

**HUMAN-LLM INTERACTION AND THE REORGANIZATION OF INTELLECTUAL CONTINUITY:
UKRAINIAN ACADEMICS WORKING UNDER WARTIME CONDITIONS**

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Abstract. This article examines how Human–Large Language Model (LLM) interaction reorganizes continuity of academic work under wartime conditions. In Ukrainian higher education, interruption, displacement, infrastructural instability, emotional strain, and fragmented temporal organization increasingly disrupt sustained academic activity. While existing research on Human–Artificial Intelligence interaction primarily focuses on technological capabilities, adoption, ethics, or learning outcomes, less attention has been paid to how Human–LLM interaction supports continuity of work under unstable conditions.

The study develops a continuity-centered analytical framework combining Activity Theory, Distributed Cognition, the Assumption of Insufficient Knowledge and Resources, and Affordance Theory. Methodologically, the article adopts an abductive exploratory approach based on interpretive engagement with interaction materials voluntarily shared by nine Ukrainian educators using systems such as ChatGPT, Claude, Gemini, and Copilot during wartime.

The findings demonstrate that Human–LLM interaction operates through asymmetrical distributions of continuity work. Five dimensions of asymmetry were identified: temporal, contextual, experiential, cognitive, and recovery asymmetries. The analysis further identified two continuity mechanisms supporting distributed resumability: externalization, through preserved interaction histories that enable resumption of interrupted work, and temporal compression, through rapid procedural stabilization that reduces coordination demands under fragmented conditions.

The study argues that the significance of Human–LLM interaction lies not only in the generation of outputs, but increasingly in supporting resumability and stabilization of academic work under interruption-intensive conditions. The findings may inform higher education policy, educator support practices, crisis pedagogy, and future research on Human–Artificial Intelligence interaction under instability.

Keywords: Human–LLM interaction; distributed cognition; intellectual continuity; distributed resumability; wartime higher education; Human–LLM asymmetry; academic work under instability.

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Introduction

Wartime conditions profoundly disrupt the continuity of intellectual work. In Ukrainian higher education, air alerts, displacement, unstable infrastructure, emotional strain, migration, and institutional uncertainty fragment the temporal and organizational conditions necessary for sustained academic activity. Teaching, research, writing, administration, and communication increasingly unfold under



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conditions of interruption, shortened planning horizons, unstable routines, and fragmented attention (Lavrysh et al., 2025; Zhyhora et al., 2024). Under such circumstances, continuity itself becomes a practical problem rather than a taken-for-granted background condition of intellectual work. In response, educators attempt to preserve what Ukrainians describe as a cultural notion of *normalno* — the ongoing reconstruction of workable continuity.

At the same time, large language models (LLMs) are becoming integrated into everyday academic and professional practices. Educators increasingly use systems such as ChatGPT, Claude, Copilot, and Gemini for drafting, restructuring, summarization, translation, brainstorming, and administrative support. Existing research on LLMs in education and professional environments primarily focuses on technological capabilities, adoption patterns, ethical concerns, or learning outcomes. Considerably less attention has been paid to how Human–LLM interaction becomes involved in maintaining continuity of intellectual activity under unstable conditions.

This article approaches Human–LLM interaction not as isolated prompt-response exchange, but as a form of distributed intellectual work organized across human and technological participants operating under fundamentally different conditions. LLMs can rapidly generate and restructure text without interruption or fatigue, while human participants remain embedded within materially constrained environments shaped by institutional responsibility, temporal fragmentation, emotional strain, and infrastructural instability. Under such conditions, continuity cannot be assumed. It must be reconstructed, resumed after interruption, externally supported, or sometimes deliberately limited in order to reduce coordination demands.

The wartime context of Ukrainian higher education provides a particularly important environment for examining these dynamics because disruptions to continuity become highly visible within everyday intellectual activity. Human–LLM interaction under such conditions does not simply concern efficiency or technological assistance. It concerns how academic and professional work remains possible despite instability, interruption, and fragmented working conditions. The interaction practices developed under such conditions may also reveal emerging forms of professional resilience through Human–LLM coordination under instability. This study is a part of the larger project "*Normalno* under Fire: Investigating Human–LLM Partnerships to Stabilize Educators' Daily Rhythms in Wartime Ukraine".

Although grounded in the wartime context of Ukrainian higher education, the analytical significance of the framework extends beyond explicitly military conditions. Contemporary intellectual work increasingly unfolds within environments characterized by instability, accelerated digitalization, fragmented attention, institutional uncertainty, and continuous interruption. Under such conditions, Human–LLM interaction may become progressively important as part of the distributed coordination and reconstruction of intellectual continuity. Although many forms of Human–LLM interaction described in this article are not exclusive to wartime environments, conditions of instability make continuity management particularly visible as an analytical problem rather than a taken-for-granted background condition of intellectual work.

The framework developed in this article emerged through exploratory interpretive engagement with interaction materials voluntarily shared by Ukrainian educators using LLM systems under wartime conditions. Rather than offering a comprehensive empirical account of AI use, the article develops an abductive conceptual framework informed by recurring interactional patterns, continuity practices, and coordination difficulties visible within these materials.

The article addresses the following *research question*: How does Human–LLM interaction reorganize the maintenance of intellectual continuity under conditions of wartime instability?

