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Question Understanding from the Perspective of Context Theory

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Abstract

This paper uses context theory to study the question in natural language. In syntax, questions can be classified into polar questions, alternative questions, concealed questions, and inquisitive questions. In semantics, it can be divided into polar questions and inquisitive questions. Only inquisitive questions with characteristics of inquisitiveness, informativeness, compliance, and transparency need to be studied by context theory. There are three levels for question context: question-answer facts, background knowledge, and question presupposition. The question context composes the possible world where the question is. Question understanding is a function of the mapping of the question through the possible worlds, and the set of propositions consisting of different possible worlds of the question context and the set of propositions consisting of different possible answers to the question are mapped to each other, resulting in different answers in different possible worlds of the same question.

Keywords

inquisitive question, question context, possible world, proposition set

1. Inquisitive Question and Polar Question

1.1 The Types of Questions

The questions in philosophy of language can be divided into several types from syntax: polar question, alternative question, concealed question, and inquisitive question.

1.1.1 Polar Questions

Polar questions are those that ask for the truth-value of a given proposition (Ivano Ciardelli, Jeroen Groenendijk, & Floris Roelofsen, 2019). Polar questions take the form of general interrogative sentences. There are only two polar answers, yes or no, and the true values of the two answers contradict each other, either A or B. The most typical polar questions are "yes-no questions". Polar questions can be divided into three types: positive polar question, which manifestation is $?p$; negative polar question, which manifestation is $?\neg p$; alternative polar question, which manifestation is $?(p \vee \neg p)$ (? : Question operator; $\neg$: negation; $\vee$: disjunction. See: Jens Allwoof, Lars-Gunnar Andersson, and

Osten Dahl, 1977). Regardless of the way of expression, the result of the semantic logic analysis of the polar questions is the same. There are only two indexes.

The structured meaning framework is as follows:

Positive polar question: ?p

{[?p]}=

{[P]}U{[¬p]}=

{λw[P in w]}U{λw[¬p in w]}=

{λw[P in w], λw[¬p in w]}

Negative polar question: ?¬p

{[?¬p]}=

{[P]}U{[¬p]}=

{λw[P in w]}U{λw[¬p in w]}=

{λw[P in w], λw[¬p in w]}

Alternative polar question:?(p∨¬p)

{[?(p∨¬p)]}=

{[P]}U{[¬p]}=

{λw[P in w]}U{λw[¬p in w]}=

{λw[P in w], λw[¬p in w]}

([]: proposition; {}: set; =: set equal; U: union; λ: abstract operator, which refers to a class and an attribute; w: world, which means possible world. See: Jens Allwoof, Lars-Gunnar Andersson, and Osten Dahl, 1977.)

From the above formulas, we can prove that there are only two possible answers: *p* or *¬p* for the above three kinds of polar questions: *?p, ?¬p, ?(p ∨¬p).* For example, for the proposition "light walks in a straight line", the polar questions that can be asked include: the positive polar question "Does light walk in a straight line?", the negative polar question "Does not light walk in a straight line?", the alternative polar question "Does light walks in a straight line, or does not it?" There are only two possible answers to the three polar questions: "Light walks in a straight line" and "Light does not walk in a straight line". It can be seen that although the polar question is divided into positive polar question, negative polar question, and alternative polar question, this is only a difference in the linguistic expression of the polar question. Therefore, the semantics of the three kinds of polar questions are essentially the same. The answer to the polar question is a fixed closed polar answer.

1.1.2 Alternative Questions

Alternative questions are those that list several options, separated by disjunction, and ask for a choice among these (Ivano Ciardelli, Jeroen Groenendijk, & Floris Roelofsen, 2019). Alternative questions take the form of alternative interrogative sentences: ?(p∨q). The semantics of an alternative question can be regarded as a semantic combination of two or more polar questions, that is, an alternative question contains two or more polar options (Robert van Rooy & Marie Šafářová, 2003).

The structured meaning framework is as follows:

Alternative question: ?(p∨q)

{[?(p∨q)]}=

{[?p]}U{[?q]}=

{λw[p in w]}U{λw[q in w]}=

{λw[p in w], λw[q in w]}

([]: proposition; {}: set; =: set equal; U: union; λ: abstract operator, which refers to a class and an attribute; w: world, which means possible world. See: Jens Allwoof, Lars-Gunnar Andersson, and Osten Dahl, 1977.)

