

Connecting “Conceptual Investigation” and Latent Space Through the GNG+MST Model

An AI Interface for Overcoming Organizational Cognitive Lock-In

Mindware Research Institute

Version 0.1

Executive Summary

Organizations often appear to act rationally on the surface, yet in practice they frequently lose freedom of thought by implicitly conforming to existing norms, categories, and evaluation criteria. In this paper, we refer to this condition as **cognitive lock-in**. By this we do not mean that people have stopped thinking altogether. Rather, we mean a state in which organizations can still engage in active discussion within existing conceptual frameworks, while losing the ability to question those frameworks themselves and to move toward genuinely new states.

This problem is especially common in new business development and strategic planning. Even when research activities are carried out, as long as they remain bound to existing market categories and known definitions of need, they tend to remain an extension of backward-looking “fact-based research.” New ideas are often dismissed at an early stage with objections such as “there is no evidence” or “the need has not been proven,” preventing sufficient exploration and concept formation.

Mindware Research Institute has proposed **Conceptual Investigation** as a methodology for addressing this problem. Conceptual Investigation is an exploratory approach to information analysis that focuses on conceptual differences and emerging signals before they are absorbed into existing categories, with the aim of opening up future possibilities. However, it is difficult for humans alone to practice this method consistently, because human thought is deeply constrained by preexisting language and conceptual systems. This white paper proposes a framework for overcoming this limitation by connecting the latent representational space of large language models (LLMs) with a conceptual

structure model based on **GNG+MST**. Although LLMs process discrete language, internally they represent meaning in a high-dimensional continuous space. In this paper, we refer to this property as **continuous cognition in latent space**. Humans, by contrast, can share thought only through language, and are therefore prone to remaining trapped within visible and already articulated conceptual regions, which we call **explicit space**. The GNG+MST model represents this explicit space as a structure within semantic space, making its contours, densities, gaps, and connections visible. In doing so, it becomes possible to identify latent regions that humans have not yet articulated in language, but that may nevertheless be adjacent to, or connected within, semantic space. GNG+MST should therefore be understood not merely as a visualization technique, but as an interface through which humans and AI can share thought.

1. Problem Statement: Why Do Organizations Overlook New Possibilities?

Many organizations possess vast amounts of information, frequent meetings, and well-developed decision-making processes, yet still fail to detect new opportunities. This problem cannot be explained simply by lack of information or lack of effort. More fundamentally, organizations often become so strongly adapted to existing classification systems, evaluation criteria, and success patterns that they can no longer adequately explore possibilities outside those frameworks.

In this paper, we call this condition, in a broad sense, **cognitive lock-in**. This does not mean that individuals are apathetic or that organizations have stopped debating. On the contrary, organizations are often highly diligent in analyzing, discussing, and validating. But as long as those activities are repeated within the same assumptions, the same categories, and the same evaluative frames, new state spaces are difficult to open. In other words, cognitive lock-in is a condition in which an organization functions effectively within an existing conceptual system, while losing the capacity to reorganize that conceptual system itself.

1.1 Why Organizations Become Overfitted

For companies and institutions, categories, KPIs, evaluation criteria, and decision procedures are indispensable. They align organizational perception, reduce the cost of judgment, and enable reproducible operations. The problem is not their existence. The problem is that tools originally meant to help organizations understand environmental change gradually solidify into frameworks that define reality itself.

At that point, organizations believe they are observing reality, when in fact they are seeing only what their existing instruments are capable of detecting. As a result, they may successfully pick up signals that fit existing markets, yet miss unnamed changes, cross-category signals, pre-quantitative discomfort, and emerging needs.

1.2 What Happens in New Business Development

This issue becomes particularly visible in new business development and strategic exploration. Companies seek to improve decision quality through market research, competitor analysis, customer interviews, and proof-of-concept evaluation. These are important activities. However, when they depend too heavily on existing market definitions, already validated needs, and comparable competitive axes, research becomes less an effort to discover unknown possibilities and more an effort to reconfirm known frameworks.

For example, when a new idea is evaluated only in terms of questions such as:

- Which existing category does it fit into?
- Can it be explained through known customer segments?
- Is there already explicit evidence of demand?
- Can it be justified using standard investment criteria?

the idea is likely to be rejected before it has time to mature. The issue here is not caution itself. The issue is that a concept still in formation is being judged by the same yardstick used for already-completed business concepts.

1.3 What Is Needed Is Not More Information, but Reorganization of the Conceptual Frame

In response to this kind of problem, organizations often say, “Let’s gather more information,” or “Let’s listen more closely to the voice of the customer.” This can certainly

be useful. But as long as the existing conceptual framework remains fixed, newly added information is likely to be absorbed into existing modes of organization. As a result, the volume of information increases, while the structure of what is visible changes very little. What organizations need, therefore, is not simply more information. They need a method for reinterpreting differences and signals that cannot be fully captured by existing categories, and for reorganizing conceptual space itself. **Conceptual Investigation**, as proposed by Mindware Research Institute, is positioned as a methodology for addressing this challenge.