The exploratory materials further suggest that Human–LLM interaction may reorganize intellectual continuity in different ways, including both extension of continuity across interruptions and reduction of continuity demands through rapid procedural stabilization. These interaction patterns further suggest that continuity increasingly depends not on uninterrupted individual concentration alone, but on forms of distributed resumability through which partially completed work may be externally preserved, resumed after interruption, and procedurally stabilized across Human–LLM interaction.

The aim of the article is to conceptualize Human–LLM interaction as a form of continuity management within distributed intellectual work under wartime conditions. The article contributes a continuity-centered framework for analyzing Human–LLM interaction under unstable conditions and develops a systematic categorization of asymmetries shaping continuity maintenance within distributed intellectual work.

The article is structured as follows. The first section reviews the theoretical approaches underlying the framework. The second section outlines the methodological positioning and empirical materials informing the study. The third section develops the Human–LLM Asymmetry Framework and discusses continuity management within Human–LLM interaction under wartime conditions. The article progressively develops a continuity-centered framework explaining how asymmetrical Human–LLM interaction supports preservation, reconstruction, and resumability of academic work under fragmented wartime conditions.

Literature Review: Theoretical Foundations of the Human–LLM Asymmetry Framework

Understanding Human–LLM interaction under wartime conditions requires a framework capable of analyzing intellectual work not as an isolated cognitive process, but as a distributed and materially situated activity whose continuity depends on the coordination of human, technological, institutional, and temporal resources. Under conditions of instability, interruption, and fragmented routines, continuity can no longer be assumed as a stable background condition of academic and professional work. The framework developed in this article therefore combines four complementary theoretical traditions: Activity Theory, Distributed Cognition, Assumption of Insufficient Knowledge and Resources (AIKR), and Affordance Theory (Fig. 1).

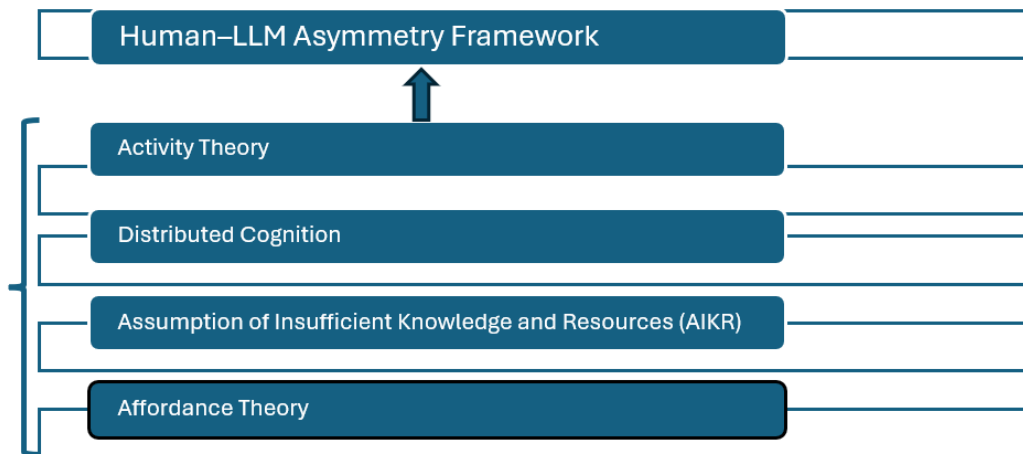


Figure 1. Conceptual Foundations of the Human-LLM Asymmetry Framework

Source: created by the author (Mykhailenko, 2026).

These traditions are introduced in the order in which they progressively specify the analytical problem addressed in the article. Activity Theory conceptualizes intellectual work as a goal-oriented activity system mediated by tools, institutional structures, and material conditions. Distributed Cognition explains how cognitive processes become distributed across human and technological participants within such systems. AIKR provides the basis for understanding humans and LLMs as structurally non-equivalent forms of intelligent systems operating under fundamentally different conditions of knowledge, responsibility, and contextual situatedness. Affordance Theory explains how interaction possibilities emerge relationally between actors, technologies, and environments under specific conditions of use.

Taken together, these approaches provide the conceptual vocabulary necessary for analyzing Human-LLM interaction as a form of distributed intellectual work in which continuity must be maintained, reconstructed, externally supported, or deliberately limited under conditions of instability.

1. Activity Theory and Intellectual Work under Conditions of Instability

Activity Theory conceptualizes human activity not as a sequence of isolated cognitive acts, but as a socially organized and materially mediated system oriented toward collective and individual goals (Engeström, 2009; Engeström, 2000). From this perspective, intellectual work emerges through dynamic relations between subjects, tools, institutional rules, communities, divisions of labor, and historically formed practices. Cognition therefore cannot be reduced to processes occurring solely “inside” the individual mind. It is organized through systems of mediation that structure how work becomes possible, coordinated, and sustained over time.

This perspective is particularly important for understanding Human–LLM interaction because it shifts analytical attention from technological capabilities alone toward the transformation of activity systems themselves. LLMs do not simply assist isolated users in performing discrete tasks. They increasingly become integrated into the mediating structures through which academic and professional work is organized, resumed after interruption, coordinated across fragmented conditions, and maintained over time. Drafting, restructuring, summarization, translation, planning, and communication may all become partially redistributed through Human–LLM interaction within broader systems of intellectual activity.

