The language model of artificial intelligence chatGPT - a tool of qualitative analysis of texts

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Summary

An explorative test of the suitability of the language model of artificial intelligence (AI) ChatGPT for the qualitative analysis is presented. The data fed into the program is a response from a social work student to an interview question about her study practice. ChatGPT was asked questions about identifying basic themes, concepts, typologies, and evaluations. The robot provided surprisingly appropriate answers, but it rejected self-critically the request for professional conceptualization. The conclusion of the informal experiment is that ChatGPT is a useful tool in qualitative analysis, provided that the researcher can ask appropriate questions (prompts). However, the output of the robot must be evaluated and supplemented by a human researcher before final report and publication. The issue of authorship and responsibility is raised.

INTRODUCTION

The language model of artificial intelligence, ChatGPT, and the author’s first experiences

As the author of this report is not an expert in computer science and artificial intelligence (AI), he became acquainted with the development of the language model of artificial intelligence, ChatGPT, through articles in daily newspapers written by experts in this field, including Sašo Dolenc, a physicist, philosopher, and established scientific journalist (Dolenc, 2023); Prof. Ivan Bratko, former head of the laboratory for AI at the Faculty of Computer Science, and Prof. Matjaž Gams, head of the Department of Intelligent Systems at the University of Ljubljana (Kapitanovič, 2023). However, the robot himself explained his nature most directly at the prompt of Prof. Špela Vintar, the caretaker of the new interdisciplinary study program in Digital Linguistics at the Faculty of Arts, University of Ljubljana (Špela Vintar, 2023). Since the nature of the chatGPT program has become generally known in the meantime, these opinions will not be quoted (references are given). Prof. Gams concluded his contribution with the statement, "A phenomenal achievement and an extremely useful tool... I urge those who have not yet used it to do so as soon as possible. They will make a leap in productivity, in the future, and save a lot of time" (Gams, in Kapitanovič, 2023). The opinions expressed, especially the last one, were a strong incentive for author’s first attempts to test them.

In his initial conversations, the author asked the program various questions, such as: about the percentage of
the surface area of individual continents compared to the total world surface area (testing the assertion that Westerners discriminatingly depict Africa as smaller than it actually is); about the philosophical arguments for materialism, idealism, and dualism; about the winter conditions for sailing in the Adriatic Sea and recommended routes in the summer; about excess deaths and deaths due to Covid-19 in Slovenia during the pandemic; about the psychoanalytic explanation of eating disorders; about the advantages and dangers of moderate alcohol consumption, and similar topics.

The author did not verify the robot's answers with independent sources (online portals such as Wikipedia are probably included in the robot's data set and are not independent), but based on lay judgment, the answers were surprisingly accurate. Only the general answer regarding the psychoanalytic explanation of eating disorders and moderate alcohol consumption was quite superficial. The robot was quite mistaken only in the wicked question about the content of an ancient Slovenian folk narrative poem. In this regard, the author realized that the robot can also fabricate misleading confabulations. He also found that the program's answers largely depend on the appropriateness of the questions or prompts. With more concrete questions, one gets more concrete answers. Sometimes it is good to suggest something to the robot to recollect and connect the data. It should also be noted that ChatGPT is a conversational robot, which means that it answers questions and reacts to comments. Therefore, it is not a substitute for Wikipedia, for example, which offers comprehensive and reviewed articles with notes, sources, and references to other websites.

