

CONCOMITANCE

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Primary Disciplinary Field(s): Philosophy, Statistics, Psychology

1. Core Definition

Concomitance refers fundamentally to the simultaneous or co-occurring existence of two or more entities, events, or variables. In its broadest sense, it simply describes a state of being parallel or happening together in time or space, without necessarily implying a direct causal link between the co-occurring phenomena. The observation of concomitance is a crucial starting point for many scientific inquiries, providing empirical evidence that necessitates further investigation into the nature of the relationship, which may range from pure chance to complex interdependence. This concept moves beyond mere association by emphasizing the simultaneity or consistent pairing of observations across different instances or subjects.

The specific definition provided in psychological and philosophical contexts often refines this meaning, focusing on the simultaneous occurrence of at least two **sensations** or symptoms that are believed to derive from a single, underlying fundamental reality or truth. For instance, if a subject simultaneously reports a specific visual distortion and a specific somatic feeling, and both are known symptoms of a particular neurological disorder, the two sensations exhibit concomitance. They are distinct manifestations (symptoms) but share a common origin (the disorder). This highlights the utility of concomitance as an indicator that disparate observations might be traces pointing toward a unifying, hidden mechanism or cause.

While often used interchangeably with terms like **correlation** or association in casual language, concomitance maintains a distinct academic flavor, especially when discussing philosophical questions regarding mind-body relations (e.g., Cartesian dualism) or when strictly defining variables that vary together in a controlled experimental setting. Statistical tools, such as the Analysis of Variance (ANOVA), are often employed to formally test the extent and significance of concomitance between different variables, confirming whether their joint variation is statistically reliable or merely random noise, as demonstrated by the ability to display concomitance on an **ANOVA graph**.

2. Etymology and Philosophical Roots

The term **concomitance** derives from the Latin *concomitari*, meaning "to accompany" or "to attend," combining *con-* (together) and *comitari* (to follow, often related to *comes*, a companion). This etymological root underscores the central idea of two things traveling or existing side-by-side. Philosophically, the concept gained significant traction during the Enlightenment, particularly in discussions related to metaphysics and epistemology, where thinkers sought to understand the

relationships between observed phenomena and underlying reality that generated simultaneous appearances.

One of the most profound historical applications of concomitance is found in the debate surrounding the **mind-body problem**. Philosophies of dualism, such as those articulated by René Descartes and further developed into psychophysical parallelism, often utilized the principle of concomitance. In **psychophysical parallelism**, mental events and physical events are conceptualized as two entirely distinct series that occur synchronously without causal interaction. The sensation of pain (mental event) and the physical trauma (bodily event) occur together, or concomitantly, not because the body causes the mind or vice versa, but because they are synchronized by a greater, often metaphysical, organizing principle. This framework relies heavily on the consistent observation of concomitance to argue for the non-reductive existence and strict synchronization of the mental and physical realms.

Furthermore, the concept is tightly linked to methodologies for identifying causality, most notably the work of John Stuart Mill. Mill's methods of induction, particularly the **Method of Concomitant Variations**, explicitly formalized the use of simultaneous variation as a marker for a potential causal relationship. According to Mill, if an increase or decrease in one phenomenon (the presumed cause) is invariably accompanied by a corresponding increase or decrease in another phenomenon (the presumed effect), they are likely causally connected. Although Mill's method attempts to transition from mere concomitance (co-occurrence) to causation, the initial observational step relies entirely on detecting the concomitant relationship between the variables under scrutiny, thereby establishing it as a foundational logical principle.

3. Concomitance in Statistical Analysis

In modern empirical research, especially within statistics and experimental design, **concomitance** is often rigorously quantified to determine the degree to which variables co-vary. While correlation measures linear association, concomitance specifically highlights the joint dependence of variables, often in the context of experimental manipulation or comparison across groups. This is particularly relevant when assessing the influence of different factors simultaneously, necessitating models that account for these co-occurring influences to isolate true treatment effects.

The Analysis of Variance (ANOVA) and, more specifically, the Analysis of Covariance (ANCOVA), are crucial tools for analyzing concomitance. When researchers employ ANCOVA, they are explicitly analyzing concomitance by introducing a **covariate**--an auxiliary variable that is known to vary concomitantly with the dependent measure but is not the primary factor of interest. The goal is to statistically remove or adjust for this simultaneous variation. For instance, if testing a new drug's effect on recovery time, initial patient health status (which naturally varies concomitantly with recovery time) must be accounted for.

By controlling for the concomitant variable, ANCOVA helps purify the residual variance, thereby increasing the statistical power and precision of the test for the main effect. If a preliminary analysis shows significant concomitance between an external variable and the outcome, failing to include it in the model risks confounding the results, leading to an inaccurate conclusion about the hypothesized causal link. Thus, detecting and modeling concomitance is an essential step in robust experimental design, ensuring that observed differences are truly due to the experimental manipulation rather than concurrent, extraneous influences.

