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DESIGNING A FRAMEWORK FOR ETHNOGRAPHY-DRIVEN PROMPT ENGINEERING IN SOCIAL WORK

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Abstract: *This study proposes a framework for integrating ethnographic principles into prompt engineering (PE) for large language models (LLMs) in social work. While PE has emerged as a key methodology for optimizing LLM outputs, it often lacks grounding in the cultural contexts of end users. By bridging theoretical approaches and methodologies from social and computer sciences, the proposed framework addresses the limitations of a strictly semantic approach in PE. The framework's theoretical foundations are grounded in empirical data gathered during an ethnographic field study conducted within a social service organization. Ten interviews were analysed following the key stages of the ethnographic analysis method. Key cultural themes composed of multiple semantic relationships were uncovered and then connected to core prompt components. These components were further elaborated into various prompting techniques and developed into a set of prompt templates that can be applied to LLM evaluation and further customization.*

Keywords: *large language models, prompt engineering, ethnography, social work.*

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INTRODUCTION

Background. Recently, AI systems have revolutionized a range of professional workflows (Ratnayake and Wang, 2023), and social work professional settings are no exception. Specifically, variations of programs powered by large language models – including chatbots, virtual assistants, simulations, and conversational agents – have been increasingly adopted across typical work environments (Ranade et al., 2024) and have gradually been employed in social service delivery (Seniutis, Sas, Gružauskas, 2024). Several countries have successfully implemented these LLM-driven solutions in public services. In Sweden, 95% of local authorities have replaced certain staff functions with AI-powered digital coworkers (O'Dwyer, 2020). In Norway, the virtual agent "Frida" has handled 270,000 inquiries on social security benefits during the COVID-19 pandemic, equivalent to the workload of 220 service agents (Ringes, 2020). In Finland, Kela has processed 3 million interactions, with 72% of benefit applications submitted online (Kela, 2021).

The rapid expansion of large language models (LLMs) has sparked significant interest, not only in their social impacts – primarily focusing on the benefits and risks their outputs pose to users – but also in understanding and enhancing their performance from a technical perspective. A substantial body of literature highlights that crafting effective prompts is crucial to maximizing the capabilities of LLMs (Ein-Dor et al., 2024; Ranade et al., 2024; Schulhoff et al., 2024; Wei et al., 2022; Liu et al., 2023b;Napieralski et al., 2024).

Since general-purpose LLMs, also known as pre-trained or foundation models, trained on large datasets, may not always perform optimally for domain-specific tasks, specialized LLMs are developed to deliver enhanced performance and tailored outputs for specific applications. One fundamental approach to specializing LLMs is fine tuning (see Table 1). It involves using a custom dataset tailored to the target domain to further train a pre-trained general-purpose model. This process adjusts the model's parameters, enabling it to capture domain-specific nuances and improve performance on specialized tasks. Beyond adjusting the model itself, prompt engineering, can be employed as an effective way to improve LLM performance. By crafting precise hard prompts, users can steer a general-purpose model toward generating more accurate and contextually relevant responses to their inputs without needing the model to be retrained (Schulhoff et al., 2024). When managing complex and specific tasks with LLMs, prompt tuning, which leverages AI-driven design of soft prompts, can serve as both a substitute for additional training data and a method to guide the model toward desirable outputs. To automate and optimize the process of prompt creation, prompt tuning introduces the concept of soft prompts. Instead of manually designing prompts, soft prompts are learnable embeddings that the model adjusts during training (Khattab et al., 2024; Yuksekgonul et al., 2024; Kolková & Ključnikov, 2022).

Our study focuses primarily on prompt engineering (PE), aiming to explore how methodological strategies from social research can inform the process of prompt crafting. Through this exploration, we actively engage in the process by not only providing guidance but also constructing prompts, incorporating certain techniques from prompt tuning (PT) in the process.

Table 1. Approaches to specialize a pre-trained model for domain-focused tasks

Approach	Fine tuning	Prompt engineering	Prompt tuning
Lifecycle stages	Training	Deployment	Training/ Deployment
Status of LLM	Pre-trained model (untuned)	Pre-trained or fine-tuned model	Pre-trained or fine-tuned model
Input sources	Labelled data + Input	Hard prompt + Input	Soft prompt + Input
Task roles	Humans create and annotate datasets; inputs are used after training.	Humans craft hard prompts (text) and provide inputs to guide outputs during exploitation.	Humans provide input-output examples for training; the model optimizes soft prompts (learnable embeddings) for use during exploitation.
Description	Enhances a pre-trained model during the training phase by incorporating a large number of tunable examples. This ensures the model generates domain-specific outputs in response to user inputs.	Guides an untuned pre-trained model during the exploitation phase by using human crafted hard prompts. These prompts precede user inputs to help the model deliver accurate and relevant outputs.	Optimizes soft prompts in a lightweight training phase, adjusting their parameters to guide responses without altering the model. The optimized prompts are combined with user inputs.

State of art. Prompt engineering (PE), defined as the process of crafting effective input queries to enhance LLM outputs (Brown et al., 2020), is considered one of the most robust methodological approaches for evaluating model effectiveness. However, PE has been criticized for its narrow focus on prompt engineering techniques, primarily involving trials and tests to establish best practices for prompt design (see Short and Short, 2023; White et al., 2023). To address these limitations, Ranade et al. (2024) proposes a theoretical foundation for effective prompt engineering by integrating rhetorical theory, combining the architectural workflows of algorithms with insights from writing studies. Goloujeh et al. (2024) and Sanchez (2023) also highlight the predominant focus in PE on the semantic structure of prompts, including syntax (Jiang et al., 2022), the role of word order (Lu et al., 2022), use of constrained vocabularies, prompt formulation, and writing techniques (Liu et al., 2023; Liu and Chilton, 2022). Goloujeh et al. (2024) further emphasize the general tendency to focus on individual interactions between the user and the LLM (Pereira et al., 2023) and extend their analysis to the social dynamics within prompt communities. They illustrate how prompts emerge as social constructions shaped by the competing interests of different groups and highlight that collective knowledge is just as crucial for the development of new prompt creation practices as the technical tools used for crafting prompts.