**The use of AI in qualitative social research**

Social and ethical consequences of using AI were widely discussed, but there is much less written about its use as a tool in qualitative research. The general guidelines for using AI, specifically "Large Language Models (LLMs)" and ChatGPT in higher education are given in the article by Rahman et al. (2023). Researchers have found that the use of AI in research has received conflicting responses, and that the problems associated with it have only recently been addressed in detail. In a study entitled "Adoption of Artificial Intelligence (AI) in Higher Education," researchers used ChatGPT to ask a series of questions related to the various phases of the research plan: research idea, literature review, methodology, data analysis, and findings. The researchers found that ChatGPT is an effective tool for generating research ideas, writing introductions, posing research questions and hypotheses, but that the researcher's judgement is necessary in formulating the problem due to its importance. The program can compile and summarize literature, but if asked to create a coherent narrative, it begins to "make up" information and even provide false references. However, according to the article, and without an example, it can perform qualitative analysis if provided with transcribed data. The program can also compose a description of the methodology if informed of which methods the researchers intend to use, but it is not suitable for analyzing quantitative data. Based on these findings, the researchers developed recommendations for each phase of the research, which cannot be discussed here. The authors advise caution in using this tool and call on the scientific community to develop guidelines for appropriate use of language models, especially ChatGPT, in research and publishing.

Similarly, Dönmez et al. (2023) tested the ChatGPT program as a consultant for a quantitative study on students' motivation to learn STEM subjects (science, technology, engineering, and math). They asked the robot questions related to various phases of the research: which research questions would be appropriate, what the research design should be to test the impact of different factors on motivation to learn, which grade levels of students to include, whether to include teachers, how large the sample size should be, which measuring instruments would be appropriate, and what the title of the research should be to avoid repeating the titles of the existing studies. The program provided acceptable answers to all questions, although some were more general. It also made some errors. In general, it did not provide references except for measuring instruments. The program accurately summarized, described, and interpreted the statistical measures used, and on request, it provided a summary of the study, limited to 100 words.

Both studies indicate that AI programs can be useful assistants, but they cannot replace human researchers' judgement. We cannot delve into the organizational and ethical issues that arise from the use of AI for research purposes, but both studies mention them. Similarly, Opara et al. (2023) discuss them.
The author of this paper approached its topic when he asked the robot questions about qualitative analysis: about Glaser and Strauss’s (1967) grounded theory; about the concept of tentative theory within the grounded theory (Mesec, B. 1998); about the difference between thematic analysis and grounded theory, and about the way grounded theory is constructed. The answers were surprisingly accurate, precise, and "smart". The author wanted to check some parts of his book in preparation (Mesec, B., 2022) and was satisfied with both the robot and himself.

Since the purpose of this research was to explore the possibilities of using the AI program in textual analysis, the author addressed ChatGPT as follows:

Prompt: "Find references for the following research: 'The use of AI, specifically ChatGPT, in the qualitative analysis of interviews within the grounded theory tradition'.”

Response: "I’m sorry, but I cannot find specific references for that research question because it is a very specific and narrow research topic. However, I can provide you with some general information on the use of AI and ChatGPT in qualitative analysis of interviews, as well as on grounded theory."

Table 1: Request for outputting references on the research topic

We thanked for the provision of general information, and without the bot’s help we discovered an important article online about the connection between grounded theory and artificial intelligence programming. The article entitled "Grounded Theory Abstraction in Artificial Intelligence" (Zucker, 2003) combines two seemingly completely different things: artificial intelligence programming and sociological grounded theory. The former belongs to the field of natural science, mathematics, and technology, while the latter originally developed in the social sciences and humanities. This leads us to think about the opposition between the natural science-positivist method on the one hand and the humanistic-interpretive method on the other. However, as we find out, both appear connected. The key to resolving this apparent contradiction is the concept of "abstraction." Grounded theory by Glaser and Strauss is constructed by constantly comparing empirical statements and gradually abstracting their common characteristics. This creates abstract categories from empirical statements and descriptive concepts. We consider the awareness that guided abstraction through appropriate algorithms is the core of developing artificial intelligence programs as central to connect construction of AI programs and qualitative analysis within grounded theory. The same mental process is going on in both instances. Artificial intelligence becomes “intelligent” through guided abstraction, by constantly comparing input data, recognizing their common characteristics, and merging similar ones (coding). This observation has consequences for the method used in this study.