Activity Theory also emphasizes that technologies cannot be analyzed independently from the conditions in which they are embedded. The significance of LLMs consequently depends not only on model performance, but on how interaction becomes situated within institutional expectations, temporal pressures, infrastructural constraints, and organizational instability. Under wartime conditions, continuity of intellectual work increasingly depends on the ability of activity systems to reorganize themselves across fragmented and unstable environments.

Kaptelinin and Nardi (Kaptelinin & Nardi, 2022; 2012) brought Activity Theory into direct dialogue with human–computer interaction research by emphasizing that digital technologies do not simply enter preexisting systems as neutral instruments. Technologies function as mediators that reorganize the activity itself. Their introduction reshapes relations among all other system elements, including what forms of action become possible, how labor is distributed, what counts as competent practice, and how institutional rules are enacted. The integration of a new technology therefore involves not the addition of a tool to an otherwise stable structure, but the partial reconfiguration of the activity system around the mediator's specific properties.

Within the framework developed in this article, Activity Theory therefore provides the foundational understanding of intellectual work as a mediated, situated, and systemically organized activity whose continuity depends on coordination across heterogeneous human and technological resources.

2. Distributed Cognition and Human–LLM Interaction

While Activity Theory conceptualizes intellectual work as a mediated activity system, Distributed Cognition further displaces cognition itself beyond the boundaries of the individual subject. Developed primarily through the work of Hutchins (1995), this perspective argues that cognitive processes are not confined to the human mind, but emerge through coordinated interaction between people, artifacts, representational structures, technologies, and environments. Thinking, remembering, calculation, interpretation, and decision-making may therefore become distributed across heterogeneous systems rather than internally contained within isolated individuals.

The significance of this perspective for Human–LLM interaction lies in its rejection of strictly individualistic models of cognition. LLM-supported intellectual work cannot be adequately understood through the opposition between “human thinking” and “machine assistance” as separate domains. Instead, interaction

increasingly unfolds through distributed cognitive configurations in which prompting, reformulation, summarization, restructuring, memory externalization, drafting, and continuity reconstruction become interactionally organized across human and technological participants.

Distributed Cognition is particularly useful for analyzing continuity under conditions of instability because continuity itself may become partially externalized across interaction systems. Notes, drafts, prompts, archived conversations, iterative revisions, and dialogic interaction histories may function as distributed cognitive supports allowing interrupted intellectual activity to be resumed and reorganized over time. Under such conditions, continuity no longer depends exclusively on uninterrupted individual concentration or internally maintained cognitive coherence. It increasingly emerges through the coordination of distributed representational and interactional resources.

At the same time, Distributed Cognition does not imply symmetry between participants within these systems. Human and technological actors contribute fundamentally different forms of processing, contextualization, responsibility, and situated understanding. Distributed cognition therefore does not eliminate asymmetry; rather, it makes asymmetrical coordination analytically visible within the organization of intellectual activity itself.

Suchman (2007) extends this perspective in a direction that matters specifically for human-machine interaction. The asymmetry Hutchins describes between human collaborators and the artifacts they work with takes a particular form when one of those artifacts is a machine. Humans act in situations: they engage with their material and social environment moment by moment, adjusting in response to what unfolds. Machines, by contrast, can only operate through the plans encoded in them. The labor of making a human-machine partnership function as a single coordinated system — of taking what the machine produces and grounding it in the situation the human actually inhabits — is itself a form of cognitive work, and it falls almost entirely on the human. Suchman's contribution is the insistence that this is not a defect to be engineered away but a structural feature of the partnership.

Within the framework developed in this article, Distributed Cognition provides the basis for conceptualizing Human-LLM interaction as a distributed cognitive configuration through which continuity of intellectual work may be maintained, reconstructed, externalized, or reorganized under unstable conditions.

3. The Assumption of Insufficient Knowledge and Resources and Human-LLM Asymmetry

Distributed approaches to cognition explain how intellectual activity may become organized across human and technological participants, yet they do not fully account for the structural non-equivalence between these participants. For this reason, the framework developed in this article draws on Wang's Assumption of Insufficient Knowledge and Resources (AIKR), which conceptualizes intelligence as adaptive operation under conditions of incomplete knowledge, limited resources, and uncertainty (Wang, 2006, 2019).

Within AIKR, intelligence is understood not as ideal rationality or unlimited

optimization, but as the capacity to operate under constraints. Human cognition is therefore inherently situated, selective, temporally bounded, and shaped by incomplete access to information and resources. Intellectual activity unfolds under conditions of uncertainty, interruption, competing priorities, emotional pressure, institutional responsibility, and limited cognitive capacity. Under wartime conditions, such constraints become especially visible as academic and professional work increasingly depends on adaptation to fragmented and unstable environments.

LLM systems operate under fundamentally different conditions. Although they may simulate contextual coherence through statistical language generation, they do not experience embodiment, fatigue, responsibility, institutional accountability, and material or moral consequences. Their apparent continuity is computational rather than experiential or socially situated. Human participants, by contrast, remain responsible for interpretation, verification, contextual appropriateness, and the practical consequences of interaction outcomes.

The concept of asymmetry in this article therefore refers not merely to difference between humans and AI systems. It also refers to unequal distribution of continuity maintenance, interpretive judgment, contextual responsibility, and coordination work within Human–LLM interaction. Humans remain responsible for sustaining coherence between generated outputs and situated institutional, professional, and material realities that the model itself does not inhabit.

