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Introspective Inspection

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Abstract: This summary review examines the inspection process in relation to fundamental research paradigms and factors influencing those paradigms. The objective is to offer a brief insight into the inspection process through the prisms of science, philosophy, and psychology but not to advocate for a specific approach. The reader is encouraged to consider factors related to the interchanges of an observer, the phenomena that are observed, and the combination of the observer and the observed. Arming the observer with broader knowledge can bolster approaches to inspection. At a minimum, the discussion will encourage introspection. The term 'observer' is used contextually in this paper both as the act of receiving information from the external world and as a practitioner assessing phenomena. An awareness of the different avenues of inquiry and factors influencing inquiry may assist with conceptual and practical approaches to observation and inspection. Gathering information through observation has obvious similarities with data collection in formal research. The act of observation shapes our interpretations of reality and how information is processed into knowledge. Practical field-level inspections lack formal research structure; however, envisioning inspections from a theoretical perspective allows appreciation for both quantitative and qualitative approaches. A combination of qualitative and quantitative paradigms is termed mixed-methods or mixed methodology. This conceptual quantitative-qualitative amalgam includes reconciling their philosophical roots with positivism, interpretivism, and constructivism. Comparisons between research methods and field-level inspection are explored through information research and summary review. The constructs of the observer effect, solipsism, social capital, and locus of control inform the discussion.

Keywords: Inspection, research, ontology, epistemology, methodology, observer effect, solipsism, social capital, locus of control.

Introduction

The inspection process is influenced by many factors. Experienced individuals are familiar with the challenge of balancing multiple factors in real time. The individual performing the inspection (investigator) may observe an individual, an event, or both. The investigator or observer may either interact or be partitioned from the individual or event. Field-level inspections collect information related to items such as performance or behavior prior to documenting the findings. Technical applications and measurable inspection outputs are understandably more quantifiable than the abstractions of nuance, intuition, and interpretation that permeate the inspection process. Further, inspections performed on a confederate (i.e., internal employee) may be intrinsically different than inspections performed on a less familiar person (i.e., external party). Additional variables are introduced when the inspection involves only internal employees compared with an internal employee inspecting an external party. Nevertheless, all inspection-related aspects are essential for comprehensive assessment or Gestalt representation [1]. Observers understand that the human component of an inspection is less tangible than the associated structural elements. Consequently, behavioral influences must be understood and appreciated to assess their impact on inspection results.

Inspections are information gathering activities. Practical information is collected and interpreted, recorded as data, analyzed, and ideally converted to actionable knowledge. Knowledge conversion comprises implied and specific characteristics referred to as tacit and explicit knowledge [2]. These overt and inherent aspects inform the observational process and add to organizational knowledge. Inspection results must be valid and reliable to produce meaningful data to improve the activity and organization. Inspections must represent reality to add value.

A significant consideration is whether partitioning between the investigator and the investigated event alters the nature of the inspection. What constitutes the boundaries of an observed event is open to debate. The question is whether the observer, the

person observed, and the observed event can be accurately perceived as both independent entities and as a single unit. If the observer's actions influence the inspection, the inspection outcome is arguably a product of the investigator and the event. It logically follows that if a different person observes the same event, the outcome may differ. This infers that the observer is a critical variable factor in the inspection equation. A compounding factor in this multivariate scenario involves separating individual observer effects from additional intervening variables [3, 4]. These uncertainties may not rise to the level of C. S. Lewis' unanswerable questions [5] or Thomas Aquinas' omnipotence paradox [6] but warrant further consideration. Discussion of inspection processes and research paradigms follows.

Paradigm

Variables including the actions and behavior of the individual performing the inspection, and the nature of the event under investigation arguably shape the outcome. It is useful to first frame these variables within quantitative and qualitative paradigms and then consider their ontological and epistemological foundations. Paradigms are described as integrated methodological frameworks [7] or logically structured theory-creation systems or traditions [8]. The paradigmatic structure encompasses facets such as the research design, research method, and incorporates: (a) how an observer or investigator has acquired knowledge (epistemology); (b) the individual's perspective regarding the nature of reality (ontology); and (c) the methods used for inquiry (methodology) [9, 10, 11]. Cognitively framing the inspection within a paradigmatic structure allows contemplation of how the predispositions of the investigator influence the inspection. Three primary research paradigms are quantitative, qualitative, and mixed methods.