PROBLEM

We attempted to determine whether the ChatGPT language model can be useful in qualitative text analysis in the field of social work and related areas. We were interested in identifying tasks where it could be useful, either by replacing human analysis to some extent or suggesting solutions. In modern approaches to qualitative research, the question of analysis (after the interview) is increasingly emphasized (Vanover et al., 2022).

METHOD

The study is exploratory and heuristic in nature. We used an informal comparison of the robot’s (AI) and human researcher’s (HI) products in the analysis of social work text (a comparative study). This approach
is in line with the "qualitative heuristics" (QH) guidelines (Kleining, 2010); "informal" because we did not follow any existing procedure for comparison - list of dimensions, as it needs to be invented.

Heuristics derives from the basic premise that discoveries are the result of systematic research methods, not intuition (Popper, 1994/1934/ ) or armchair theorizing. In QH research, four rules should be observed: 1. openness of the researcher to new knowledge and discoveries that differ from what is already known; 2. readiness to consider changes in the research subject; in our case, this would mean the readiness to accept the unexpected meaning and role of AI in qualitative research; 3. willingness to change previously recommended qualitative analysis procedures (e.g. introduce interactive AI analysis); 4. to examine the phenomenon under study (qualitative analysis process) from as many aspects as possible; to compare different views and seek their common characteristics and differences.

Technically, the appropriate method for our purpose is the comparative sequence method (Muller, 2016), which means that HI and AI are alternately and sequentially used. We use the method of constant comparison of HI and AI utterances. The comparation follows the recommended analysis process according to the grounded theory method by Glaser and Strauss through the following steps: 1. thematic analysis, 2. coding (= semantic analysis), 3. defining concepts and categories, 4. creating a relational model, 5. tentative theory. We cannot expect the robot to perform a complete analysis if prompted: "Perform a qualitative analysis of the following interview record in accordance with the grounded theory method by Glaser and Strauss". However, we expect it to respond appropriately to prompts at each stage or task. We cannot expect it to master the terminology of qualitative analysis, so we will adapt and express the commands in more general, non-specific language.

**DATA**

Interview with a social work student about her practice (Mestek et al. 2019):

"Can you tell me how you experienced your mentor during your three years of practice?"

"In the first year when I was in a society for helping and self-help of the homeless, I perceived my mentor as very relaxed, the kind that lets us be very independent on the practice, to do the practice as we envisioned it. Actually, there were no commands about what we had to do or what we shouldn’t do, but he really gave us a free hand, maybe even too much freedom, because sometimes I didn’t know what to do on the practice and there wasn’t always some guidance. Still, he tried to find out how my colleague, who was also doing her practice with me on this learning basis, and I felt, what we might want to accomplish. He also helped us to carry out a project that was very successful; the society even gave us money so we could carry out the project, so the mentor was really correct. In short, I experienced him as a simple person who wants us, as students, to learn mostly on our own during practice. He also told us that we would learn the most as students on practice if we just looked, observed what people talked about, how they talked, what their problems were. Just by listening to people, we would learn a lot.

In the second year, I did my practice in a society for helping addicts and their families. There was a similar thing here, except that the mentor was a little more consistent. She followed my tasks more, she always encouraged me to send her assignments where I needed some help, because if not, she would quickly forget about them. She always wanted me to do things well, she corrected things for me, and she told me, "look, you might have expressed yourself a little wrong here." In general, I experienced her as someone who led me well, but at the same time, she gave me a lot of leeway, a lot of freedom to do what I wanted to do. So, both of them were really good."

**ANALYSIS OF THE INTERVIEW RECORD WITH HUMAN INTELLIGENCE (HI)**

Proceeding through recommended stages of qualitative analysis.
1. Themes:
Experience/description of mentors: mentor’s behavior, mentor’s personality, mentor’s informal leadership theory
Self-experience
Evaluation of mentoring or practice

2. Coding (assigning concepts). We skip the display of coding at the first stage of descriptive concepts because of the space used.