The significance of AIKR for the present framework lies in its ability to conceptualize Human–LLM interaction without reducing either humans or LLMs to incomplete versions of one another. Asymmetry thus becomes a structural condition of distributed intellectual work itself rather than a temporary technological limitation. The analytical focus consequently shifts from questions of replacement or equivalence toward the organization of continuity across fundamentally non-equivalent forms of intelligence operating under unstable conditions.

4. Affordance Theory and Continuity Management in Human–LLM Interaction

Affordance Theory contributes to the framework by explaining how possibilities for action emerge relationally between actors, technologies, and environments rather than residing exclusively within technological systems themselves (Gibson & Rader, 1979; Norman, 2008; Raveendranath et al., 2024). From this perspective, technologies do not possess fixed meanings or universally stable functions independent of the contexts in which they are used. Instead, affordances become actualized through situated interaction under specific material, institutional, temporal, and organizational conditions.

Hutchby (2003) extended this framework to sociotechnical systems, arguing that technologies should be understood neither as neutral instruments whose meaning is wholly socially constructed nor as objects whose effects are determined by their material properties alone. Technologies have what Hutchby calls functional and relational affordances: their material properties enable certain forms of action and constrain others, but which affordances become consequential depends on the social and material conditions in which the technology is encountered. A telephone affords

distance communication only where infrastructure, skill, and social practice make telephoning possible. The technology's properties are stable; the affordances they constitute vary with context. Hutchby's intervention is decisive for the present framework because it brings affordance theory into the territory the framework operates in: the relational dynamics between human participants and the digital systems they work with.

This perspective is particularly important for understanding Human–LLM interaction because identical systems may become integrated into intellectual work in fundamentally different ways depending on how continuity is organized across interactional contexts. The same LLM may function as a drafting assistant, a continuity support mechanism, a procedural problem-solving tool, a temporary external memory structure, or an additional source of coordination complexity. Interaction outcomes therefore cannot be reduced either to model capabilities alone or to generalized assumptions about “AI impact.”

Affordance Theory also makes it possible to analyze why Human–LLM interaction does not produce uniform organizational patterns even within similar professional environments. Some users may develop iterative interaction practices oriented toward continuity reconstruction across interrupted work processes, while others may deliberately restrict interaction to short procedural exchanges in order to minimize coordination demands. Affordances consequently emerge not as static technological properties, but as relational possibilities shaped by user strategies, institutional expectations, temporal pressures, and conditions of instability. The interaction materials also suggest that affordances may emerge not only through the extension of continuity but also through the deliberate minimization of temporal coordination demands within interaction.

Within the framework developed in this article, affordances are therefore understood as continuity-related interaction possibilities emerging under asymmetrical and unstable conditions. This perspective helps explain how Human–LLM interaction may support maintenance and reconstruction of intellectual continuity in some situations while contributing to fragmentation, additional verification work, or interactional complexity in others. The analytical focus thus shifts from evaluating LLMs as universally beneficial or harmful technologies toward examining the situated organization of continuity within distributed intellectual work.

The four theoretical traditions developed across Sections 2.1–2.4 collectively provide the conceptual basis for analyzing Human–LLM interaction as a form of distributed intellectual work organized under conditions of instability. Activity Theory situates intellectual activity within mediated systems shaped by institutional, technological, and material conditions. Distributed Cognition explains how cognitive processes and continuity supports become distributed across human and technological participants. Wang's Assumption of Insufficient Knowledge and Resources conceptualizes the structural non-equivalence between humans and LLMs as fundamentally different forms of intelligent systems operating under unequal conditions of knowledge, responsibility, and situatedness. Affordance Theory explains how interaction possibilities emerge relationally within specific

organizational and environmental contexts.

Taken together, these approaches make it possible to conceptualize Human–LLM interaction not simply as tool use, but as the distributed organization and maintenance of intellectual continuity under fragmented conditions. The next section outlines the abductive methodological positioning through which this theoretical synthesis was developed in dialogue with exploratory engagement with wartime interaction materials.

Methodology: Abductive Framework Development and Empirical Materials

This article adopts an abductive methodological orientation combining theoretical synthesis with exploratory interpretive engagement with Human–LLM interaction materials. Rather than testing predefined hypotheses or conducting a fully formalized qualitative coding procedure, the study seeks to develop a conceptual framework capable of describing how continuity of intellectual work becomes organized within Human–LLM interaction under conditions of instability.

Abductive research proceeds through iterative movement between theoretical concepts and empirical observations, allowing analytical categories to emerge progressively through dialogue between conceptual interpretation and empirical material (Timmermans & Tavory, 2012). Within this study, theoretical reflection and exploratory examination of interaction materials developed in parallel. The framework was therefore not imposed deductively upon the corpus but gradually refined through repeated comparative engagement with recurring interactional patterns visible across the materials.

The empirical materials consist of voluntarily shared interaction logs produced by nine Ukrainian educators using LLM systems during wartime, from 2023 to early 2026. The materials included interactions with systems such as ChatGPT, Claude, Gemini, and Copilot across a range of academic and professional tasks, including drafting, revision, summarization, translation, planning, communication, and administrative work. The corpus was not treated as a statistically representative dataset, but as exploratory material enabling analytical engagement with emerging forms of Human–LLM coordination under fragmented working conditions.