According to the above formula, to the above selective question: *?(p ∨q)*, there are only two possible answers: *p, q*. This is an alternative combination of possible answers to the polar question *?p* and the polar question *?q*. For example, the possible answers to the alternative question "Is light a particle or a wave?" —— "Light is a particle" or "Light is a wave" —— are the semantic combination of possible answers for the polar question "Is light a particle?" and the polar question "Is light a wave?". Through the semantic analysis of the answer to the alternative question, it is concluded that the final set is the combination of the answer set of the polar questions. From a pragmatic point of view, the answers to alternative questions are limited by the question index. Therefore, alternative questions can also be seen as polar questions.

1.1.3 Concealed Questions

Concealed questions are phrases that can be interpreted as embedded questions, including definite determiner phrases, indefinite determiner phrases, quantified determiner phrases (Floris Roelofsen & Maria Aloni, 2008).

E.g.:

I know that light goes in a straight line. ≈ I know "Does light go in a straight line?".

I know the form of light transmission. ≈ I know "What is the form of light transmission?".

I know every paper provided by this scientific conference. ≈ I know "How many English papers and Chinese papers are provided at this scientific conference?"

Through the above example, it can be seen: The proposition "I know that light goes in a straight line" contains the definite determiner phrase "light goes in a straight line", which means that I know the answer to the polar question "Does light go in a straight line?"; The proposition "I know the form of light transmission." contains the indefinite determiner phrases "the form of light transmission", which means that I know the answer of the inquisitive question "what is the form of light transmission?"; the proposition "I know every paper provided by this scientific conference" contains the quantified determiner phrases "every paper provided by this scientific conference" means that I know the answer to the quantified question "How many English papers and Chinese papers are provided at this scientific conference?". The concealed question is only morphologically embedded in a declarative sentence, but the concealed question can be analyzed separately in terms of semantics and pragmatics. Therefore, we

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can ignore the syntax particularity of the concealed question, and divide it into a polar question or an inquisitive question from the perspective of pragmatics.

1.1.4 Inquisitive Question

Inquisitive questions take the form of special interrogative sentences. Because special interrogative sentences begin with interrogative noun phrases or adverbs, such as which, where, when, who, why, how, etc., most of them start with the letter *wh*, so they can also be called *wh*-questions. Hintikka first noticed the huge ambiguity between the detailed explanation and the existing interpretation of the *wh*-questions (Jonathan Ginzburg, 1995). Later linguistic philosophers gradually discovered in their research on the inquisitive questions that the inquisitive questions have multiple unique characteristics such as inquisitiveness and informativeness, and it cannot solve the problem of understanding the inquisitive questions from the perspective of syntax and semantics. Therefore, it is a promising path to study inquisitive questions from the perspective of pragmatics. This article will analyze the peculiar attributes of the inquisitive questions in detail in the next section.

In terms of question syntax, interrogative sentences have many forms. However, from the above analysis, we can see that from the perspective of semantics and pragmatics, there are mainly two types of questions, namely, inquisitive questions and polar questions. The most fundamental difference between these two questions lies in the possibility of answering them. The possibility of answering the polar question is fixed, and it is easy to form a knowledge closure. In contrast, the answer to the inquisitive question is open and inquisitive, and there are many possibilities.

Therefore, how to answer inquisitive questions needs to be considered by the respondent according to different contexts or other constraints. This requires the analysis of inquisitive questions from the perspective of context theory. For example, in the question of the form of light propagation, from a semantic level, one can only choose whether the light travels in a straight line, whether it is in the form of light waves or an electromagnetic process. However, light may be not only light waves or electromagnetic waves, but also light particles, wave-particle duality, etc. These options are not available in the polar question, and the answerer cannot give it. Because classical semantics requires strict compliance with logic, and from a logical point of view, no other assignments are given in the question, and new assignments cannot be added to the answer. This shows the limitations of the polar problem. Polar questions are prone to unsatisfactory answers, and answers that are not close enough to the facts. Therefore, combining context and other factors, thinking and answering questions from a pragmatic perspective can be more consistent with the facts, and more satisfactory and more appropriate answers can be obtained.

1.2 Inquisitive Question and its Characteristics

Hintikka once said:

"The logical form of a *wh*-question (which, who, where, etc.) consists of an imperative operator plus a description of the cognitive situation the questioner wants to be brought about (the latter is the desideratum of the question) (Jaakko Hintikka, 1979)."