3. Categories:
COMMITTED - INDIFFERENT LEADERSHIP
DIRECTIVE - NON-DIRECTIVE LEADERSHIP
TASK-ORIENTED - RELATIONSHIP-ORIENTED LEADERSHIP

4. Definitions of the categories:
COMMITTED - INDIFFERENT LEADERSHIP: In this case, it is assumed and also evident from the text that leadership in both situations is committed, meaning that the mentors are dedicated and interested in helping the student successfully complete the practice, to progress in professional knowledge and not just meet the required criteria for success, but also to have a fulfilling life experience. The opposite of such an attitude towards mentoring is indifferent leadership, which does not assume mentor’s dedication and interest beyond fulfilling completely formal learning obligations (which may also occur in schools).

DIRECTIVE - NON-DIRECTIVE LEADERSHIP / TASK-ORIENTED - RELATIONSHIP-ORIENTED LEADERSHIP: These concepts are defined by variables and opposite modalities, evident from table 2.

5. Relational model, typology, or conceptual hierarchy (as evident from table 2):
The listed concepts comprise a bipolar typology, two different types or styles of leading, directing or "mentoring” practice.

6. Tentative theory as a result of the analysis (below)
A HUMAN RESEARCHER’S ANALYSIS RESULT: TENTATIVE THEORY OF PRACTICE GUIDANCE (MENTORING) AT AN EDUCATIONAL BASE

Social work students perform their practice in a very wide range of educational bases (EB) from centers for social work to primary schools, health institutions, and justice institutions-prisons (Mesec, M., 2015). This provisional theory (tentative theory) cannot be generalized to all EBs. Based on the experience of a trainee with practice at the Society for Assistance and Self-help for the Homeless and the Society for Assistance to Addicts and their Families, we can describe a certain pattern of trainee experience and the behavior and thinking of mentors, a pattern that may prove to be more generally valid through additional research.

The trainee mentions the following topics: experiencing the mentor’s behavior, personality, pedagogical approach or leadership theory; experiencing herself and evaluating the practice. The trainee compares both mentors.

Both mentors are committed to the student’s successful completion of the practice and her personal well-being and development, as opposed to possible indifference or laissez-faire. This is their common feature. However, they differ in their leadership style. In the first case, the leadership style is less directive, while in the second case, it is more directive. These styles partially overlap with another possible typology, that of being more task-oriented or more emotionally or relationally oriented. These two dimensions are classically described in connection with leadership in works on organizational behavior or management (see Mesec B., 1992).
Both styles can be described through differences in the following variables: trainee’s perception of mentor’s behavior, mentor’s personality, mentor’s implicit or espoused leadership theories; how the trainee experiences herself; how she evaluates the practice. In this regard, as allowed in writing a tentative theory, we can deviate somewhat from the actual data by stating, for example, the opposite of the described term, although it is not described in the material and is not a property of either mentor or his style, but logically follows from the described term as its opposite.

The LESS DIRECTIVE STYLE is characterized by the fact that the mentor acts in a way that allows the trainee independence ("lets us be very independent in practice"), freedom / latitude in action ("...he really gave us a free hand..."), perhaps even explicitly instructing, allowing, or providing; allows the student her own ideas, plans, and desires ("to do the practice as we envisioned it"; "what we might like to accomplish"); does not give instructions or correct tasks but is interested in the ward’s well-being ("...but he did try to find out how I and my classmate were feeling..."). A mentor who leads in this style is described as simple and relaxed ("...I experienced the mentor as very relaxed...") as opposed to haughtiness and tension / concern. In this style, the trainee sometimes feels lost and wishes for more guidance and direction ("...sometimes I didn’t know what to do on practice, and it wasn’t always...").