The analysis focused not on evaluating correctness or efficiency of model outputs, but on identifying recurring forms of continuity management within interaction processes themselves. Particular attention was given to how participants resumed interrupted work, reconstructed context across sessions, organized iterative interaction, externalized cognitive continuity through dialogic exchange, engaged in anticipatory clarification before action, or deliberately minimized continuity demands through bounded procedural interaction.

Because the article develops an exploratory conceptual framework rather than a comprehensive empirical typology, the materials are used primarily as analytical orientation, with selected excerpts used illustratively to demonstrate recurring interactional patterns rather than as a basis for generalized causal claims. The study therefore does not aim to measure frequency of interaction patterns or produce

definitive classifications of AI use. Instead, the interaction materials function as empirically grounded points of theoretical sensitization supporting abductive framework development.

The wartime context is analytically important not because it represents an exceptional or isolated case, but because conditions of interruption, instability, infrastructural disruption, emotional strain, and fragmented continuity become particularly visible within everyday intellectual activity. Such conditions intensify processes that may remain less analytically visible in more stable environments and therefore provide a productive context for examining how continuity of intellectual work becomes distributed, reconstructed, and coordinated through Human–LLM interaction.

All interaction materials used in the study were voluntarily shared by participants for research purposes. The materials were anonymized prior to analysis, and personally identifiable information, institutional identifiers, and sensitive contextual details were removed or generalized in the presentation of examples. Short interaction excerpts included in the article are used illustratively to demonstrate recurring interactional patterns rather than as objects of detailed discourse analysis. The study follows an exploratory abductive design focused on conceptual framework development rather than evaluation of individual participants.

Results: Human–LLM Asymmetry and Continuity Management

1. Dimensions of Human–LLM Asymmetry

The framework developed in this article conceptualizes Human–LLM interaction as a form of distributed intellectual work organized across structurally non-equivalent participants. Humans and LLMs participate in the same interactional processes under fundamentally different conditions of continuity, responsibility, contextual situatedness, and resource limitation. Asymmetry therefore does not refer simply to technological difference, but to unequal distribution of coordination demands within interaction itself.

Exploratory interpretive engagement with the interaction materials revealed several recurring asymmetry dimensions shaping Human–LLM interaction under conditions of instability and fragmented continuity. These dimensions are summarized in Table 1.

The asymmetries summarized in Table 1 should not be understood as fixed barriers separating humans and LLMs into independent domains. Rather, they shape the conditions under which continuity of intellectual work becomes organized through interaction. Human participants remain responsible for maintaining coherence between generated outputs and situated academic, professional, institutional, and material realities that the model itself does not inhabit.

Table 1. Structural Conditions Shaping Human–LLM Asymmetry

Dimension of Asymmetry	Human condition	LLM condition	Interactional implications
Temporal	Interruption, urgency	Continuous availability	Repeated reconstruction of

Dimension of Asymmetry	Human condition	LLM condition	Interactional implications
			context and continuity
Contextual	Situated institutional and material embeddedness	Statistical textual processing	Human responsibility for contextual appropriateness
Experiential	Emotional and practical consequences	No lived consequences	Emotional self-regulation remains human's responsibility
Cognitive	Selective and resource-limited cognition	Rapid large-scale text generation	Humans evaluate relevance and correctness
Recovery	Fatigue and loss of continuity over time	No exhaustion accumulation	Humans repeatedly restore interrupted work

Source: compiled by the author based on exploratory engagement with educator-LLM interaction logs (Mykhailenko, 2026).

The interaction materials collected under wartime conditions suggested that these asymmetries became organized through different forms of temporal coordination within Human–LLM interaction. Some participants developed iterative interaction practices involving repeated returns to the same conversations, gradual refinement of drafts, and reconstruction of continuity across interruptions. In several long-form interactions, participants repeatedly resumed unfinished analytical tasks through prompts such as “continue restructuring the previous section” or “return to the earlier version and integrate the new argument.” In such cases, interaction histories functioned as external supports preserving partially completed intellectual work across fragmented working conditions.

Other interactions were organized through highly bounded procedural exchanges focused on rapid clarification, verification, or immediate task completion. Typical prompts included brief procedural questions such as “Can I apply again?”, “What does this requirement mean?”, or “Is this formulation acceptable?”. Rather than extending continuity across sessions, these interactions minimized continuity demands through rapid stabilization of specific uncertainties. Such practices should not necessarily be interpreted as limited or superficial forms of AI use. Under fragmented and overloaded conditions, minimizing coordination demands may itself function as an adaptive strategy for maintaining the broader continuity of intellectual activity.

The asymmetries summarized above create unequal conditions for maintaining continuity within distributed intellectual work. Human participants remain constrained by interruption, fatigue, contextual responsibility, and limited cognitive resources, while LLM systems preserve interaction traces and remain continuously operational. Under such conditions, continuity can no longer depend solely on uninterrupted human cognition. Instead, Human–LLM interaction increasingly

operates through adaptive mechanisms that reorganize how continuity becomes maintained, reconstructed, or strategically minimized under fragmented conditions.

