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## **4.6 ALTERNATIVE INTERPRETATIONS: CHAOS THEORY**

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There are many alternative interpretations of causation, out of which we shall be focussing on the chaos theory. All sciences accept and rest on the assumption that there is space, time continuum and there are causes at least in the macroscopic sphere and knowing the causes behind phenomena can help us understand the way the universe functions. Causation is very fundamental to all natural, life, and behavioural sciences. Chaos theory is the scientific and mathematical study of cases where like any other case or situation, deterministic causal laws apply, however, since the production effects are extremely sensitive to the causes, the causation almost becomes random and chaotic making determination of causes and their corresponding effects almost impossible. Chaos theory does not deny causal connections but because these connections are too subtle (assumed theoretically) that it appears that there is no causation happening between the things under observation.

One important aspect of this theory is the butterfly effect. It is described as a phenomenon where a slight change in the scenario or to say in other words, a minimal causal influence can bring about a large change in the result or the effects. The underlying principle is that the

magnitude of the causal force may not necessary be equal to the force of the effect or the outcome. The name of this theory has come from the metaphor that a butterfly flaps its wings at a location and as a result there is a tornado at a distant location. This effect is often noticed in meteorology, where it is a challenge to find what has led to a certain disturbance in the weather. The implication is that the intensity of a cause can be weak but it can lead to tremendous effects leading to a great difference between the two states, and likewise there can be a reverse butterfly effect where the intensity of the cause can be a lot and the effect is minimal, to the extent that the difference may even be hardly noticeable. This theory makes us understand that causation may be significant or completely insignificant as a natural phenomenon.

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## 4.7 LET US SUM UP

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The unit discusses various ideas and theories of causation from the ancient, medieval, modern and contemporary perspectives. The unit includes some of the most prominent and significant developments of the principle of causality. We learned that a certain cause is a principle of influence which brings about an effect or result. Likewise, an effect is a principle which is an outcome of a causal influence. In principle every effect has a cause and vice versa. Traditionally, causality has been classified by Aristotle in his metaphysics under four types—material, formal, efficient, and final cause. Later these four causes were grouped as intrinsic and extrinsic causes. A further development of the philosophical idea of causation was developed in the medieval times by Thomas Aquinas, who used the principle of causation as the basis of demonstrating the existence of God, through the Cosmological argument. Aquinas argued for the existence of the Self caused cause, which is the First Cause and made the law of Causation divine and Universal by equating it to theism (God). Another development of the idea of causation, as a strict geometric formulation, is presented by Spinoza, who held that there is nothing from which an effect does not follow. This necessity of every event or thing to be both cause and effect is the contribution of Spinoza, which he justified in a pure rational manner.

The unit then takes up the critique of causation by Hume who questioned not just the empirical and rational basis of the law of causation, but also denied its existence except as a mere figment of the mind, a misapprehension due to constant conjunction of events and getting habituated through that repetitive conjunction of those events. Hume reduces

causation to a mere repetition of sequences, and redefines the principle of cause and effect from being an absolute principle to merely a habit and custom.

Lastly, the chapter discusses an alternative interpretation of the causal law, given in the form of the chaos theory. Chaos theory brings apparently contrasting concepts of randomness and cause and effect determination together and explains the meaning of cause and effect from the point of view of their intensities, and suggests that unpredictability due to chaos and predictability due to cause effect is not mutually exclusive always. The chapter concludes with a special instance of the Butterfly effect.

### **Check Your Progress II**

**Note:** a) Use the space provided for your answer.

b) Check your answers with those provided at the end of the unit.

1. What is causation according to Chaos Theory?

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### **4.8 KEY WORDS**

**Law of Causation :** The law that ‘Every thing is a cause of something and is an effect of some cause’.

**Causa Sui :** Self-caused cause

**Constant Conjunction :** Repeated observation of events that are successive and contiguous in space and time.

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### **4.9 FURTHER READINGS AND REFERENCES**

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## **4.10 ANSWERS TO CHECK YOUR PROGRESS**

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### **Check Your Progress I**

1. A material cause is a cause which is responsible for the materiality of the thing under consideration. It is what that thing is made up of. For example, the material cause of a table is wood, the material cause of a rock is minerals, etc. A formal cause is the concept or idea behind the thing. A thing cannot come into effect without its idea or form. For example, the appearance and shape of a statue is the formal cause of the statue that is there.

2. There is nothing from which an effect does not follow, and every effect must have a cause. This is the Law of Causation. There is a necessity that everything is caused. Every thing is a cause of something and is an effect of some cause.

### **Check Your Progress II**

1. Chaos theory is the scientific study of cases where like any other case or situation, deterministic causal laws apply, however, since the production effects are extremely sensitive to the causes, the causation becomes almost random and chaotic, making determination of causes and their corresponding effects almost impossible. Chaos theory does not deny causal connections but because these connections are too subtle (assumed theoretically), it appears that there is no causation happening between the things under observation.