2. Philosophical Background: Why Humans Cannot Easily Free Themselves from Existing Concepts

2.1 Husserl's Epoché

In Husserlian phenomenology, **epoché** can be understood as an attitude of placing existing common sense and assumptions in brackets, and attending instead to how things actually appear. In a business context, this is close to observing the changes taking place in reality without immediately applying existing market definitions or evaluation criteria.

What matters here is not abandoning concepts altogether. Rather, it is refusing to absolutize established interpretive frameworks and examining whether they may be overlooking something. This is precisely the attitude needed in new business creation and strategic exploration.

2.2 The Analogy of Drawing

Because this discussion is abstract, it may be clarified through an analogy with drawing. People who are poor at drawing often grasp an object through known labels such as “dog,” “cat,” or “tree,” and then attempt to draw a generalized image corresponding to that label. By contrast, a painter sets aside, for a moment, the question of what the object is, and attends instead to differences themselves: lines, shadows, contours, and proportions. The same thing happens in organizational strategy. The impulse to immediately fit

reality into known market categories or customer classifications is efficient, but it makes new signals harder to see. Conceptual Investigation, by contrast, emphasizes grasping emerging signals as bundles of differences before imposing familiar labels on them.

2.3 The Constraint of Language on Thought

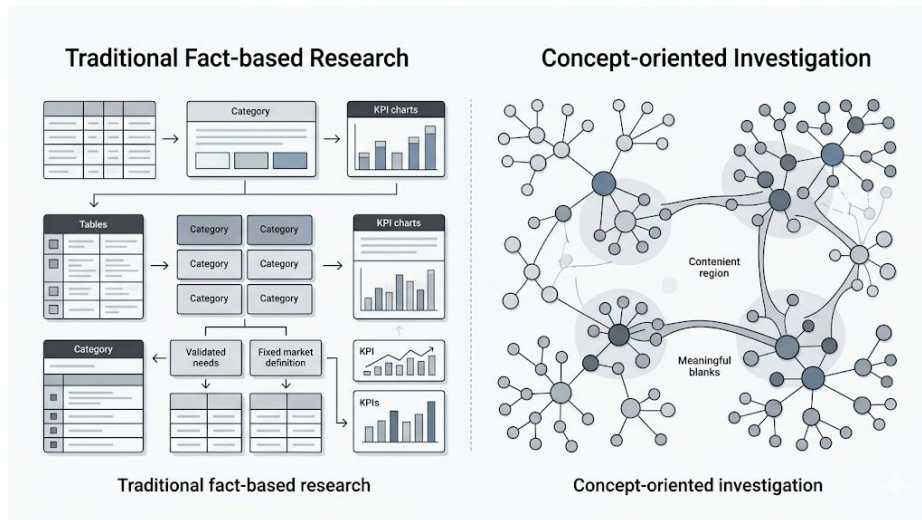
Human thought, however, is not as free as visual art. We think primarily through language, share thought through language, and organizational decisions are likewise made through verbalized concepts and documents. As a result, when organizations encounter new changes, they often have no choice but to describe them using old words. In this sense, organizational cognitive lock-in is not a matter of laziness. It is a condition in which the conceptual apparatus required to describe and judge a new situation has not yet been formed.

3. What Is Conceptual Investigation?

Conceptual Investigation, as proposed by Mindware Research Institute, is an information analysis method that examines not only the accumulation of facts but also the arrangement of concepts and their possibilities for transformation. Conventional research tends to focus on already existing facts, predefined markets, and known competitive axes. By contrast, Conceptual Investigation emphasizes questions such as:

- What signals do not yet have stable names?
- What is happening at the boundaries of existing categories?
- What kinds of connections are possible between concept groups that appear far apart?
- What conceptual gaps might become future opportunities?

Conceptual Investigation therefore aims not merely at retrospective fact-checking, but at structuring possibilities for the future. Yet it is difficult to practice this approach consistently through human cognition alone. The reason is straightforward: humans themselves can think only within existing language. This is where AI, and especially the latent representational space of LLMs, opens up new possibilities.



4. LLMs and Continuous Representation in Latent Space

4.1 Human Linguistic Thought Is Discrete

The words humans use are fundamentally discrete. A word like “cold,” for example, compresses a wide range of actual experiences into a single label: dry cold, bone-chilling cold, damp cold, even cold associated with fear. The experiences may differ greatly, but language bundles them under the same symbol.