Our study views prompt engineering not merely as a socially constructed practice but as an integrated process encompassing both social and technical dimensions. It offers a methodological framework designed to ensure a human-centred approach in prompt engineering, effectively linking social contexts that require LLM solutions with the technical PE strategies which enhance models' performance. Guided by ethnographic principles, this framework ensures that prompt design is deeply rooted in the complexities of social realities.

Study aim. Drawing on our preparation for a case study aimed at creating prompts to evaluate the effectiveness of a specific LLM in social work practice, we developed and examined the methodological steps involved, providing examples of how to incorporate socio-technical contexts, such as the use of LLMs in social work practice, into the prompt design process. This framework aims to inform the prompt design process with insights from prompt users (social workers), ensuring that the prompts are effectively tailored to their professional interests and settings. The objective is to move beyond the surface-level semantic symbols (folk terms) used by social workers to uncover the cultural meanings that shape their professional practice and convert these insights into effective prompts.

First, we review theoretical and methodological perspectives drawn from social and computer sciences to contextualize our choice of ethnography and prompt engineering as foundational elements for developing our new framework. Next, we outline a range of ethnographic principles essential for formulating research questions that uncover specific insights and detail how these insights can be analysed and systematically organized into relevant topics. We then review the essential structural components of a prompt and the most relevant prompt engineering techniques, providing examples of each. Finally, we demonstrate how topics drawn from our ethnographic analysis inform the key structural components of a prompt and can be embedded into various prompting techniques.

METHODOLOGY

To formulate the theoretical and methodological foundations of the framework outlined in the 1-3 objectives and further elaborated in the corresponding paragraphs of the Results section, we conducted an exploratory review of interdisciplinary literature, covering both social and computer sciences. We did not conduct a traditional systematic literature review, due to the limited amount of existing peer-reviewed literature on integrating social research methodology into prompt engineering. Instead, our approach was more aligned with scoping studies, which focus on swiftly identifying the fundamental ideas driving a research domain and the main evidence and sources available, especially in fields that are complex or have not been thoroughly reviewed (Arksey & O'Malley, 2005). Such methodological approaches have proven effective in emerging interdisciplinary fields where systematic literature reviews may be constrained by limited peer-reviewed literature (Farchi et al., 2021).

Our review was guided by these three research questions: 1) What are the common approaches within social and computer sciences for conceptualizing, developing, and evaluating sociotechnical systems? 2) How are ethnographic data collection and analysis methods applied to examine human and non-human cultures? and 3) What are the key components of prompts, and the techniques used for prompting? After identifying an initial set of sources for each of the questions across Web of Science, EBSCO, and SCOPUS, we reviewed the reference lists to find additional literature.

Table 2. Ethnographic interviews with social workers

Client group	Number of interviews (units)	Interview duration (h)
Homeless	2	02:22:30
Migrants	2	03:14:38
Families experiencing separation	2	01:56:33
Formerly incarcerated individuals	2	02:16:10
Single mothers raising children	2	02:23:28
	Total: 10	**Total:** 12:13:19

Additionally, in order to construct and test our framework, as outlined in Objective 4 and the corresponding paragraph of the Results section, we conducted an ethnographic field study in a NGO by observing the daily work practices of and interviewing social workers engaged in face-to-face interactions with their clients (see Table 2). We developed an interview

instrument, gathered and analysed data according to ethnographic principles and procedures (see Spradley 2016), which are thoroughly discussed in the Results section. Data analysis was conducted manually using conventional software tools, without the involvement of artificial intelligence (AI) or machine learning (ML) techniques. We also demonstrated how the gathered insights can be integrated into prompt formulation.

RESULTS

1. Theoretical and methodological connections between social and computer sciences

In the initial part of this study, we review theoretical and methodological perspectives derived from social and computer sciences, which offer sufficient analytical concepts and methodological principles to explain and investigate such phenomena as socio-technical systems. Looking at the historical debate on technology and society, we identify shared efforts among researchers in these fields to conceptualize socio-technical systems while striving to avoid deterministic views. This discussion highlights the importance of these approaches to our framework. We then examine the dominant methodological positions held by scholars on either side of the debate.

1.1. Overcoming technological and social determinism in conceptualization of sociotechnical systems

The academic debate about digital technologies and society within social and computer sciences began in the mid-20th century, as the commercialization of early computers opened the door to their wider use (Kling et al., 2005). From the 1950s to the 1970s, due to the high costs of emerging computer technologies, these advancements were mainly used in business. This led researchers to focus on how computerized systems affected organizational structures. Scholars from various fields also studied the social impacts of these systems, each bringing the methods and theories of their disciplines. On one side were social scientists – sociologists, educators, communication experts, and political scientists. On the other were experts from the formal sciences1, including informatics, computer science, and information science (Mitchel & Talburt, 2003; Wanda J. Orlikowski & Barley, 2001; Wanda J. Orlikowski & Iacono, 2001; Yatsko, 2018).

Advances in digital technologies opened new applications, encouraging researchers to adopt innovative approaches. For example, the 1970s saw a rapid expansion of digital technologies in the public sector. By the late 1980s, Rob Kling, a key figure in the formal sciences, formally established the field of social informatics, defining it as “the interdisciplinary study of the design, uses, and consequences of information and communication technologies that takes into account their interaction with institutional and

1 Formal sciences are a field of study in which knowledge is created by analysing abstract structures or, in other words, formal systems, rather than elements of the natural or social world, which respectively become the objects of the natural and social sciences.

cultural contexts" (2005, p. 5). His work emphasized the need to integrate theoretical and methodological perspectives from both formal and social sciences, aiming to create a more comprehensive understanding of the social dimensions of computerization. This shift ultimately required researchers to broaden their focus – from solely examining organizational contexts and computerized systems to exploring the wider applications and social implications of emerging digital technologies.