Method

Quantitative Paradigm

The quantitative paradigm is rooted in positivist philosophy, empiricism, and is generally characterized by numerical approaches to assessment. Positivism is the belief that the nature of reality and truth operate independently of the observer [10]. Ontologically, a single universal truth exists that is independent of human perception and is immutable. This epistemological perspective positions the observer and the observed as separate autonomous objects. The investigator (observer) is partitioned from the phenomena in quantitative studies. The investigator cannot observe an event (phenomena) without either influencing the phenomena or having the phenomena influence the investigator, akin to inquiry using a one-way mirror [12, 13, 14]. Techniques such as blind studies and randomization are employed to achieve independence between the observer and the observed. The investigation and analysis of associations between variables ideally occurs in a value-free environment. Large, statistically amenable sample sizes provide representative sampling and generalizability [13]. Counting observations or converting verbal responses to numerical surrogates for analysis are examples of quantitative processes. The qualitative paradigm dictates a different approach.

Qualitative Paradigm

Qualitative inquiry differs from its quantitative counterpart as described supra. The qualitative paradigm is predicated upon interpretivism and constructivism [12, 13, 14]. This approach is recognizable as inquiry through questioning and discussion. The investigator is embedded (non-partitioned) with the object of inquiry. From an ontological perspective, multiple truths and realities exist constructed through the individual's reality rather than the universal truth specified under the quantitative paradigm. In this sense, reality is built on the foundation of one's personal orientation reference. Reality is socially constructed; therefore, the nature of reality is continually evolving [10, 15, 16]. Epistemologically, the only access to reality is via the independent mind of the individual. An external reference is not available to compare assertions of truth [18]. The investigator and the object under inspection are interdependently connected.

Perception is not passive. According to Zwirn (2020) [19], "perceiving is not simply witnessing what is in front of us but is creating (independently for each us) what we perceive through a co-construction from the world and the mind" (p. 10). The situational context of the observer and the observed phenomena mutually create the event, which shapes the inquiry. Smith (1983) [18] professed that "reality has no existence prior to the activity of investigation, and reality ceases to exist when we no longer focus on it" (p. 45). Qualitative research emphasizes meanings and processes, rather than the objective empiricism of quantitative research. Qualitative methods of inquiry such as focus groups, interviews, and participant observation are employed to unearth underlying information. Qualitative approaches use smaller purposeful samples that need not be representative of the broader population [10]. The goal is to extract more in-depth and richer information from smaller groups of articulate respondents.

Introspective Inspection

Mixed Methods

The quantitative and qualitative perspectives provide choice in terms of approaches to inspection. Aligned with personal choice, both methods have been alternatively pilloried and praised. The quantitative paradigm aligns with data collection and analysis such as the aggregation of inspection counts and Likert-scale surrogates for capturing categorical information. The qualitative paradigm aligns with excavating inherent behavioural drivers through conversation and the interpretation of actions. The application of mixed methods requires facility with both paradigms. Some familiarity with quantitative and qualitative perspectives arms the investigator or observer with a larger toolkit. Quantitative and qualitative paradigms differ epistemologically and ontologically. However, both paradigms are theory-based, possess logical rules of inference, and share the objective of knowledge creation through comprehending and improving the human condition [20, 21, 22, 23]. Conceptually, mixed methods encourage exploration of the quantitative-qualitative continuum to determine a preferred position along the spectrum or, rarely, at either pole. Investigators may view approaches to inspection through this paradigmatic lens. While maintaining requisite process rigor during the inspection, the observer exercises their training and experience. Mixed methods allow a middle ground for leveraging both qualitative and quantitative aspects. For example, Howick and Schmaus (2018) [24] found that Occupational Health and Safety (OHS) students effectively transferred classroom knowledge (safety literacy) to the workplace by creating a personal connection to the academic material. This connection was generated through discussion and shared experience with a cohort. Leveraging theory for practical application may benefit from a mixed toolkit.