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>PRACTICE LEADERSHIP CHARACTERISTICS</th>
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<tbody>
<tr>
<td>MENTOR’S EXPECTATIONS</td>
<td>LESS DIRECTIVE</td>
</tr>
<tr>
<td>OF THE STUDENT</td>
<td>RELATIONSHIP ORIENTED</td>
</tr>
<tr>
<td>Independence-Dependence</td>
<td>Independence</td>
</tr>
<tr>
<td>Initiative-Obedience</td>
<td>Self-initiative</td>
</tr>
<tr>
<td>Observation-Task execution</td>
<td>Learning by observation</td>
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</table>

| MENTOR’S BEHAVIOR/PERSONALITY | |
| Letting go-Guidance | Does not give instructions | Wants to guide |
| Attitude towards assignments | Does not correct assignments | Corrects assignments |
| Quality control | Does not check quality | Checks quality |
| Explicitly offering help | Does not offer help | Offers help |
| Mentor’s personality | Relaxed | Worried, conscientious |
| Mentor’s leadership theory | Non-interference, delegation | Direction, supervision |
| STUDENT’S FEELINGS | Uncertainty, being left to oneself | Security, guidance |
| PRACTICE EVALUATION | Positive | Positive |

Table 2. Typology of mentorship styles on EB

**ANALYSIS OF THE INTERVIEW RECORD WITH ARTIFICIAL INTELLIGENCE ChatGPT**

**a. Comparison of both typologies**

Our aim was not only to compare typologies, but to see broader, how the program operates. Human’s typology at hand, lets first see the robot’s and then inquire into its way of doing the analysis.

Prompt: “How would you describe the style of the first and second mentor with just one or two words?”
Table 3. Prompt for coding the styles of mentoring

Thus, the result is as follows:

<table>
<thead>
<tr>
<th>STYLE</th>
<th>STYLE</th>
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<tr>
<td>ROBOT (UI)</td>
<td>Relaxed, informal</td>
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<tr>
<td>HUMAN (HI)</td>
<td>Less directive, relational</td>
</tr>
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</table>

Table 4. Comparison of human and robot conceptualization of mentoring styles

Comment. We prompted the program to name each leadership style with just one or two words in order to avoid verbose answers and ensure a clear naming or coding of the styles. The result is excellent. However, we notice that the robot did not use learned terms (“directive vs. non-directive”, ”task-oriented vs. relationship-oriented”), but descriptive expressions that are close to the direct experiential level, the vocabulary used by the student. The word “informal” was not used by the student, but it does well describe the mentor’s style.

We can see that the robot used more concrete expressions, while the human used more abstract ones. The advantage of the latter is that they can be linked to existing theories, e. g. of organizational behavior, and therefore open up the possibility of new interpretations and conceptual connections. However, as mentioned, with appropriate prompts, the robot could also be encouraged to engage in similarly abstract conceptualization.

b. The analysis of robot’s answers

Actually, we did not begin our conversation with the robot with the above prompt but with a more general and demanding encouragement. Namely, the author of the article has to disavow himself and the statement written in the paragraph about the method: "We cannot expect the robot to perform a complete analysis instead of us if we command it to "Perform a qualitative analysis of the above interview transcript using the grounded theory method according to Glaser and Strauss". Contrary to our aim, our first command to the ChatGPT was precisely that, as is evident from the text below. It was followed, in less than a minute, by the robot’s response:

Prompt: "Perform a qualitative analysis using the grounded theory method according to Glaser and Strauss on the following text:" (transcript of the interview)

Response: "The grounded theory method according to Glaser and Strauss focuses on researching social phenomena from the perspective of the people who experience them. This method requires the researcher to consider data that comes from the experiences of people directly connected to this phenomenon. Based on this, the researcher can formulate theories that are grounded in actual people’s experiences.

The text describes the student’s experience, who did internships in two aid societies. First, she described her mentor in the first year, who gave her a lot of freedom in doing the internship. The mentor did not give her instructions, but encouraged her to be independent and learn from experience. The student felt that the mentor wanted to help her, but did not impose his ideas on her. Her mentor helped her with a successful project, which gave her the feeling that the mentor was very correct.