A similar shift occurred among social scientists, moving from purely intradisciplinary approaches – focused on a single field – to interdisciplinary approaches that integrate insights from multiple disciplines. In the 1960s, this shift led to the formation of a new field, closely linked to sociology, which borrowed tools and methods from anthropology, geography, history, organizational studies, and philosophy of science. Formally named "Science, Technology, and Society" (STS), it is also known by other titles such as "Science Studies", "Science and Technology Studies", "The Sociology of Scientific Knowledge", and "Social Studies of Science and Technology" (Law, 2008, pp. 624–626).

While social informatics began with studies on how computerized systems impact organizational work, STS pioneers like Thomas Kuhn, Wiebe Bijker, Steve Woolgar, Michel Callon, and Bruno Latour were more interested in the sociological foundations of the scientific method and the technologies it produces. Although they originated separately, both fields moved in a similar direction: social informatics began focusing on social knowledge and the societal impacts of technologies, while STS increasingly concentrated on technology itself and the knowledge fields that interpret it. Researchers in both disciplines shared an interdisciplinary commitment to understanding the socio-technical nature of these phenomena. Their central question was this: does society shape technological advancement, or do technologies determine societal change? This question formulation underscores a divide between two theoretical perspectives: one side leans toward social determinism, while the other supports technological determinism. Notably, both formal and social scientists are represented in these opposing viewpoints.

Kling introduced social informatics as a response to the dominance of technologically deterministic theories within informatics (Kling et al., 2003, 2005; Lamb & Sawyer, 2005). His approach – STIN (Socio-Technical Interaction Network) – draws on the socio-technical principles of Bijker, an early STS pioneer, whose ideas laid the groundwork for the SCOT (Social Construction of Technology) approach within STS (Sawyer & Tyworth, 2006). SCOT ultimately led to a shift within the STS movement – from theories rooted in social determinism to more radical perspectives that emphasize the autonomy of technology relative to social reality.

SCOT is grounded in the idea that technologies are socially constructed, suggesting that they are forms of material culture shaped by active social interests. In this view, the structure of technologies is seen as a reflection of social order. However, some STS scholars have criticized this SCOT view, arguing that technologies, as technical systems, contain a distinct relational logic – reflecting relationships among system components – that can influence and reshape social reality. Therefore, social reality alone cannot fully explain technical systems and requires explanation itself (Law, 2008).

An alternative perspective was offered by STS representatives Michel Callon and Bruno Latour, who laid the foundations for Actor-Network Theory (ANT). To avoid a reductionist view of socially constructed technologies, they propose a radical interpretation of sociality.

The primary assumption of this approach is that sociality is constantly constructed and transformed in real interactions between heterogeneous (non-homogeneous, diverse in nature) elements: people, technologies, natural phenomena, documents, non-human life forms, knowledge, social factors, and so on. Some critics associate ANT with technological determinism due to the unique autonomy granted to non-human actors according to this perspective (Collins & Yearley, 1992; Grint & Woolgar, 1997). Key ANT concepts show that ANT offers an unusual yet valid approach to traditional sociological thinking, avoiding social or technological determinism when creating knowledge about the socio-technical systems (Tatnall, 2005). For example, within this approach, agency is understood as the ability of both human and particularly non-human actors to involve other actors in action in unexpected ways, thereby assembling a heterogeneous network. This contrasts with the traditional understanding in social sciences, where action is controlled by human consciousness and confined exclusively to the human realm, as well as with the natural sciences, where action is perceived as material causality driven by the logic of cause and effect, thus being largely predictable (Latour, 2005).

The analysis of theoretical perspectives drawn from social and computer sciences shows that socio-technical systems, whose composing elements should be reflected in prompt design, must be ontologically understood in a way that avoids both social and technical determinism. Contemporary research in transportation and urban planning demonstrates similar challenges in understanding complex socio-technical interactions, where technological innovations like autonomous vehicles require careful consideration of both social acceptance and technical implementation (Razavi & Sierpinski, 2024). This can be achieved by accounting for the unpredictable agency of both human and non-human actors (see Table 3).

Table 3. Theoretical perspectives within social and computer sciences

Science field	Social science		Computer science
Discipline	Science Technology and Society (STS)		Social informatics (SI)
Theoretical perspective	SCOT	ANT	STIN
	Towards social determinism	Overcoming technological and social determinism	From technological towards social determinism
Relevant authors	Bijker W. E.	Latour B.	King R.

1.2. Overcoming technological and social determinism in developing and evaluating impact of sociotechnical systems

User-centred design emerged as a fundamental approach within computer science, particularly in the field of human-computer interaction (HCI), during the 1980s. It emphasized that designing computer systems is not simply a technical undertaking but also a social and cognitive process (Norman, 2013). This approach highlighted the significance of considering the user's context and needs throughout the entire design process (Winograd & Flores, 1986). Ethnographic methods, recognized as the most effective means, were employed to gain deeper insights into the situated nature of human interactions with technology (Suchman, 1987).

Rooted in the social sciences, ethnography has been traditionally viewed as a privileged methodology in anthropology and began making its way into human-computer interaction

research – a subfield of computer science – as early as the 1980s. This shift occurred when studies in computer system design moved away from a focus on the individual user's cognitive experience and needs, instead embracing a perspective centred on group work processes and social interactions (Blomberg et al., 2017). Today, there is a broad field of research that prioritizes ethnography, assigning it the status of the most reliable approach in studies assessing the development of computerized technologies or their impact in business and social service organizations (White et al., 2009).