2. Modes of Temporal Coordination in Human–LLM Interaction

The interaction materials collected under wartime conditions highlighted how Human–LLM interaction may reorganize not only the distribution of intellectual work, but also the temporal organization of cognition itself. Across the corpus, LLM systems functioned not simply as sources of information or text generation, but as infrastructures through which continuity of intellectual activity could be externally supported, resumed after interruption, compressed into bounded exchanges, or temporarily stabilized under conditions where continuity could no longer be assumed.

One recurring mode of interaction involved continuity-extending coordination. In such cases, participants used LLMs through iterative and longitudinal interaction practices oriented toward preservation and reconstruction of unfinished intellectual activity over time. Conversations were repeatedly resumed across multiple sessions, often involving recursive refinement of drafts, restructuring of arguments, translation, reformulation, or continuation of previously interrupted tasks. Interaction histories functioned as temporary external memory structures preserving partially completed cognitive work across fragmented temporal conditions.

Recurring iterative prompts included requests such as “continue restructuring the previous section,” “return to the earlier version and integrate the new argument,” “rewrite according to the revised framework,” or “continue from the previous draft after the interruption.” In such interactions, continuity no longer depended entirely on uninterrupted individual concentration. Instead, continuity became partially externalized across dialogic interaction histories that enabled resumability of intellectual work after interruption.

At the same time, the interaction materials revealed a second mode of temporal coordination operating through continuity minimization rather than continuity extension. Many interactions consisted of highly bounded procedural exchanges focused on rapid clarification, interpretation, verification, or anticipatory reduction of uncertainty before action. These interactions were typically short, transactional, and oriented toward immediate stabilization of specific situations rather than development of extended dialogic continuity. In many cases, multiple short clarification exchanges preceded relatively simple administrative, pedagogical, or communicative actions.

Recurring procedural prompts included questions such as “Can I apply again?”, “What does this requirement mean?”, “Is this formulation acceptable?”, “How should this document be structured?”, or “What should I do before submission?”. In such cases, the value of interaction did not depend on sustaining continuity across sessions. Instead, LLMs functioned as low-threshold interpretive infrastructures reducing temporal and cognitive costs associated with uncertainty, procedural ambiguity, or fragmented decision-making conditions.

This distinction is analytically important because interactions characterized by low continuity should not necessarily be interpreted as weak or superficial forms of AI integration. Under conditions of overload, interruption, and temporal fragmentation, minimizing coordination demands may itself function as an adaptive strategy for

preserving broader continuity of intellectual and professional activity. Human–LLM interaction therefore supports continuity not only by extending cognitive processes across time, but also by reducing the need for continuity-intensive cognition in situations requiring rapid procedural stabilization.

The materials therefore suggest that Human–LLM interaction increasingly operates not only through extension of cognitive continuity, but also through selective reduction of continuity demands under conditions of instability.

The materials therefore suggest that Human–LLM interaction reorganizes continuity not only through extension of cognitive activity across time, but also through selective reduction of continuity demands under instability. Continuity increasingly becomes distributed across interaction histories, procedural clarification, iterative refinement, and externally preserved interaction traces rather than sustained solely through uninterrupted concentration.

3. Continuity Mechanisms and Distributed Resumability

The asymmetries identified in Table 1 indicate that humans repeatedly reconstruct continuity, evaluate contextual appropriateness and correctness, regulate emotional consequences, and restore interrupted work, while LLMs remain continuously available and preserve interaction traces. Under such conditions, continuity increasingly depends on mechanisms that preserve resumability across interrupted intellectual activity.

Two continuity mechanisms became particularly visible across the interaction materials. The first involves externalization through iterative interaction histories that preserve unfinished cognitive activity across interruptions. Drafts, archived conversations, recursive revisions, and reformulated fragments function as external continuity supports that allow participants to resume partially completed work over time. Recurring prompts such as “continue from the last version,” “integrate the comments into the previous draft,” or “return to the earlier structure” illustrate how continuity increasingly becomes distributed across preserved interaction traces rather than maintained entirely through uninterrupted concentration.

The second mechanism involves temporal compression through rapid procedural stabilization of bounded uncertainties. In such cases, participants minimize continuity demands by reducing intellectual activity to localized operations requiring immediate clarification before action. Short exchanges such as “what documents are required in this case?”, “does this wording sound appropriate?”, “summarize only this section,” or “just give me the key points” did not extend continuity across sessions. Instead, they reduced the coordination burden required for resuming activity under fragmented conditions.

Together, these mechanisms suggest that continuity under instability is no longer organized primarily through sustained linear intellectual progression. Instead, continuity increasingly depends on the ability to suspend, preserve, and later resume partially completed cognitive activity across interruptions. Human–LLM interaction therefore reorganizes continuity around distributed resumability, where partially

completed cognitive activity can be externally preserved, re-entered after interruption, and selectively stabilized across interaction histories.

This transformation becomes visible in interaction practices themselves. Many exchanges reorganized larger intellectual tasks into resumable operations through requests such as “translate only this paragraph,” “rewrite the conclusion separately,” “generate discussion questions for this section,” or “explain this term before I continue writing.” Participants also repeatedly returned to preserved interaction fragments through prompts such as “continue from where we stopped yesterday” or “restore the earlier outline.” Such interactions indicate that continuity increasingly depends on coordination of incomplete but recoverable cognitive fragments distributed across human and technological systems.

From this perspective, the continuity mechanisms identified in the interaction materials can be understood as adaptive responses through which distributed resumability becomes maintained under asymmetrical continuity conditions (Table 2).