In the second year, the student had a different experience with her mentor. This mentor was more consistent and gave her tasks that she had to do. The mentor gave her feedback on her work and helped her improve
her work. However, the student still had a lot of freedom in doing the internship. Based on this text, we can formulate some qualitative analyses. Firstly, we notice that both mentors encouraged the student to be independent in doing the internship. Secondly, we notice that the first experience was more focused on learning from experience, while the second experience was more focused on completing tasks. Thirdly, we notice that both mentors helped the student improve her work, but the second mentor was more consistent in monitoring her work.

Based on these observations, we can formulate some suggestions for further research. For example, we can examine how different mentoring methods affect students’ learning during internships. We can also examine how mentors can encourage students’ independent learning while providing guidance and support.

Table 5. The first prompt and the response of the AI

Comment. In the first paragraph of the response, the program correctly identified the essence of the grounded theory, which is that it is based on statements about direct experiences of affected people. Perhaps it narrowed the definition of the nature of the source material too much, as indirect expressions and descriptions can also be considered empirical material. In the second paragraph, the program accurately summarized the description of the student’s experience and added the phrase that "the mentor did not impose their ideas on her." These words are not in the student’s statement, but they deepen the understanding of her feeling!

The student’s writing also does not contain a statement that "the second mentor gave her feedback." This is actually the robot’s "fiction," a slightly more abstract paraphrase of the student’s words. Excellent code!

In the next paragraph of the response, the program did something that is also not directly present in the student’s statement: it summarized the common characteristics of both mentors and the differences between them. We notice that the program "tries" to always consider opposing possibilities: "first-second," "so-but," "positive-negative." The last paragraph of this first part of the robot’s response is a completely new addition - it is not in the student’s statement - these are suggestions for further research on the impact of mentoring on successful student learning. We notice that the program emphasizes autonomy while providing guidance. It replaces the exclusive logic of "either-or" with the more productive inclusive logic of "both-and." In short, the program does not use empty words or "chew," but paraphrases the source text in a way that adds and deepens thoughts in the right sense in a slightly more abstract way and adds its "fiction" (guidelines for further research), which are meaningful and productive. In a later conversation with the robot it acknowledges, that it added a text which was not present in the source text: “Yes, the program’s response contained a completely new addition in the last paragraph - suggestions for further research on the impact of mentoring on successful student learning.” What is more: the chatGPT used the phrase in the above my comment while writing it and added in self-praise: »Yes, the program accurately summarized the student’s experience and added a phrase that deepened the understanding of her feeling«. It’s not science fiction!

In a similar way as in table 3, we tried to limit the robot’s verbosity and force it to provide concise naming, which is essentially another name for coding, in the following questions.

Prompt: “Using just one or two words, how would you describe the experience of the student with the first mentor versus the second mentor?”

Response: “The student’s experience with the first mentor could be described as "freedom" or "independence," while the experience with the second mentor could be characterized as "guidance" or "direction."

Table 6. Prompt for coding the student’s experience.

Comment. We cannot be entirely satisfied with this answer because the labels obtained do not indicate as much the student’s experience as the leadership style, especially with the second mentor. The student made some statements about her experience, such as "sometimes I didn’t know what to do anymore"; the mentor
was interested in "how we feel"; "I experienced him as a simple person"; "I experienced her as really good at leading me." A human researcher might code these expressions as "feeling lost," "disorientation," "sense of security, provision," "sense of orientation," or something similar. In short, here the robot could have made a better effort.

With the following prompts, we wanted to elicit an analytical assessment of the work of both mentors.

Prompt: “What are the positive and negative aspects of the work of the first and second mentors?”

Response: “The positive aspects of the first mentor’s work are that he allowed the student a lot of freedom in her work and let her do things her way, and encouraged her to observe people and learn from them. The negative aspect, however, was that he did not always provide enough guidance and instructions.

