

## **APPLICATION OF DIFFERENTIAL DIAGNOSIS IN INSPIRATION ECONOMY LABS – A LITERATURE REVIEW**

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***Abstract:** In an unstable economy and in societies that are full of turbulent challenges, we need to solve problems and create opportunities in a disruptive way. Differential diagnosis as a technique was first used in medicine; it was found to play a great role in helping investigators to distinguish between particular cases, or to differentiate one condition from another with similar features.*

*This paper reviews best practice in differential diagnosis. It first illustrates how it is applied in medicine and then sheds light on its analogical applications in diagnosing problems and challenges in socio-economics. From this, opportunities can be found that can create an inspiration-based economy.*

*The paper concludes with recommendations on the utilisation and operationalisation of Differential Diagnosis (DD) in Inspiration Economy Labs as a means of pinpointing the blind spots in any chronic problems.*

### **INTRODUCTION**

Inspiration has captured and continues to capture the interest of many cultures and organisations yet it has only recently been clarified as to its source in the work of Thrash and Elliott (2004, 2003). As psychologists, they and others began to see clearly that inspiration is a state that can be ignited by overcoming challenges and solving problems.

The world is searching today for more positive solutions that come from hidden opportunities. Therefore, concepts that help in exploring or unleashing opportunities are more and more in demand in real life. Differential Diagnosis is one of the concepts that has been studied and reviewed to see its potential ability to help in this drive to discover better solutions (Richardson *et al.*, 2005). In searching for an “inspiration opportunity”, the technique of observation was discussed by Buheji and Thomas (2016) in the handbook of Inspiration Economy as being the best methodology for unleashing

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hidden opportunities. With focused observations, specific experiments can be identified to answer hidden questions. In learning from the mystery stories of Sherlock Holmes, Hintikka (1983) shows how the observation of facts resulted in Holmes concluding, in the case of a theft, for example, that the watchdog did not bark as the horse was being stolen. Based on this important observation, as Hintikka mentions, Holmes commenced an abductive process that led him to ask who had trained the watchdog. And since the stablemaster was found to be the owner of the horse, then he would be in the area under scrutiny.

The techniques that Sherlock Holmes used are more often evidenced today in science through the differential diagnosis used by the medical community. Since there are few or no literature reviews that have covered the application of differential diagnosis in areas other than the diagnosis of patients in order to narrow down the problem with regard to treatment, the following literature review is considered to close a major gap in the literature for both researchers and practitioners, especially for those who are considering creating change with minimal resources.

## LITERATURE REVIEW

### Introduction to Differential Diagnosis

Differential diagnosis is a technique first used in medicine to distinguish between one particular disease or condition and others that presented similar clinical features (Richardson et al., 2002). With differential diagnosis techniques, physicians are trained during their medical studies to identify systematically the potential presence of a disease where multiple alternatives are possible. Thus, as professional medical problem-solvers they are expected to use a process of elimination that shrinks the "probabilities" of candidate conditions to negligible levels. To do this, they use evidence such as symptoms, patient history, and their medical knowledge. Thus, as professionals in terms of differential diagnosis, such physicians are trained to meet challenges and to come up with more definitive diagnostic checks. In fact, through differential diagnosis, physicians become better forecasters of possibilities and probabilities; they also gather more focused evidence in order to eliminate the unlikely.

### Mechanics of Differential Diagnosis

Differential diagnosis is based mainly on four steps: evaluation, calculating the risk factors, setting proper diagnostic criteria, and then being open-minded in terms of other conditions that might be considered (Richardson *et al.*, 2002). Differential diagnosis depends on the depth and the quality of the assessment of the symptoms that are being considered. For example, the physician is expected to check the severity of breathlessness, a cough, sputum production, wheezing, chest tightness, weight loss or anorexia; or changes in a patient's alertness or mental state, fatigue, confusion, anxiety, dizziness, pallor or cyanosis. Hence, DD opens up many possibilities for diagnosis that would help to relate, interpolate or even associate a range of different symptoms.