Ethnography's methodological principles and techniques are informed by the assumptions underlying ethnomethodology and the ANT approach. At least three of them can be identified. The first ethnographic principle of "being there" involves the researcher's direct participation in the field, conducting participant observation, and employing other minimally mediated data collection methods (Murchison, 2010, pp. 12, 14, 16). This approach helps the researcher understand, acquire, and convey the local perspective (i.e., insider's perspective), aiming for inductive, embodied, personalized, epistemically inclusive, actively engaged, and deeply immersed knowledge generation (Nycz, 2017; Spradley, 2016b; Spradley & McCurdy, 2012). It aligns with what Bruno Latour (2005) calls knowledge generation "from the inside" rather than "from the outside", by following the participants who represent the reality being studied rather than creating explanations a priori, to minimize the risk of confusing "what is explained" with "what needs to be explained".

Ethnography also includes the possibility of involving diverse groups of informants, integrating their conflicting positions and perspectives, and employing various data collection and analysis methods and techniques, as well as different theoretical approaches. This allows for the creation of knowledge about objects of a heterogeneous nature (belonging simultaneously to different spheres of reality) and capturing their variability (Murchison, 2010, pp. 4, 10-13). As a multifaceted approach, ethnography provides tools to overcome "asymmetric anthropology," which focuses exclusively on studying static human cultures and shifts attention toward the performativity of natural objects (Latour, 2004, p. 87).

According to the ethnographic principle of reciprocity, it is required that the ethnographer try to integrate the practical interests of the participating community with the scientific goals and available resources of the researcher (Atkinson, 2007). In this way, the knowledge generated cannot be solely attributed to the researcher's merit nor be addressed exclusively to the academic community. Scientific production should be directed toward the community. Moreover, the scientific explanations created should encourage changes within the group that participated in the research. It does not imply researcher bias or partiality in the explanations developed. On the contrary, integrating the interests of the stakeholders indicates the importance of attentiveness to empirical reality, creating theoretical explanations that not only reflect empirical reality but also become part of it and transform it from within (Latour, 2005).

The examination of methodological approaches from social and computer sciences suggests that to effectively develop and evaluate sociotechnical systems, it is essential to choose epistemological strategies that address both social and technical realities. Thus, the prompt design process – an integral step in building specialized LLMs – should be guided by insights derived from data collection and analysis methods capable of capturing both materiality and sociality (see Table 4).

Table 4. Methodological approaches within social and computer sciences

Science field	Social science	Computer science
Discipline	Anthropology	Human-computer interaction (HCI)
Methodological approach	Ethnography	User-centred design
	Overcoming technological and social determinism	From technological towards social determinism
Relevant authors	Spradley J.	Norman D.

APPLYING ETHNOGRAPHIC DATA COLLECTION AND ANALYSIS METHODS

Having discussed the theoretical and methodological foundations of our framework for integrating socio-technical context into prompt design, this section focuses on gathering key insights for prompt formulation through ethnographic interviews and the application of ethnographic analysis principles. Our preparation for the ethnographic field research started with a systematic literature review (SLR) (Seniutis, Gružauskas, Sas, 2026), revealing key concepts like stages in the helping process, everyday work tasks, work tools, challenges and professional identity (see Table 5). These concepts served as initial guidelines for our fieldwork, particularly in designing the questionnaire for formal interviews. Similar initial topics can also be identified by conducting pilot interviews or through participant observation.

Table 5. Topics deriving form SLR conceptual framework PICOC

Concepts	**Description**	**Topics for field research**
Population	Social work professionals, particularly social workers, and representatives of various other helping professions, involved in social work practice. This includes both practitioners and managers.	Professional identity
Intervention	Use of various Large Language Model (LLM) tools in social work practice.	Work tools
Comparison	The application of LLMs: a) across various organizational settings; b) for diverse professional tasks; c) at different stages of social service delivery; and d) for different client groups; e) and in shaping professional identity.	Stages in the helping process Everyday work tasks Professional identity
Outcomes	Benefits and risks arising from the use of various LLM tools.	Challenges
Context	Social work practice includes particularly the social service delivery process and its different stages, and more broadly it refers to social assistance or social problem-solving processes and their stages.	Stages in the helping process

Designing ethnographic questionnaires

To elicit extensive and detailed verbal accounts from our informants and gain deeper insights into their specific knowledge, practices, and perspectives, we adopted Spradley's (2016) methodology for ethnographic interviews in designing our research questionnaire (see Table 6). This approach uses various question types categorized into three groups: descriptive, structural, and contrast questions, each designed to uncover unique insights.

Descriptive questions aim to elicit a large sample of utterances in the informants' native language, thereby uncovering the insider's perspective on a particular cultural scene. For instance, descriptive grand tour questions invite informants to provide a broad overview of their routine activities by guiding the researcher through their experiences. In contrast, mini-tour questions focus on exploring specific, smaller aspects of an informant's experience. Other descriptive questions include example questions, which ask informants to discuss real, concrete incidents that illustrate broader practices. Similarly, experience questions prompt informants to share specific experiences from particular settings. These questions often reveal atypical or unique events, whereas native language questions ask informants to use the terms and phrases most commonly used in their environment.

Table 6. Designing ethnographic questionnaires

Topics	Question group	Question type	Question formulation
Stages in the helping process	D*	Grand Tour Question	Could you take me through the entire client helping process step by step?
	S**	Cover Term Question	What are all different stages in the helping process?
	C***	Contrast Verification Question	You mentioned a few stages in the helping process; could you explain how they differ?
Everyday work tasks	D	Mini-tour Question	Could you walk me through the detailed tasks you handle at every stage of helping a client?
	S	Included Term Question	Do all the tasks you mentioned belong to a specific stage of the helping process?
	C	Direct Contrast Question	How does task (A) that you mentioned differ from task (B)?
Work tools	D	Native Language Question	How would you refer to work tools and which of them do you find yourself using most often? Can you list them?
	S	Cart Sorting Structural Question	Work tools can be listed on cards, placed before the informant, who may then be asked, "Are these all the types of work tools?"
	C	Contrast Set Sorting Questions	Please list the work tools on these cards and organize them into piles that reflect how they are similar or distinct from one another.
Challenges	D	Example Question	Can you give an example of an issue you encounter while performing tasks at different stages of helping?
	S	Substitution Frame Question	You mentioned some challenges you face. Can you think of other terms that fit the sentence: "I struggle with ____"?
	C	Triadic Contrast Question	Among the issues you mentioned, which two are most similar, and which one stands out as different?
Professional identity	D	Experience Question	From your experience, which knowledge, skill, or value do you find most critical in your role, and why? Could you share some examples?
	S	Verification Question	Are there any other knowledge, skills, or values that you consider essential in your work?
	C	Rating Questions	Which of your professional competencies do you see as most important, somewhat important, and least important?