The positive aspects of the second mentor’s work, on the other hand, are that she was precise, consistent, and provided the student with a lot of guidance and instructions, which led to her achieving good results in her work. The negative aspect, however, was that she had less freedom in carrying out her tasks and was more under the influence of the mentor.”

Table 7. Prompt to evaluate the positive and negative aspects of mentorship

Comment. This is an excellent balanced summary of the positive and negative aspects of both mentors’ relationships. We notice that the robot has "made up" something again by adding that "the student achieved good results in her work", which is not directly stated in the student’s statement. She also did not write that she "was more under the influence of the mentor." However, her position can be defined as such; if not under the influence, then under supervision. We see that the program responds well to specific prompts for evaluation, naming, differentiation, and similar. Like a student, like a teacher. However, this is not always the case, as evidenced by the following conversational episode. Since we were not satisfied with the robot’s naming of the student’s experience (Table 6), we asked it a more general question about her experience.

Prompt: ”What was the student’s experience like?”

Response: “The student’s experience regarding the mentors in the text was positive. The student perceived the first mentor as a relaxed and straightforward person who allowed her a lot of independence in carrying out her practice, which enabled her to learn from her mistakes and learn a lot from them. At the same time, the mentor helped her with the project and was concrete when necessary. The second mentor was more consistent and precise in monitoring the tasks given to the student, but at the same time gave her freedom and helped her when needed. The student felt that the mentor guided her well and was helpful in learning and developing her professional skills. In summary, the student felt that both mentors were good in their own way and helped her in her learning and development as an expert in her field.”

Table 8. The robot’s repeated description of the student’s experience

Comment. The program accurately and meaningfully summarized the student’s report, and also added some of its own. The student does not mention that she "learned a lot," but rather that she will "learn a lot" if she listens; she does not mention that the mentor "helped her develop her professional skills." However, this follows from everything that was said. We regard this statement from the robot as a conceptual upgrade to the student’s statement. It would not be wrong to include this nice phrase in an internship report.
What did the robot contribute to the analysis

The general impression is that the program responded appropriately. It answered the questions (prompts) without going off-topic; it did not mislead or give completely wrong answers; it did not ramble or "spin" with paraphrasing without adding meaning, but remained "grounded" at the level of the original diction, but also did not use terms of "scientific" language.

Its answers can be classified into several types (with some examples):

SUMMARIZING
It appropriately summarized the description of the student’s experience.
It summarized the common characteristics of both mentors and the differences between them.

BALANCING
It states opposing possibilities: "first-second," "so-but," "positive-negative."
It replaces the logic of "either-or" with the inclusive logic of "and-and."
It summarizes the positive and negative aspects of mentoring.

EXPRESSION OF ESSENCE
It appropriately identified the essence of a grounded theory, perhaps narrowing the definition slightly.
It describes the mentors’ style as "informal."
Both mentors are fine in their own way.

ADDING
It indicates that the student learned a lot and achieved good results.
It indicates that the mentor helped her develop her professional skills.
It indicates that the mentor was helpful in her learning.

DEEPENING (ABSTRACTION)
It added the phrase that the mentor "did not impose her ideas" on her.
It indicates that the second mentor "provided feedback."
The first experience is focused on “learning from experience”, while the second is focused on “completing tasks”.

SUGGESTING
It suggests ideas for further research on the impact of mentoring on learning outcomes.

REPEATING
Negative aspects of the program’s responses include unproductive repetition, such as when asked to identify the student’s experience in one or two words.

ADDING INAPPROPRIATE TERMS
It states that we can form "some qualitative analyses" based on the text.

MISUNDERSTANDING THE QUESTION, STATEMENT OUTSIDE THE QUESTION
It overlooks the student’s statements about her experiences and does not name them.
Table 9. The categories of the program’s answers

Comment. The program’s responses are surprisingly good and useful. This may indeed mean that “conceptual understanding really hides in neural processing” (Vintar, ibid. p.15).