Humans can of course enrich expression through metaphor and complex phrasing. Saying “cold enough to hammer nails with a frozen banana” produces a much richer image than simply saying “cold.” Yet even in such cases, what humans are ultimately manipulating is still a combination of discrete words and symbols.

4.2 The Internal Representation of LLMs Is Continuous Space

LLMs, by contrast, convert word sequences internally into high-dimensional vectors and operate on meaning within a continuous latent representational space. In that space, “cold” is not merely a word, but also a point or local region in a multidimensional field. Similar concepts and related contexts can be represented as neighboring areas and

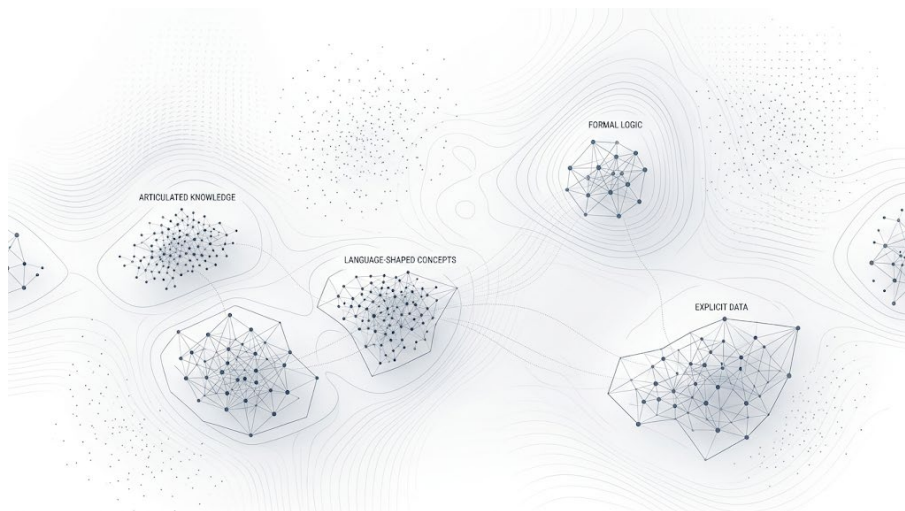
connective structures.

In this paper, we refer to this internal property, for convenience, as **continuous cognition in latent space**. Strictly speaking, this does not prove that AI “thinks” in the human sense. But it does mean that LLMs make use of continuous semantic representational space in ways that go beyond simple manipulation of discrete symbol strings.

4.3 Explicit Space and Latent Space

Here we may distinguish between **explicit space**, the semantic region that humans have already articulated in language, and **latent space**, regions that are not yet sufficiently verbalized but are nevertheless connectable within semantic space. Human discussion usually takes place within explicit space. But from the standpoint of AI, human linguistic thinking may be using only a small portion of a vast semantic field, skipping over many intermediate or unnamed regions.

This cognitive gap helps explain why AI outputs can sometimes be difficult for humans to understand, or why they may suggest associations that do not naturally occur to human thinkers.

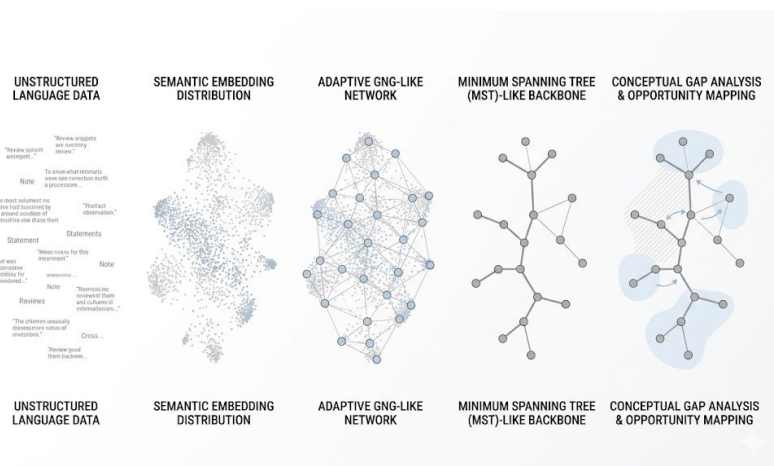


5. The Role of the GNG+MST Model

5.1 Structuring Explicit Space

The GNG+MST model places human-articulated text collections into embedding space and transforms their distribution into a self-organized structure of nodes and connections. GNG captures local semantic continuity, while MST extracts a global backbone. As a result, scattered linguistic expressions can be grasped not merely as a list, but as a conceptual terrain.

What matters here is that even when the model handles only what has already been articulated, it can still suggest the presence of regions that have not yet been adequately verbalized, through patterns of distribution, density, branching, and bridge-like relationships.