* - Descriptive questions → Domain analysis
** - Structural questions → Taxonomic analysis
*** - Contrast questions → Componential Analysis

Structural questions delve into how informants categorize and organize their knowledge, providing insight into their cognitive frameworks. For example, verification questions check for the existence of a knowledge domain by exploring its types and included terms. Cover term questions focus on broad categories – cover terms within informants' knowledge domain, identifying different types of specific cover terms. They help reveal the components of the domain. Included term questions narrow the focus to intrinsic structure of these broad categories, which clarifies how informants organize their knowledge within a domain. Substitution frame questions prompt informants to think of alternative terms, while card sorting questions involve writing terms on cards and asking informants to categorize them based on their own understanding of how terms relate to each other.

Contrast questions explore how informants make distinctions and comparisons within their knowledge. For instance, contrast verification questions help ensure clarity, by confirming researcher's understanding of the differences and similarities among folk terms. Similarly, direct contrast questions ask informants to compare folk terms by focusing on a known characteristic and asking how other terms contrast on that characteristic. Meanwhile, contrast set sorting questions ask informants to classify items by similarities or differences, which uncovers their classification systems. Further, dyadic and triadic contrast questions ask informants to distinguish differences and similarities between terms. This clarifies the boundaries and meanings they assign to key concepts. Rating questions further explore priorities by asking informants to rank various items.

Outlining data analysis procedures

Each of the discussed groups of ethnographic questions according to Spradley (2016) corresponds to a specific analysis procedure. In other words, insights gained through descriptive, structural, and contrast questions require the following types of ethnographic analysis: domain, taxonomic, and componential, concluding with thematic analysis.

Domain analysis is the first step in organizing descriptive data, identifying broad areas of knowledge – or "domains" – that represent how informants perceive their experiences (see Bernard, 2017). Each domain consists of a "cover term", a broad category, along with "included terms", the specific elements within that category. Semantic relationships illustrate how these terms (both cover and included) are interconnected. In our field research, we examined nine universal semantic relationships as outlined by Spradley (2016) (see Table 7).

Table 7. Domain analysis

Domain	Cover term	Semantic relationship	Included term
Z	Y	Strict inclusion (X is a kind of Y)	X
		Spatial (X is a place in Y, X is a part of Y)	X
		Cause-effect (X is a result of Y, X is a cause of Y)	X
		Rationale (X is a reason for doing Y)	X
		Location for action (X is a place for doing Y)	X
		Function (X is used for Y)	X
		Means-end (X is a way to do Y)	X
		Sequence (X is a step (stage) in Y)	X
		Attribution (X is an attribute (characteristic) of Y)	X

Definition (X is a way to define Y)		X

Taxonomic analysis builds on domain analysis by investigating how informants categorize and organize their knowledge within each domain (see Bernard, 2017). This analysis uncovers the relationships and hierarchy within a domain, revealing which elements the informant considers central versus peripheral. It provides insight into how informants interrelate concepts within their cognitive structures, offering a more nuanced understanding of their knowledge system. An example of the results of taxonomic analysis from our field research is presented below (see Table 8).

Table 8. Taxonomic analysis

Domain	Cover term	Semantic relationship	Included term (first level)	Semantic relationship	Included term (second level)
Z	Y	(X is an attribute (characteristic) of Y)	X_1	(X is an attribute (characteristic) of X_1)	$X_{1.1}$
					$X_{1.2}$
					$X_{1.3}$
			X_2	(X is an attribute (characteristic) of X_2)	$X_{2.1}$
					$X_{2.2}$
					$X_{2.3}$

Componential analysis focuses on the differentiation of terms or elements within a domain. Using contrast questions, this analysis reveals the criteria informants use to evaluate and distinguish between similar items, highlighting subtle variations and tacit knowledge (see Hammersley & Atkinson, 2007; Bernard, 2017). By exploring these distinctions, researchers gain insights into the values and priorities that inform informants' decisions and actions (see Table 9).

Table 9. Componential analysis

	Dimensions of contrast		
Contrast set	**1**	**2**	**3**
Folk term X	Attribute X-1	Attribute X-2	Attribute X-3
Folk term Y	Attribute Y-1	Attribute Y-2	Attribute Y-3
Folk term Z	Attribute Z-1	Attribute Z-2	Attribute Z-3

The final stage, thematic analysis, involves identifying patterns across cultural domains to uncover overarching cognitive principles or shared beliefs that guide behaviour and interpretation within a culture. These themes may be explicit, such as formal norms, or tacit, requiring inference from unspoken patterns (see Hammersley & Atkinson, 2007). The process highlights connections between cultural subsystems, demonstrating how different aspects of a culture interrelate. Researchers might consider utilizing hypermedia tools, including AI-based software that integrates text, images, audio, and video, to facilitate multi-modal exploration of cultural themes. Such tools enhance both the accessibility and depth of ethnographic presentations (Dicks et al., 2005).

EXPLORING PROMPTS' STRUCTURE AND PROMPT ENGINEERING TECHNIQUES

In the following section, we move from ethnographic data collection and analysis to examining the key components of prompt structure. We also present an overview of fundamental prompting techniques, highlighting their connection to specific components of a prompt and providing illustrative examples.