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Inquisitive questions can be called *wh*-questions in terms of syntax; in terms of semantic, they can be called search questions (Lauri Karttunen, 1977). Because it is not enough to answer this kind of question, just from the semantic assignment provided by the question itself. It is unlike the polar questions, which only have two assignments, positive and negative. It is also unlike the alternative question, which have several options. If you want to answer an inquisitive question, the cognitive agent needs to give play to its rational subjective initiative and actively think about it. Thinking needs to combine the context of the question and use the cognitive method of pragmatics to conduct specific contextual exploration. Therefore, from the perspective of pragmatics understanding, such questions can be called inquisitive questions.

Inquisitive questions have many characteristics, such as inquisitiveness, informativeness, compliance, and transparency.

1.2.1 Inquisitiveness

The concept of inquisitiveness comes from inquisitive semantics. Its basic concept is "The basic idea of *INQ* can be briefly expressed as follows: the meaning of a sentence comprises two components, informative content, and inquisitive content. The former is the information provided by a sentence, and the latter is the issue raised by the sentence. By and large, if the information provided is sufficient to settle the issue that is raised, the sentence is an assertion. If, however, the information provided is insufficient to settle the raised issue, the sentence is inquisitive." (Shalom Lappin & Chris Fox, 2015). If there are multiple possibilities for a question and the answer needs to be determined based on the context, the question is inquisitiveness.

Inquisitiveness Definition: Q is inquisitiveness, if and only if *[Q]* contains at least two possible answers (Jeroen Groenendijk & Floris Roelofsen, 2009). According to this definition, contradiction and tautology are not inquisitiveness.

1.2.2 Informativeness

Only questions with informativeness are worthy of interpretation in the context. Informativeness refers to questions with information content. That is, question Q is informativeness in world w if and only if question Q remains a possibility in world w, and question Q excludes a possibility at least in world w.

Informativeness Definition: Q is informativeness, if and only if $\cup[Q]\neq w$ (Ivano Ciardelli, Irma Cornelisse, Jeroen Groenendijk, & Floris Roelofsen, 2009).

The informativeness of questions requires that Questions cannot be eliminated in the information state of question-answer participants, and their existence is necessary for the sense of information. Furthermore, informativeness requires that the question be able to affirm certain information and at the same time negate the contradictory information. According to this definition, contradictions and tautologies are not informative. The presupposition of the question is also the embodiment of the informativeness of the question, and the preconditions for providing information cannot be separated from the question itself. Questions have presuppositions. Presuppositions are propositions, that is, they contain information.

1.2.3 Compliance

Compliance can determine the relevance between utterances, but it is more stringent than relevance. Compliance stipulates the consistency of information exchange, judging whether a certain questioning behavior is related to a certain context. Therefore, compliance is essentially contextual information compliance.

Question compliance refers to the verbal questioning behavior that is relevant to the above context. In a sense, compliance is a restriction on informativeness, limiting the information's requirement of the question to be relevant to the context. At the same time, the concept of compliance only makes sense when the agent's intent to know and the question are inquisitiveness. Therefore, compliance is further regulation of the inquisitiveness and informativeness of the question.

When cognitive participants intend to know, they may propose several different possible question expressions, and the last question asked is the best compliant, that is, the most compliant with the previous context. And this last question is one of the different possible forms of question expression.

Compliance Definition: Q is compliant with I, $Q \propto I$, iff

1)   every possibility in [Q] is the union of a set of possibilities in [I]

2)   every possibility in [I] restricted to [Q] is contained in a possibility in [Q]

(Jeroen Groenendijk & Floris Roelofsen, 2009).

1.2.4 Transparency

The interactivity of the question-answer requires that the question must be transparent, or at least transparent among all question-answer participants. The meaning of the question should be public and can be circulated. "The transparency of understanding is the conscious experience that accompanies understanding, which the knower can introspect, thereby learning that they now understand something new." (Andrei Mărăşoiu, 2019)

Transparency is a necessary requirement for language communication. All participants should maintain the common ground and the information state of each individual appropriately, and respond to the words given. In particular, unacceptable opinions should be publicly announced, and words that no one opposes should be incorporated into the common ground and the information state of each participant. This requirement is called transparency. Questions and answers are open and transparent to all participants so that they can be supported, questioned, or denied by everyone.