4. Concomitance in Psychology and Sensation

The psychological definition of concomitance emphasizes the consistent co-occurrence of distinct internal states or sensations, often suggesting a unified underlying cause. This perspective is vital in fields like clinical psychology and neurology for differential diagnosis and the study of complex perceptual experiences. When two symptoms, such as a specific type of memory deficit and a particular pattern of sleep disturbance, are consistently observed together in patients with a specific neurological lesion, their **concomitance** strongly suggests that both symptoms arise from the same anatomical or functional impairment, even if their surface manifestations appear unrelated.

In the field of psychophysics, concomitance is studied through the precise relationship between objective physical stimuli and subjective psychological responses. Researchers investigate how multiple aspects of a physical stimulus, such as the amplitude and frequency of a sound wave, covary with the subjective experience of loudness and pitch. The simultaneous, lawful variation between these physical and psychological dimensions establishes a psychophysical concomitance. Understanding these concomitant relationships allows researchers to construct predictive models of perception, explaining how the brain integrates unified sensory input from channels that happen simultaneously.

The study of **synesthesia** provides a compelling, if unusual, example of psychological concomitance. In synesthetic individuals, stimulation of one sensory or cognitive pathway leads to automatic, involuntary experiences in a second sensory or cognitive pathway. For example, hearing musical notes (auditory stimulus) might trigger the mandatory perception of specific colors (visual sensation). These highly consistent, simultaneous pairings are textbook cases of subjective concomitance, where two distinct sensations are linked by an atypical, yet robust, neurological infrastructure. Investigating the neural basis of such simultaneous experiences helps researchers understand the mechanisms of sensory binding and cross-modal co-processing within the brain.

5. Concomitance vs. Causation and Correlation

It is crucial to define the differences between **concomitance**, **correlation**, and **causation**, as

confusion among these terms is a pervasive source of error in interpreting scientific results. Concomitance is the observational statement that two phenomena co-occur. Correlation is the statistical measurement that quantifies the strength and direction of a linear relationship between two variables. Causation implies that one event or variable directly produces or influences the outcome of the other, often through an identifiable mechanism. While concomitance is a prerequisite for both correlation and causation, it is not sufficient to establish either, especially causation.

The foundational challenge in methodology is avoiding the logical fallacy of equating simultaneity with direct influence. For instance, the observation that the rate of homicide and the rate of ice cream consumption are strictly concomitant (both rise during the summer months) illustrates the danger of this conflation. Neither phenomenon causes the other; rather, both are concomitant effects of a third, confounding variable: high ambient temperature. In such cases, the observed concomitance is spurious, necessitating the search for the underlying common cause, which requires methods far more complex than simple observation.

However, the initial establishment of a robust concomitant relationship remains vital to the scientific process. If a theoretical model suggests a relationship between Variable X and Variable Y, but empirical observation fails to show that changes in X are reliably accompanied by changes in Y, the initial hypothesis is immediately weakened or refuted, irrespective of any complex statistical analysis. Therefore, concomitance acts as a necessary empirical filter in research: researchers must first confirm that phenomena co-occur reliably before committing resources to complex studies designed to disentangle causal pathways and determine directionality.

6. Methodological Implications and Research Design

The proper identification and measurement of concomitance dictate significant elements of research design, especially in complex fields such as epidemiology, economics, and sociology, where direct experimental manipulation of variables is often impossible or unethical. Researchers in these fields must employ careful sampling techniques and rigorous measurement protocols to ensure that observed simultaneity is genuine and not merely an artifact of measurement error, sampling bias, or historical coincidence.

In epidemiological studies, understanding concomitant risk factors is paramount for developing effective public health interventions. For example, studies might observe the concomitant occurrence of low socioeconomic status (SES), lack of access to healthy food, and high rates of Type 2 diabetes. While low SES does not directly initiate the biological pathology, the consistent, simultaneous presence of these variables indicates a robust systemic relationship that must be analyzed as a network of concomitant influences. The methodological implication is that complex phenomena require multi-variable analysis to model this network of concomitant relationships,

rather than searching for simple, linear, proximal causes.

Furthermore, the principle of concomitance is central to the psychometric validation of psychological measures, particularly in establishing **convergent validity**. If a new instrument designed to measure the construct of narcissism is truly valid, the scores derived from it (Variable A) must vary concomitantly with established measures of grandiose self-view (Variable B), lack of empathy (Variable C), and behavioral self-promotion (Variable D). The simultaneous variation across multiple indicators strengthens the argument that the various measures are all accurately tapping into a single, unified theoretical construct, demonstrating reliability through robust concomitance across measurement domains.

7. Further Reading

[Analysis of Covariance \(ANCOVA\)](#)

[Dualism and the Mind-Body Problem \(Stanford Encyclopedia of Philosophy\)](#)

[Mill's Methods of Induction: The Method of Concomitant Variations](#)

[Introduction to Psychophysics and Sensation Measurement](#)