5.2 Identifying Latent Space

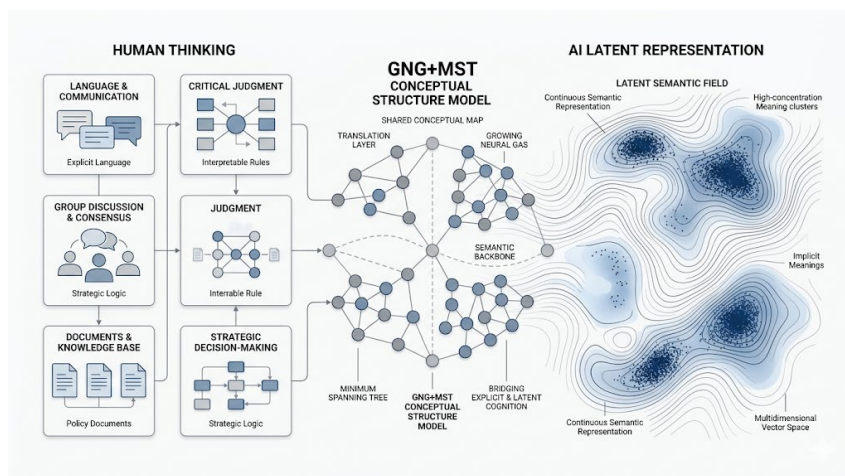
GNG+MST does not fully reconstruct latent space itself. However, by expressing the contours of explicit space as structure, it can reveal:

- intermediate, unstructured regions between nodes
- candidate bridges between large concept groups
- peripheral possibilities around high-density regions
- blank areas that have rarely been discussed, yet may be connectable

In other words, by mapping what humans have already put into words, GNG+MST allows still-unspoken possibilities to emerge as outlines.

5.3 A Shared Interface Between AI and Humans

AI is strong on the latent-space side; humans are strong on the explicit-space side. AI can internally handle continuous semantic structures, but humans cannot read those structures directly. Humans judge, discuss, and decide through language, yet are easily constrained by existing concepts. The GNG+MST model stands between the two. It does not expose the entirety of latent space directly, but by structuring explicit space and indicating the latent possibilities around it, it functions as an interface mediating between AI's semantic space and human linguistic thought.



6. Application Potential

This framework is not limited to analytical visualization. It can be applied across a variety of organizational activities.

6.1 New Business and Strategic Exploration

Explore new conceptual territories that are difficult to capture through existing market categories, and discover unnamed opportunity spaces.

6.2 R&D and Technology Exploration

Visualize connectable possibilities between different technological domains and identify candidates for combinatorial innovation.

6.3 Reorganization of Organizational Knowledge

Reorganize meeting records, interviews, reports, and proposals into conceptual structures, and understand the explicit spaces within which the organization is confined.

6.4 Collaborative Thinking with AI

Rather than using LLMs only for simple answer generation, this approach enables more structured human-AI collaboration by having the model interpret routes on conceptual maps, bridge candidates, and possible blank regions.

7. Positioning and Limits of This Proposal

This proposal is not an argument that AI should replace humans. On the contrary, its aim is to transform AI's latent representational power into an interface that supports human judgment and creativity.

Likewise, the phrase “continuous cognition in latent space” is, at present, a theoretical metaphor. It does not equate the internal computation of LLMs with human consciousness or subjectivity. What this proposal claims is that the fact that LLMs operate on continuous semantic representational space can be used to provide structural guide-lines that help humans become partially freer from existing concepts.

GNG+MST is not omnipotent either. It is a powerful means of representing the skeleton of explicit space, but it does not fully describe latent space itself. Even so, it has clear practical value in that it gives an explorable contour to latent regions that humans cannot directly access.

8. Conclusion

Organizations do not necessarily overlook new possibilities because they lack information. More fundamentally, they do so because overadaptation to existing classification systems, evaluation criteria, and decision-making modes prevents them from fully grasping unknown change and still-forming opportunities. This problem is caused not by lack of knowledge, but by fixation of concepts.

What is needed, therefore, is not merely a system that produces existing answers more quickly. What is needed is a system that can discover questions not yet sufficiently asked, and capture as structure those signals and possibilities that have not yet been absorbed into existing categories. Conceptual Investigation has been proposed as a methodology for this purpose.

By combining the latent representational space of LLMs with the GNG+MST model, Conceptual Investigation can evolve into a more practical intellectual interface. GNG+MST structures the explicit space articulated by humans and indicates, through its contours, the presence of latent space. In this sense, the model serves as a bridge through which AI and humans can share thought.

What organizations need going forward is not only a system that generates existing answers at high speed. They also need a system that discovers insufficiently formulated questions and excavates insufficiently articulated possibilities as structure. The GNG+MST-based Conceptual Investigation proposed in this paper is intended as a foundation for that purpose.

Contact