Key components of a prompt

A prompt in the context of generative AI and LLMs may be defined as a textual input provided by users to guide the model's response (Meskó, 2023; Wojciechowski & Korjonen-Kuusipuro, 2023). The structure of a prompt is critical for eliciting the desired response from the model (Amatriain, 2024). Prompts can range from simple queries to complex instructions and may include structural elements such as instructions, examples, input data, output formatting, style instructions, and role definitions (Schulhoff, 2024) (see Table 10).

Table 10. Components of a prompt

Component	Description	Prompt template*
Directive	The primary intent or goal of the prompt, often expressed as an explicit or implicit instruction or question, serves as the core task for LLM.	**Q:** Translate/explain/paraphrase/summarise/edit this text: [INPUT TEXT] **A:** [OUTPUT]
Examples	Also referred to as exemplars or shots, these are demonstrations of the expected task included in the prompt.	**Q:** Example 1 [INPUT] - [OUTPUT] Example 2 [INPUT] - [OUTPUT] Summarise provided text: [INPUT TEXT] **A:** [OUTPUT]
Additional information	Also referred to as input or external data, it is supplied to the model as context or a text passage for analysis.	**Q:** Based on the following passage, answer the question: **1. Passage: [EXTERNAL DATA AS CONTEXT]** **2. Question: [INPUT TEXT]** **A:** [OUTPUT]
Output Formatting	Instructions that define the tone or format of the response, such as writing in a narrative or academic style, or presenting information as bullet points, a table, JSON, or a paragraph.	**Q:** Analyse the input data: [EXTERNAL DATA AS ADD. INF.]. Identify key trends or patterns. **A:** [OUTPUT] **Q:** [INPUT TEXT] **1. Extract details about [TOPIC] from the provided text, listing them in bullet points.** **2. Summarize the extracted details in a formal tone in no more than one short paragraph.** **A:** [OUTPUT]
Role	Specifies the persona or identity the AI should adopt while responding.	**Q:** Answer the question about [TOPIC], excluding any references to [SENSITIVE SUBJECT] **A:** [OUTPUT] **Q:** You are [SPECIFY ROLE]. Respond to the following question [INPUT TEXT]. **A:** [OUTPUT]

***** - An example of a prompt with a predefined structure, including placeholders for dynamic content.

Advanced prompting techniques

As becomes clear from what has been stated, the components of a prompt structure are the fundamental building blocks of a prompt, forming the foundation of any prompt, regardless of its complexity (Schulhoff et al., 2024). Meanwhile, when it comes to solving complex tasks that require advanced reasoning, various prompt techniques built upon the foundational structure of the prompt are applied (Amatriain, 2024). Based on the essential components of a

prompt structure, we selected from a variety of prompting techniques those that emphasize specific components and, in some ways, serve as their extension of functionality of each prompt component. In Table 11, we detail how prompting techniques build on and refine specific prompt components, using template examples as visual representations.

Table 11. Advanced prompting techniques

Prompt component	Prompting technique	Description	Prompt template
Directive	Chain-of-Thought (CoT) Prompting	CoT extends directives by breaking down complex instructions into smaller, logical steps. Used for tasks requiring multi-step reasoning (Ratnayake & Wang, 2024).	**Q:** Explain the process of [TOPIC] step by step. **A:** [OUTPUT]
Examples	Few-Shot Prompting (FSP)	FSP uses examples to guide the model in replicating patterns and improving accuracy for specific tasks. Few-shot examples help clarify expectations. (Brown et al., 2020).	**Q:** Perform [TASK] based on provided examples: Example 1 [INPUT 1] - [OUTPUT 1] Example 2 [INPUT 2] - [OUTPUT 2] Apply the same to the following: [INPUT TEXT] [EXPECTED OUTPUT]
Additional information	Retrieval-Augmented Generation (RAG)	RAG incorporates external knowledge retrieved from databases or other sources, enriching the context for the generation process (Goloujeh et al. 2024).	**Q:** Retrieve relevant information from [SOURCE] about [TOPIC]. Use the retrieved data as context to generate a comprehensive answer to the following question: [QUESTION]. **A:** [OUTPUT]
	Thread-of-thought (ThoT) prompting	ThoT structures the reasoning process into sequential steps, each of which integrates user-provided or external contextual information (Schulhoff et al. 2024).	**Q:** Explain [TOPIC] step by step. After each step, pause and ask: "Did this make sense? Shall I continue?" Proceed only after the user confirms. **A:** [OUTPUT]
Output Formatting	Automatic Prompt Engineering (APE)	APE creates and optimizes prompts by iteratively generating, scoring, and refining them, using either external systems or the same LLM (Ein-Dor et al. 2024).	**Q:** Generate three prompts for [TOPIC] using this LLM. Score each for specificity and alignment and refine the best into an optimized version. **A:** [OUTPUT]
Role	Role-Playing (RP)	RP contextualizes directives by assigning the LLM a persona to guide its interpretation of instructions, which is particularly useful for domain-specific tasks (Amatriain, 2024).	**Q:** Act as [SPECIFY ROLE] and provide step-by-step instructions for [TASK]. **A:** [OUTPUT]
	Self-Refine Prompting (SRP)	SRP builds on directives by iteratively improving responses through feedback, (Schulhoff et al., 2024)	**Q:** Summarize the following text: [TEXT]. Provide three versions, score each for clarity and relevance [OR OTHER CRITERIA], and refine the best version. **A:** [OUTPUT]

CONNECTING ETHNOGRAPHIC FIELD WORK TO PROMPT ENGINEERING

In this final section, we present the results of our ethnographic analysis and demonstrate how we connected them to the prompt structure. We also explain how these specific findings guided us in preparing prompt templates aligned with particular prompting techniques as well as with specific prompt components. Given text constraints, we provide a concise overview of the initial analysis (not exhaustive) and a limited set of prompt template examples (not complete).