We can see that in its thinking, the robot did not stray far from descriptive terms of lower levels of abstraction and did not paraphrase "grounded" text with more "learned" words. For example, it did not write that the grounded theory is "inductive"; it did not even use the word "experiential". It wrote, descriptively, that theories are grounded "on people’s actual experiences". This is accurate and very grounded description; a good foundation for more abstract conceptualizations!

In the following part, the robot paraphrased the experience of the student in the same grounded style with descriptive terms, not more abstract ones. Let’s compare the student’s statement with the robot’s paraphrase.

Student: "The mentor... lets us be very independent during our internships and we do the internship the way we have imagined it. Actually, there were no orders telling us what we could or couldn’t do, but he always let us have free rein, maybe even too much freedom, because sometimes I didn’t know what to do on my internship, and there wasn’t always guidance.”

Robot: "The mentor... gave her a lot of freedom in doing the internship. The mentor did not give her instructions but encouraged her to be independent and learn from experience."

We can say that this would be a good summary of the essence of the student’s statement if the robot mentioned the student’s feeling of lack of orientation.

Robot: "The student felt that the mentor wanted to help her, but did not impose his ideas on her.”

This is an excellent summary. We can observe that the student did not say, “she felt that the mentor wanted to help her” and there is no use of the phrase “did not impose his ideas on her”. These words are not found in her statement, but the description is adequate - hitting the mark! Mental work. Amazing!

DISCUSSION

Our study is an exploratory comparative heuristic based on a part of an interview conducted by a student with her colleague. It includes 1. a comparison of the researcher’s conceptualization of statements in the interview (HI) with the response (conceptualization) of the AI program; and 2. an analysis of the robot’s responses using an improvised classification procedure based on grounded theory. As such, it is a first step towards further research with more input data and a more strictly formalized method.

The input text, the student’s response to one of the questions about practice, is already quite structured, divided into two learning bases, two mentors, and contains a comparison of both based on similar variables. The structure is largely evident. Therefore, this material may allow for an assessment that is biased in favor of artificial intelligence. The question is how the robot would perform with more unstructured text. This is certainly one of the possible directions for further research, which would involve analyzing texts of varying degrees of organization or prior conceptualization.

The comparison of the text analysis by human analyst (HI) and artificial intelligence (UI) showed that the analyst quickly recognized two types of ”mentoring” in the text and constructed a typology. He immediately moved to a higher level of abstraction and identified two patterns of leadership that make up a polar typology. The robot, on the other hand, expressed the same difference using more descriptive terms at a lower level of abstraction. In further research, it would be advisable to repeat this type of comparison of AI and HI products on different types of materials.
Our choice of prompts was intuitive and improvised. Further research should systematically vary the formulation of the prompt as an independent variable and observe the program’s response as a dependent variable. The criteria for the “goodness” of the program’s response have not yet been specified, which means that the criteria for the “goodness” of a code must be specified within the grounded theory. In general, this should be the dimension of the abstraction of a code.

The comparative sequence method (Muller, 2016), based on Zucker’s insight (2003), proved to be suitable. This means that qualitative analysis can be carried out through the interaction of the researcher with the AI program, so that the researcher maintains a critical distance from the program’s outputs and uses useful (reasonable) paraphrases and discards useless (unreasonable) ones, or uses the latter per negationem, thereby transforming them into intelligent and functional ones.

CONCLUSION

Any belittling of artificial intelligence is inappropriate. The program is not perfect, but according to the results, it is close to being so in the role of an assistant to the human researcher. We can lead the robot to new subject areas it has no knowledge of, but with the development of the program, these murky waters will become less and less. The program operates at the same level of abstraction as the input text, but it does not just play with words and paraphrase in conversational language, in other words, it does not "babble", at least not in principle. It is capable of creative paraphrasing, i.e., summarizing statements so as to express their essence. We could even say that in this sense, it is capable of "reading between the lines", i.e., saying what was not said but was meant. This is something that many human beings cannot do.

LITERATURE

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