making strategies. Veterinarians may employ analytical heuristics, such as systematic decision trees or Bayesian inference, to structure their reasoning process and reduce cognitive load. Type 2 reasoning is characterized by systematic, analytical reasoning processes. Veterinarians carefully evaluate the reliability and validity of clinical information, consider alternative hypotheses, and weigh the strength of evidence in support of different diagnostic and treatment options. Analytical reasoning allows for logical deduction from general principles and induction from specific observations, leading to more comprehensive and evidence-based decision-making. This type of analytical reasoning is used by new graduate for the first few years of practice as well as experienced veterinarian when faced with complex clinical patients. Type 2 reasoning is slower but tends to result in more accurate judgments and decisions, particularly in complex or novel cases where careful analysis is required.

### **Thought Process that Goes into Clinical Reasoning**

*Data Collection:* The clinical reasoning process begins with gathering relevant information through a combination of history-taking, physical examination, diagnostic testing, and observation of patient behavior. Veterinarians systematically assess the patient's signalment, presenting complaints, medical history, medication history, vaccination status, diet, environmental factors, and any recent changes in behavior or activity level.

*Patient representation:* Once sufficient data has been collected, veterinarians creates a patient representation which summarizes the patient's main issues in 2 sentences or less. This can also be done by generating a problem list which groups abnormalities (identified during the history taking or the physical examination) into a hierarchized problem list.

*Hierarchized differential diagnosis:* The veterinarian then uses his knowledge to compare and contrast the patients's specific findings to illness scripts. Illness scripts are organized mental summary of a provider's knowledge of a disease. Components of a thorough illness script for the various diseases within the problem fall into epidemiology (who commonly develops the disease), time course (acute, peracute, chronic), salient clinical signs and specific diagnostic findings. Comparison of the patients' specific finding and illness scripts help veterinarians generate a list of differential diagnoses, ranked in order of likelihood.

*Diagnostic recommendations:* Based on the generated differential diagnoses, specific diagnostic tests will be recommended. The veterinarian integrates the specificity and sensitivity, as well a positive predicting value, negative predicting value, and cost of each test in helping identify the most likely differential diagnosis to help prioritize which tests should be run in priority.

*Interpretation of Results:* Once the diagnostic test results are available, veterinarians interpret the findings in the context of the patient's clinical presentation and differential diagnosis list. This involves assessing the significance of abnormal findings and refining the differential diagnosis based on the results available.

*Treatment Planning:* Based on the diagnostic tests, a presumptive diagnosis is often made and veterinarians develop a treatment plan tailored to the individual patient's needs. This may involve often a combination of medications, dietary modifications, environmental management strategies, and/ or surgical procedures. Veterinarians also provide pet owners with information about prognosis, potential complications, and follow-up care.

*Monitoring and Adjustment:* Throughout the course of treatment, veterinarians monitor the patient's response to therapy, adjusting the treatment plan as needed based on changes in clinical signs, diagnostic test results, and client feedback. This requires metacognition: the process of thinking about one's own thinking. By actively reflecting on our decision-making processes, veterinarians can identify potential biases and errors. By fostering metacognitive awareness and challenging our own assumptions, we can enhance the quality of care we provide to our patients and minimize the risk of diagnostic errors.

In conclusion, clinical reasoning is a complex cognitive process that plays a central role in small animal veterinary medicine. By systematically gathering and interpreting clinical data, formulating differential diagnoses, and developing individualized treatment plans, veterinarians are able to provide high-quality care to their patients and improve outcomes for both animals and their owners.