Also, another observation that DD is known to focus on is the medical history of the patient. For example, patients would be checked for their allergies, sinus problems and diseases. Thus, DD in medicine has given rise to successful case studies in reducing risk factors and minimising the exposure of patients in the process of diagnosis or in any subsequent interventions.

In order to understand how DD works, let us see how the profound knowledge of a physician would help him/her to decide whether or not to admit an emergency patient with chest pains. The physician would check and evaluate all the data prior to hospitalisation and would ask for evidence of vital signs, including checking the respiratory rate, its pattern and strength; and would take a pulse oximetry. Based on this, he/she would start to build an “association” with the situation in terms of the extremities and would inspect the chest to examine its palpation and the percussion of the lungs. Observations such as hearing wheezing, crackles and/or decreased breath sounds would be part of the holistic diagnosis. Here then, the final refinement of the decision would have to be linked to whether or not the problem was pulmonary (Richardson *et al.*, 2005).

If the decision was to consider a pulmonary prognosis, then the physician would focus on the potential probabilities of its being asthma, a bronchogenic carcinoma, bronchiectasis, tuberculosis, etc. If a non-pulmonary prognosis was arrived at, then the physician might suspect congestive heart failure, hyperventilation syndrome/panic attacks, vocal cord dysfunction, etc.

### **Application of Differential Diagnosis for non-medical problem solving**

The mechanics of DD can be analogically analysed. In problem solving and lean thinking, Dr Shrinivas Gondhalekar (called Dr G) from India, with whom I was fortunate to work, is one of the few people who has succeeded in applying differential diagnosis (DD) and even developing its utilisation outside medical discipline (Gondhalekar and Sheth, 2005). Dr G considered the technique to be unique since it enhances our brains’ ability to break the pattern of logical thinking and use “backward thinking” instead of the standard problem-solving technique of “forward thinking”. Dr G showed that, through using Differential Diagnosis, solutions could be transcended from being based on knowledge to being based on solid, profound knowledge.

### **Learning from Differentiation Diagnosis and its Application in Inspiration Labs**

Learning from DD methodology and how it is applied in medicine, shows that, if we want to apply it affectively and make it a more vital source of inspiration, we need to start by specifying humbly the scope of the targeted inspiration by first observing the physical content. Then, we need to start the “Differential Diagnosis” journey that leads us to discover more opportunities, forecasting and visualisation. This is shown in Figure (1): The role of Differential Diagnosis in Inspiration Labs.



Figure 1

Based on DD analysis, there would usually be two main mind map paths, just as in the issuediscussed previously regarding rolling out a prognosis in which the observations led to either a pulmonary or non-pulmonary related disease.

Such decisions involving elimination usually enhance our ability to create more focused observations for unrecognized needs. Continuing to use DD surely increases our curiosity to find hidden opportunities, making us more satisfied with the opportunitiesexplored. Differentiating between those who have and those who have not, would lead to more new and profound knowledge that would enhance our ability to forecast for the future.

Figure (2): How Differential Diagnosis increases our abilities



Figure 2

In an inspiration economy, we have also tried to develop the utilisation of differential diagnoses to further enhance the capacity of people to observe and therefore later improve the capacity of organisations to find opportunities without the need for extra resources.

### **The Discovery of Further Opportunities using Differential Diagnosis**

Hoekzema and Palmer (2005) showed that there are various methods of performing a differential diagnostic procedure. However, in general, such methods are based on the idea that we begin by considering the most common diagnosis first. Only after ruling out the simplest diagnosis should the clinician consider more complex or exotic diagnoses.

Richardson *et al.* (2002) showed that, in order to discover more opportunities using differential diagnosis, the following steps should be completed:

1. Gather all information about the sample targeted and then create a list of symptoms.
2. List all possible causes (candidate conditions) for the symptoms.
3. Prioritise the list by placing the most urgent and dangerous possible causes at the top of the list.
4. Rule out or treat possible causes, beginning with the most urgently dangerous condition and working down the list. Rule out, by practical means, using tests and other scientific methods, other possibilities to determine that a candidate condition has a negligible probability of being the cause.