Table 2. Continuity Mechanisms Supporting Distributed Resumability

Dimension of asymmetry	Interactional implications	Continuity mechanism	How continuity is maintained	Illustrative interaction forms
Temporal	Repeated reconstruction of context and continuity	Externalization of continuity	Preservation of interaction history across interruptions	“continue from the previous draft”; “return to the earlier structure”
Contextual	Human responsibility for contextual appropriateness	Externalization of continuity	Repeated contextual refinement across interaction iterations	“integrate reviewer comments”; “adapt this for university requirements”
Experiential	Emotional self-regulation remains human’s responsibility	Temporal compression	Reduction of emotionally burdensome decision coordination	“does this wording sound appropriate?”; “what should I do before submission?”
Cognitive	Humans evaluate relevance and correctness	Temporal compression	Compression of localized verification and clarification tasks	“summarize only this section”; “explain this requirement briefly”
Recovery	Humans repeatedly restore interrupted work	Both mechanisms	Resumption from preserved fragments or reduced coordination demands	“continue from where we stopped yesterday”; “just give me the key points”

Source: created by the author based on exploratory engagement with interaction materials (Mykhailenko, 2026).

These observations suggest that Human–LLM interaction should be analyzed not primarily through questions of technological capability or efficiency, but through

changing forms of continuity organization within distributed intellectual systems. Under conditions where continuity cannot be assumed, intellectual activity increasingly depends on distributed resumability achieved through preservation, reconstruction, and rapid stabilization of fragmented cognitive activity across human–technological interaction systems.

Discussion

The article addressed the research question of how Human–LLM interaction reorganizes the maintenance of intellectual continuity under conditions of wartime instability. The analysis suggests that the significance of Human–LLM interaction lies not primarily in automation or replacement of human cognition, but in supporting the possibility of continuing academic work under conditions where uninterrupted concentration and stable working environments can no longer be assumed.

The findings demonstrated that Human–LLM interaction operates through structurally unequal distributions of continuity work. Human participants remained responsible for contextual interpretation, verification, emotional regulation, repair of misunderstandings, and restoration of interrupted activity under conditions of overload, instability, and limited cognitive availability. LLM systems, by contrast, preserved interaction traces, rapidly generated reformulations, and remained continuously available across interruptions. The analysis therefore suggests that continuity within Human–LLM interaction is not shared equally, but maintained through asymmetrical distributions of interpretive, contextual, and recovery responsibilities.

Two major continuity mechanisms became visible across the interaction materials. The first involves externalization through preserved interaction histories supporting resumability across interruptions. Drafts, archived prompts, recursive revisions, and interaction traces allowed partially completed work to remain recoverable after disruption. The second mechanism involves temporal compression through rapid stabilization of bounded uncertainties that reduced coordination demands before action. Importantly, such short procedural interactions should not be interpreted as superficial AI use. Under fragmented conditions, rapid clarification and uncertainty reduction may themselves become essential for sustaining broader continuity of professional activity.

The article therefore contributes a continuity-centered framework for analyzing Human–LLM interaction under unstable conditions. Existing theories of Human–AI interaction, affordances, and computer-mediated communication have largely been developed within contexts where infrastructural stability, temporal continuity, and uninterrupted participation remain implicit background assumptions. Wartime conditions make these assumptions visible by exposing situations in which continuity can no longer be maintained solely through uninterrupted human cognitive effort. The framework developed in this article therefore extends existing approaches by demonstrating how continuity itself becomes an organizational problem within Human–LLM interaction under instability.

The wartime environment is analytically important not because it produces entirely unique forms of Human–LLM interaction, but because interruption, displacement, infrastructural disruption, and overload intensify continuity problems that often remain less visible under stable conditions. The Ukrainian case therefore functions not only as an extreme situation, but also as an analytical lens through which broader transformations of academic and professional work become more observable. Many of the dynamics identified in this study may increasingly characterize intellectual activity beyond wartime environments as contemporary work becomes more fragmented, accelerated, and interruption-intensive.

The article also has important implications for higher education, research, and professional intellectual work. The findings suggest that effective Human–LLM interaction increasingly involves not only generation of outputs or prompt engineering, but also the ability to externalize continuity, preserve resumability across interruptions, and strategically reduce uncertainty through bounded procedural interaction. Intellectual competence increasingly includes the capacity to maintain workable continuity under fragmented cognitive conditions. The interaction practices developed individually by Ukrainian academic participants in response to wartime disruption may therefore be understood as emerging forms of professional resilience rather than merely technical adaptation.

The classifications and analytical distinctions developed in this article may also support future empirical research on Human–LLM interaction. The identified asymmetry dimensions, continuity mechanisms, and coordination patterns provide an initial analytical vocabulary that may be operationalized as a coding framework for deeper qualitative and comparative analysis across different institutional, linguistic, and crisis contexts.

Several limitations should nevertheless be acknowledged. The study is exploratory and abductive rather than based on systematic large-scale coding or quantitative comparison. The interaction materials were used analytically to develop conceptual distinctions rather than to establish statistical generalizations about Human–LLM interaction patterns. Future research may therefore further examine continuity mechanisms, asymmetry patterns, and distributed resumability across more elaborated Human-LLM log analysis methodology, larger datasets and comparative contexts.