Assembling the findings across different stages of ethnographic analysis

After identifying a relatively exhaustive range of various semantic relationships with their cover and included terms (domain analysis) and grouping them based on similarities (taxonomic analysis) and differences (componential analysis), the primary overarching

ethnographic theme we uncovered from the informants' perspectives was the "helping process" (thematic analysis). This theme was articulated into five domains, each connected to the main ethnographic theme through the semantic relationship of sequence (where X represents a step or stage in Y), namely the various stages of the helping process (see Table 12). These five stages constitute a set of contrasting domains that are aligned and compared with one another, distinguishing a series of dimensions. These dimensions, in turn, can be considered subdomains for each stage of the helping process and are connected to each stage through the semantic relationship of attribution (where X is an attribute or characteristic of Y). In other words, each stage is defined by having a specific definition, goal, and set of challenges. The specific actions of social workers and their clients, as well as aspects of social workers' professional identity, can be attributed to each stage of the helping process. The included terms for each subdomain are primarily connected to their cover terms through a relationship of strict inclusion (where X is a kind of Y). For example, "problem identification" is a kind of "definition" associated with the "first stage"; "to overpower a client seeking help" is a kind of "issue" relevant to the "first and second stages"; "breaks agreements" is a kind of "client action" at the "third stage"; and "to resolve conflicts" is a kind of social worker's professional competency applicable to all stages.

Table 12. Summary of ethnographic analysis results

Contrast dimensions	**Contrast set**				
	The helping process				
	Stage 1	**Stage 2**	**Stage 3**	**Stage 4**	**Stage 5**
Definition	Problem identification	Planning process	Intervention	Handling unexpected situations	Result evaluation
Goal	– To establish a trust-based relationship with the client – To identify the client's problem	– To set goals and outline the steps to achieve them	– To act according to the plan in order to achieve the set goals	– To prepare for and handle unexpected problematic situations	– To evaluate whether the set goals were achieved, and which methods were used to reach them
Challenges	– Client's refusal to cooperate due to a lack of trust – To overpower a client seeking help		– **The client lies and/or manipulates the social worker** – It takes a long time to search for and understand new and diverse information – New unexpected situations may arise	– The social worker may give the client too much power to act on their own – To feel crappy and disappointed due to the time and effort spent with no outcome	– To withstand the client's negative emotions in a conflict situation – The social worker's fear that the client has not achieved the necessary changes and skills
Social worker's actions	– Builds a trust-based relationship with the client. – Identifies client's problems – Notes key facts about the client.	– Searches, delves into, and verifies information – Creates the plan themselves – Creates the plan in collaboration with the client	– Assigns too much responsibility to the client – Takes responsibility and works together with the client	– Before unexpected situations arise, assesses potential risks and, if they occur, updates information to prevent them	– Ensures that all the client's problems are solved, and the set goals are achieved (if not, returns to the first stage) – Evaluates whether they, as the social worker, have done everything and how

					much the client has contributed to their own change
Client's actions	– Does not recognize their problems and is often in a state of stress – Resists acknowledging their problems, which often persist for a long time – Over time, learns to accept, disclose, and acknowledge their problems	– Recognizes what needs to be done to solve their problems (e.g., stop drinking, pay the bailiffs) – Identifies the reason for seeking help and the kind of help they expect	– Lacks social skills (such as fearing phone calls, going to institutions, or accepting help) – Tries to avoid and delay unpleasant tasks – Breaks agreements	– Is unable to achieve set goals due to unexpected situations affected by external factors or caused by the client	– Experiences mixed emotions: celebrates the achieved results, has increased self-confidence, yet feels anxiety and fear due to uncertainty. – After reaching the goals, stays in touch with the social worker – calls and seeks further help – If the goals are not achieved, ends the helping relationship with the social worker, expresses anger, and provokes conflict.
Social worker's knowledge, skills, values, and personal qualities	– Although it is possible to lack certain knowledge, continuously adds to and updates their existing knowledge base – Refuses to gather and update knowledge because they don't know how to do it, thus raising the risk of unexpected situations – Uses knowledge from various fields, applying it to the client's specific needs: from substance abuse, informal education, and benefits, as well as construction, electrical engineering, and more.				
	– Constantly monitor and recognize the client's changes – Avoid becoming too close to the client, but still be there for them in every way – To resolve conflicts (with a client) – Work with documents and people alike – Collaborate with the client, colleagues, and external organizations – Use humour appropriately – Talk to the client using words that they understand – Support and encourage the client – Perform practical tasks (make a bed, rake leaves, screw in a light bulb, mold clay) – Learn new skills to relax your mind and, through that, build a connection with the client				
	– See the person as a human being, just like yourself, not as crap, and accepting them without judgment; Tolerance; Respect; Honesty.				
	– Courage, self-confidence, and empathy				

Formulating prompts informed by results of ethnographic analysis

After analysing the cultural scene, shaped by social workers' perspectives on their professional practices, and identifying the main domains, composed of semantic relationships, their interconnections, and the themes they constitute, we formulated prompts for each stage of the helping process. First, we focused on crafting the "directive", the essential component of each prompt, referencing the contrasting dimensions and their included terms. Then, we evaluated whether other components could be fulfilled, such as "examples", "additional information", or "output format". For certain prompts, we specified a distinct "role". We then evaluated which component was essential for each particular prompt and, based on this, defined a specific prompt technique.