Then, diagnoses should be removed from the list by observing and applying tests that produce different results, depending on which diagnosis is correct.

### **Application of the “Threshold Model” in Inspiration Labs**

The “Threshold Model” was developed by Stephen Pauker and Jerome Kassirer in the 1980s. The Threshold model provides a framework for self-controlled thinking about diagnosis. For example, the Threshold Model can help the differential diagnosis practitioner to rule out a diagnosis since he/she will know when to stop ordering a test, “rule out” a diagnosis, or even begin a treatment.

The Threshold model helps us to rely on our judgement as it helps each investigator to interpret tests and even act differently in different scenarios. The model is known to challenge evidence-based practice by moving from implicit to explicit decision-making.

The Threshold scale helps to close the gap that often faces an investigator during DD since it helps in making such decisions as when to start taking a sample, when to start making judgements about treatment, or when to explore further opportunities. Figure (3) shows the Threshold Model Scale.

Figure (3): The Threshold Model Scale

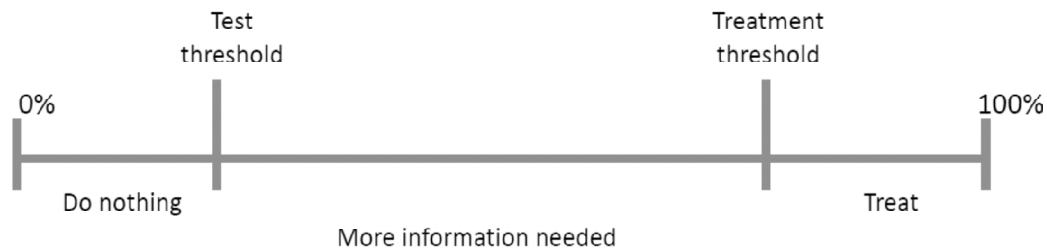


Figure 3

Hoekzema and Palmer (2005) give examples about how to optimise the use of the scale. For example, depending on the probability, known as the scale test, leads the treatment threshold being moved. So, if the physician finds a probability of more than 60% that the patient has flu, then the diagnosis would be followed directly by treatment. However, if the probability was less than 10%, flu would no longer be a concern. During the middle of the flu season, if the patient comes in with possible flu-like symptoms, the “pretest probability” is about 30%. Hoekzema and Palmer (2005) mention the pretest probability of 30% (i.e. this is typical in the flu season). These values are “post-test probabilities” and depend on three things: the pretest probability, and the sensitivity and specificity of the test.

### Differential Diagnosis and Pull Thinking

Dr G, in his book “Chronicles of a Quality Detective” mentions the importance of comparing the results between two samples. He focuses on how a comparative analysis mindset would be very useful in the DD journey. Through a DD pull-thinking mindset, Dr G emphasises that the power of ignorance supersedes the power of knowledge. Thus, we must manage to challenge the mindset humbly to see the opportunities in a problem from different angles.

### Differential Diagnosis as a Dynamic Process

Richardson *et al.* (2005) views differential diagnosis as a very dynamic process which is based on an intuitive style of thinking. DD is found to begin at the onset of the sample presentation, directing further questioning, examination and diagnostic testing.

Understanding the utilisation of DD in Inspiration Labs helps in creating a more unstructured approach that is continuously evolving towards finding and exploring opportunities.

### CONCLUSION

Differential Diagnosis (DD) as a technique has been found to help investigators to challenge established facts and renew available knowledge. In this literature review,

it has been shown that the scope of the problem under investigation (or, as we prefer to call it, the challenge) defines the total journey.

The implementation of DD outside of medical disciplines has been found to raise the curiosity of investigators and create a positive spirit for finding solutions or exploring more opportunities by making people feel more involved. This technique has been found to be highly useful in Inspiration Labs since it furthers our ability to find suitable observations and explore more new opportunities.

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