Mixed methods provide greater latitude for conducting inspections in a manner suitable to the observer. Howe (1988) [25] described 'truth' as a prescriptive concept such as 'good' and suggests that the pursuit of truth is a critical driver of mixed methods. Ontologically, mixed methods lack direct fidelity with the quantitative view of a single immutable truth or the qualitative perspective of multiple constructed truths. Rather, the approach offers this aforementioned 'middle ground'. The application of scientific (quantitative) methods to qualitative studies is routinely scrutinized for alignment with the tenets of good science [26]. The debate continues as to whether an observed event is interpreted as the same event when viewed through either the qualitative or quantitative lens.

Observational Influences

Field-level inspections generally involve a human being observing an event. Information is observed and interpreted by the human observer. Thus, factors or conditions influencing the observer and the act of observation/interpretation will influence the inspection results. Factors that influence or modify behaviours during field-level inspection have implications for observational outcomes [3]. The 'observer effect', which is often related conceptually to the Hawthorne effect, is a form of reactivity and describes how observed subjects modify their behavior in the presence of an observer. The observer effect, akin to experimenter or researcher bias, is the inclination to see what the observer wants or expects. Alvero and Austin (2004) [27] and Alvero, Rost, and Austin (2008) [28] examined the nature of behaviours related to safety inspections. These studies adeptly explored observational effects and provided insight into reciprocal outcomes for the observer and the observed. An observer approaches an inspection with *a priori* (prior) knowledge and subjective feelings about the person or phenomena under investigation [3, 29, 30, 31]. As an example, prior knowledge is a key aspect of Bayes Theorem in relation to prior probabilities that are updated as evidence accrues.

The prior probability is the probability of an event before the collection of new data. This 'prior' is revised as evidence emerges and becomes the 'posterior' probability [32, 33]. The bayesian analogy, as a thought experiment, obliquely relates to the inspection process in terms of how the observer's prior knowledge or beliefs may be revised upon collecting inspection data. The challenge is to manage one's prior beliefs to beneficially inform the inspection, but not to let personal bias adversely influence the inspection. Innate biases or predispositions are difficult to suppress, even for the self-aware individual. The observational function also loosely relates to Heisenberg's Uncertainty Principle, which asserts that the act of measurement changes the phenomena being measured [34]. When the physical act of observation couples with the inherent traits of the observer, the object under observation will be influenced. The construct of solipsism presents another perspective and is relatable to qualities inherent to the observer.

Solipsism

The ontology of solipsism provides an interesting mental exercise for considering distinctions and integrations among the observer, what is being observed, and the overarching perception of reality. The concept of solipsism may be considered epistemologically as 'only the knowledge gained from my mind can be truly known' or metaphysically where 'only I and my mind

exist' [35, 36]. What fully constitutes reality is uncertain. As thinking beings, we may view the world through multiple prisms including abstract philosophy or scientific empiricism. An extension of solipsism, discussed in quantum mechanics in relation to the measurement problem, is termed 'convivial solipsism'. Convivial solipsism is presented as an analogy for the inspection process. Inspections are measurements, as they seek to assess or evaluate that which is observed. Zwirn (2016) [37] posited that convivial solipsism is required for defining measurement in the quantum environment, and that measurement cannot be defined in this area without reference to a conscious observer. Through this lens, the world is divided into two components: the observer and the observed system. Under convivial solipsism, the observed outcome is relative to the observer [37]. The observer-observed relationship is demonstrably influenced by factors inherent to the individual and among individuals engaged in the inspection process.

Locus of Control

The locus of control concept originated with Rotter's (1954) social learning theory. This theory explores whether individuals perceive they have control over life events or whether life events are a consequence of external forces [38, 39, 40]. Humans possess both internal and external features, with one aspect generally being dominant. Perception of control is addressed in the works of Maslow, Herzberg, attribution theory, and expectancy theory. Locus of control theory operates to integrate and synthesize these concepts. Rotter's (1966) I-E scale for general locus of control assesses an individual's perspective regarding the forces that dictate reward and punishment [41]. These forces may be internal to the individual and within the individuals' control. Conversely, forces such as luck are external to the individual and perceived as uncontrollable.