Conclusions

This article argued that the growing significance of Human–LLM interaction lies not only in cognitive assistance or generation of outputs, but in supporting the continuity of academic work under conditions of instability, interruption, and overload. Drawing on exploratory analysis of interaction materials shared by Ukrainian academics working during wartime, the study demonstrated that Human–LLM interaction increasingly functions as part of the practical infrastructure through which interrupted work may be preserved, resumed, clarified, and stabilized across disruption.

The article developed a continuity-centered framework for analyzing Human–LLM interaction and introduced a systematic categorization of asymmetries shaping

intellectual work continuity maintenance. Five interrelated dimensions of asymmetry were identified: temporal, contextual, experiential, cognitive, and recovery asymmetries. The analysis demonstrated that these asymmetries are not secondary limitations of otherwise equivalent participants, but structural conditions organizing how continuity becomes maintained within Human–LLM interaction.

The study further identified two major continuity mechanisms supporting distributed resumability under fragmented conditions. The first involves externalization through preserved interaction histories, recursive revisions, and archived prompts allowing partially completed work to remain recoverable across interruptions. The second involves temporal compression through rapid procedural stabilization reducing coordination demands before action. Together, these mechanisms explain how Human–LLM interaction may support resumability under interruption-intensive conditions.

The findings also demonstrated that wartime conditions are analytically important not because they produce entirely unique forms of Human–LLM interaction, but because interruption, displacement, infrastructural disruption, and overload intensify continuity problems that often remain less visible under stable conditions. The Ukrainian case therefore functions both as an empirical context and as an analytical lens through which broader transformations of academic and professional work become more observable.

The article contributes theoretically, methodologically, empirically, and practically. It extends existing approaches to Human–AI interaction by foregrounding continuity maintenance as a central organizational problem under instability, provides an analytical vocabulary for future coding and comparative research, and offers one of the first systematic accounts of Human–LLM interaction practices among academics working under active wartime conditions.

Author Declarations

Author Contributions: The author was responsible for all aspects of the study, including conceptualization, methodology, formal analysis, investigation, data curation, writing – original draft preparation, writing – review and editing, visualization, and project administration. The author has read and approved the final version of the manuscript.

Conflict of Interest

The author declares no conflict of interest.

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Data Availability

The data used in this study are not publicly available due to ethical and privacy considerations related to the interaction materials shared by participants.

AI Usage Statement

During the preparation of this manuscript, artificial intelligence tools were used as supportive instruments for language refinement, structural organization of the text, and iterative analytical development. All outputs were critically reviewed, revised, and integrated by the author, who takes full responsibility for the content of the manuscript, interpretation of findings, and compliance with academic integrity principles.

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ВЗАЄМОДІЯ ЛЮДИНИ З ВЕЛИКИМИ МОВНИМИ МОДЕЛЯМИ ТА РЕОРГАНІЗАЦІЯ ІНТЕЛЕКТУАЛЬНОЇ БЕЗПЕРЕРВНОСТІ: УКРАЇНСЬКІ ВИКЛАДАЧІ, ЩО ПРАЦЮЮТЬ В УМОВАХ ВОЄННОГО ЧАСУ

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Анотація. Стаття досліджує, яким чином взаємодія людини з великими мовними моделями (LLM) реорганізує підтримання безперервності академічної праці в умовах війни. В українській вищій освіті повітряні тривоги, переміщення, інфраструктурна нестабільність, емоційне навантаження дедалі більше порушують умови, необхідні для сталої інтелектуальної діяльності. Водночас існуючі дослідження взаємодії людини та штучного інтелекту переважно зосереджуються на технологічних можливостях, етичних питаннях або результатах навчання, приділяючи значно менше уваги тому, як взаємодія з LLM підтримує безперервність професійної та академічної діяльності в умовах нестабільності. У статті розроблено теоретичну рамку для аналізу взаємодії людини з LLM на основі поєднання теорій Діяльності, Розподіленого Пізнання, Обмежених Знань і Ресурсів, та Доступності (Affordances). Методологічно дослідження ґрунтується на абдуктивному підході та інтерпретативному аналізі журналів взаємодії з LLM, добровільно наданих українськими викладачами, які використовували системи ChatGPT, Claude, Gemini та Copilot в умовах війни. У результаті було визначено п'ять вимірів асиметрії взаємодії людини та LLM: темпоральну, контекстуальну, досвідну, когнітивну та асиметрію відновлення. Також ідентифіковано два механізми підтримання Розподіленої Відновлюваності: екстерналізація через збереження історій взаємодії та темпоральне стиснення через швидку процедурну стабілізацію. Наукова новизна статті полягає у розробленні методологічного підходу і словника для аналізу взаємодії людини та LLM в умовах нестабільності, зокрема у систематизації асиметрій між людським і штучним інтелектом, що формують підтримання безперервності інтелектуальної діяльності. Практична цінність дослідження полягає у можливості застосування результатів у навчальних програмах і політиках вищої освіти, кризової педагогіки, професійного розвитку викладачів та подальших досліджень взаємодії людини та штучного інтелекту.

Ключові слова: взаємодія людини та великих мовних моделей; розподілене пізнання; інтелектуальна безперервність; розподілена відновлюваність; вища освіта воєнного часу; асиметрія людини та LLM; академічна робота в умовах нестабільності.