Table 13. Ethnographic evidence informing prompt design

Ethnographic theme, domains and subdomains	Prompt component: Directive	Example	Add. Inf.	Out. Form.	Role	Prompting technique	Prompt template
Stages in the helping process **Stage 1: Problem identification** Social worker's actions in identifying the client's problem Social worker's knowledge, skills, values, and personal qualities Client's actions Social worker's measures to avoid an unexpected situation	+	+	+		+	**Chain-of-Thought (CoT) + Automatic Prompt Engineering (APE)**	**QUESTION:** As a social work supervisor, provide detailed, step-by-step guidance on how I, as a social worker, can actively engage a client in the problem identification process. This includes aspects such as the questions to ask during the conversation, how to provide effective feedback, and how to create a safe environment. Please follow **[INSTRUCTION 1]** and **[INSTRUCTION 2]**. **[INSTRUCTION 1]** In your response, consider my role as a social worker **[INPUT 1]** and the characteristics of the client **[INPUT 2]**. **[INPUT 1]**: My characteristics as a social worker: a) … e.g., my areas of knowledge b) … e.g., my professional skills c) … e.g., my core values d) … e.g., my personal qualities e) … and/or other **[INPUT 2]**: Characteristics of the client: a) … e.g., demographic data b) … e.g., key issues c) … e.g., character or behavioural traits d) … and/or other **[INSTRUCTION 2]** Respond as a social work supervisor who understands the key characteristics of a social worker's professional identity **[INPUT 3]** and the potential characteristics of social work clients **[INPUT 4].** **[INPUT 3]**: Social workers' professional identity characteristics: 1. Applies interdisciplinary knowledge to meet specific client needs (e.g., expertise in substance use, informal education, social benefits, construction or electrical work, etc.) 2. Possesses various competencies (e.g., ability to identify client progress, setting appropriate boundaries while offering holistic support, conflict management, collaboration, effective use of humour, speaking in terms that the client understands, encouraging and supporting clients, performing practical tasks or learning new skills, updating outdated information, evaluating and reassigning responsibilities between themselves and the client, clarifying the client's needs and adjusting the support plan accordingly, etc.) 3. Guided by core values (e.g., human dignity, tolerance, respect or honesty, etc.) 4. Demonstrates specific personal attributes (e.g., courage, self-confidence or empathy, etc.) 5. And/or other. **[INPUT 4]**: Possible characteristics of social work clients: 1. Demographic data (e.g., different age, gender, cultural background, religious beliefs, educational background, profession, employment or marital status, etc.) 2. Key issues (e.g., substance dependence, domestic violence, other behavioural or mental health challenges, etc.) 3. Character or behavioural traits (e.g., resists assistance, rarely acknowledges their own issues, has difficulty identifying their problems, eventually accepts and acknowledges their difficulties, lacks social skills - such as fearing phone calls, going to institutions, or accepting help, tries to avoid and delay unpleasant tasks, or fails to adhere to agreements, etc.) 4. And/or other. **ANSWER: [OUTPUT]**

Table 13 presents the prompt for the first stage – "problem identification". The "directive" (see Question) focuses on the issue of social workers "overpowering a client seeking help" while attempting to identify the client's problem without their involvement. Strategies for client engagement, as outlined in the "directive," such as ensuring effective feedback and cultivating a safe environment, address the issue of "client's refusal to cooperate due to a lack of trust". Additionally, two instructions follow the formulation of this prompt. The first instruction (see Instruction 1) allows the social worker to input "additional information" specific to their own and their client's unique characteristics.

This input (see Input 1 and 2) helps the model generate more individualised and relevant output. The second instruction (see Instruction 2) provides an "example" of the common characteristics of social workers and their clients (see Input 3 and 4). This example also acts as "additional information", offering the model a concrete scenario that enhances its understanding and improves the accuracy and relevance of the generated output. The structure and content of the characteristics of social workers and their clients are derived from two main subdomains: "client's actions" and "social worker's professional identity". Finally, the role of a social work supervisor was conferred to the model to ensure that the generated output strictly pertains to the professional activities of social workers, which are focused on their interactions with clients (see Instruction1 and 2).

We also employed a prompt tuning (PT) technique, specifically the automatic prompt engineering (APE), to enhance our manually generated prompts. For this purpose, we utilised ChatGPT 4.0, tasking the model with refining the original versions of each prompt. The focus was on preserving folk terms while improving the structure and clarity to ensure the prompts were comprehensible to users with limited experience in large language models (LLMs). Additionally, the refined prompts were tailored to be particularly useful and actionable for social work professionals. However, the process of automated improvement was less seamless than anticipated. The automated refinement process, however, proved more challenging than expected, requiring repeated adjustments and clarifications. This aspect warrants further analysis in future research.

CONCLUSIONS

The results of our analysis provided a theoretical and empirical foundation for a methodological framework that bridges research methodologies from social science with the process of prompt engineering within computer science. Our theoretical exploration of mainstream analytical and methodological approaches in social and computer sciences highlights the need to overcome theoretical and social determinism in the conceptualisation, development, and evaluation of socio-technical systems. One such system may be considered the process of creating prompts, which involve an assemblage of human and non-human elements.

We showed that specifically ethnography, as a research strategy, offers effective tools for data collection and analysis, enabling the inclusion of cultural meanings, which underlie social realities, into the process of prompt formulation. This approach addresses the limitations of a purely semantic focus in prompt engineering. In addition, we outlined step by step how to uncover cultural themes composed of multiple semantic relationships articulated

by social workers in their verbal accounts of professional practice. Finally, we demonstrated how to link the organised qualitative data sets to key prompt components, which serve as the foundation for various prompting techniques.

IMPLICATIONS FOR THEORY, APPLICATION, OR POLICY

Additional research is essential to assess the quality and validate the results – specifically, the prompts engineered through the proposed framework. Experimental methodologies can support this effort by enabling intrinsic evaluation of the prompts or extrinsic evaluation of LLM outputs. In the first case, by testing and evaluating the prompts' effectiveness, they can be refined, and customised prompt libraries can be created to guide the LLM without full retraining. In the second case, datasets built from prompts, outputs, and their evaluations may be used to fine-tune general-purpose LLMs into domain-specific models.

This framework advances the methodological development of prompt engineering by grounding it in cultural contexts, thereby providing various stakeholders – including researchers, practitioners, managers, and policymakers – with a robust tool for evaluating existing LLMs and developing new specialized models tailored specifically to social work practice. The framework can be applied to evaluate or customize an LLM's alignment with professional social work interests, the specific needs of various vulnerable groups, organizational settings within social service organizations, diverse social service modalities, or ethical standards in social work.

ENDNOTES

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