An internal locus suggests personal dominion over events whereas an external locus suggests being controlled by external events. These orientations represent a stable personality trait describing how individuals attribute cause and effect to themselves or to external factors such as luck, fate, or fortune [41, 42]. Those possessing high internality will modify behavior while those possessing high externality will not [43]. Locus of control orientation holds implications for the inspection process. An internal orientation may allow a greater predisposition to engage in the inspection. Conversely, an external locus may inhibit behaviours associated with engagement. Notably, the observer is affected by both their internal preferences and by mechanisms influencing interactions with other individuals. Locus of control predispositions operate within the individual and becomes extended when the individual engages with others. The construct of social capital extends beyond the individual and assesses the nature of relationships.

Social Capital

Social capital describes the intrinsic and extrinsic benefits derived from interpersonal relationships. This social effect is a mediating factor in the inspection process and can affect interpersonal exchange. Reer and Krämer (2017) [44] described social capital benefits as the positive outcroppings gleaned by society resulting from interpersonal relationships. This description infers that positive relationships increase social capital and vice versa. For example, the social exchange between parties may differ in employee-employee vs. employee-external party interactions, contingent upon several factors. The generation of social capital has a temporal component. Organizational employees benefit from greater permanency with a single employer. Permanency may allow more time for the development of interpersonal relationships or shared organizational artifacts (culture) [45, 46, 47, 48]. Contract workers may lead more nomadic work lives, which may influence the potential for building longer-term relationships with non-transient personnel. Arguably, the nature of contracted work influences exposure time to a fixed workforce. Hence, the time required to develop more established interpersonal relationships is reduced and may be a factor for accruing social capital. Pre-existing relationships between these parties will implicitly or explicitly influence the inspection to varying degrees. The nature of the relationship between these individuals can significantly influence the effectiveness, dynamics, and outcome of the inspection.

Mechanisms for building relationships are complex. Interpersonal dynamics and relationships between organizational employees may be perceived as more established and culturally (work) differentiated than relationships between organizational employees and external parties. Consequently, social capital effects may accrue from these networked social linkages in the form of practical information (bridging social capital) or emotional support (bonding social capital) [44]. The breadth of relationship structures influences these social capital forming effects. The hierarchical position of an individual in a relationship network is relative to that person's social capital advantage. An individual's social capital is the sum of actual and potential sources within and derivative of that individual's relationship network [49]. Social capital positively promotes information sharing and access to relevant and diverse information within the network. However, (Carrera, Sohail, and Carmona (2017) [49] suggested a 'dark side' to social capital where social ties "pose restrictions on independent behaviour, as demands for conformity to a network's norms do not

necessarily promote efficiency and effectiveness but result in 'solidarity benefits' that is, 'ties that bind may also turn into ties that blind'" (p. 663). Social capital is a derivative of reciprocal or mutual exchange between parties.

Summary

Structurally and introspectively examining the inspection process is thought provoking. After descending from the abstract perches of ontology and epistemology, fundamental questions centre on the purpose of the inspection and whether the inspection outcome approximates reality. The proximity of the inspection to reality is at issue. Data and information are the products of the inspection and assist to evaluate and potentially improve field processes. To generate meaningful data for analysis and feedback, the observed event must be measured in a meaningful way. The data generated from the inspection must reflect reality, thus allowing the feedback to be consequential in terms of practically improving the inspected event. A succinct and clear link between the observed measures and the observed phenomena is essential [50, 51]. Obviously, measurements conducted under scientifically rigorous conditions differ from those conducted in the field. The degree of diligence related to measurement distinguishes scientific inquiry from practical evaluation. The linkage of data to natural phenomena through appropriate measurement adds accuracy and robustness [50]. Again, this discussion is to instill introspection and reflection related to field-level inspection, not to naively suggest laboratory applications in the field. The practitioner determines whether it is prudent to use inspection outcomes as a feedback or feed forward mechanism. The inspection and its associated components, artifacts, and influences can be perceived as a Gestalt ecosystem. As an analogy, Somerville et al. (2019) [52]described an Informed System as comprised of complicated interfaces among processes, people, technology, and associated content. Each component may be identified separately but cannot produce the desired product in isolation. Recommendations for further research include exploring situatedness, recursive self-improvement, logical fallacy, and systems theory.

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