It is clear from this subsection that among the various natural language questions, only the answers to inquisitive questions are non-closure, and not limited by the assignment of the question itself. Therefore, the answer to an inquisitive question should not be limited to the syntax and semantics of the question itself but should be understood based on the characteristics of the question. The most important characteristic of inquisitive questions is that the answers to the questions need to be explored in the question context. The question context needs to be analyzed to understand and answer the question.

2. Mapping Relationship between Question and Context

2.1 Level of Question Context

Since Frege put forward the "context principle", the context principle has received more and more attention, and context analysis has gradually become an important research method in analytical philosophy. The question is a kind of language behavior. To understand the question, we need to understand the context of the question language and the context which question effecting, because the question lies in the context. Questioning is a kind of verbal behavior. To understand and answer questions, we must start from the syntax and semantics of the question, pay attention to the facts of the questioning behavior itself, and place the question in the context it is trying to influence. Context is the source of the meaning of the question and the object of the question's effect, where the question has been arisen, understood, and answered. The author believes that the question context can be divided into question-answer facts, background knowledge, and question presupposition.

2.1.1 Question-answer Facts

The question-answer facts are explicit and the most directly knowable. It includes the context, time, places, question-answer participants, and their reflexive self-awareness, which is the question-answer participants know that they are in the question-answer dialogue.

2.1.2 Background Knowledge

Background knowledge refers to the background knowledge base of both sides of the question-answer. The essence of question-answer behavior is information exchange. At the beginning of the question-answer, both question-answer participants have some common information of factual meaning or expected meaning. This information constitutes the initial context of the question-answer and is also the part that the question-answer behavior is trying to influence. Of course, in the expectations of the question-answer participants, some information seems to be the information they agree with, but it is not. Question-answer participants may misjudge the other participants' presupposition. However, in actual communication, the consistency of information must be maintained to the greatest extent to ensure the consistency of background knowledge. Usually, this information content is composed of assertions. If the assertion is successful, that is, it is approved by both participants to the question-answer. The assertion will become part of the initial context and affect the subsequent question-answer dialogue (Robert Stalnaker, 1998). Context-dependent means that the question-answer is based on facts available in a certain sense or expected sense. Therefore, the context of the question-answer contains the information shared by the question-answer participants.

2.1.3 Question Presupposition

Question presupposition is the cognitive agent's expectations of the question. Compared with background knowledge, the presupposition is more personal and fallible. "Roughly speaking, the presuppositions of a speaker are the propositions whose truth he takes for granted as part of the background of the conversation..... Presuppositions are what is taken by the speaker to be the common ground of the participants in the conversation, which is treated as their common knowledge or mutual

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knowledge. " (Herbert H. Clark, 1992). Due to the personal feature of the presupposition, there may be differences between the actual presupposition of the questioner and the actual presupposition of the answerer. But the questioner or answerer may not be aware of the question, that is, the question presupposition lacks reflexivity. Among the presuppositions of the questioner or answerer, the presuppositions of the question-answer participants are the same, that is, their presuppositions are also the presuppositions of other participants. Question-answer participants will assume that their presupposition is the common basis for all question-answer participants, but this is not necessarily the case. What the questioner or answerer presupposes is not necessarily a common basis. As the question-answer dialogue progresses, everyone's presupposition will gradually be adjusted, and finally, they will be in a relatively coordinated state of equilibrium which acceptable to all communities.

The presupposition of the question is the unified conceptualization of its answer and the embodiment of the question's information. Question presupposition is a question element in the form of a proposition, that is, the presupposition is the propositional component of the question, which will affect the understanding and answer of the question. Early philosophers who studied questions such as Bernap and Steele define a question as presupposing a statement if and only if the truth of the statement is a logically necessary condition for there being a true (i.e., correct) answer to the question (Nuel D. Belnap & Thomas B. Steel, 1976). The presupposition of the statement in the question is true so that the question has a true answer. The converse is the same. For a question to have a true answer, the question must contain a true statement presupposition. The question itself contains the relationship between the presupposition and the answer. A true question must presuppose a true statement so that the question has a true answer. A question has one or more presuppositions, and answering the question positively is actually acknowledging the presupposition positively. The presupposition of the question must be true to answer the question positively. In terms of the true answer to the question, the logic of presupposition must be true. The presupposition of a question is the logical condition necessary for its true answer. A presupposition is a necessary condition for answering. True questions need to presuppose a true statement to have a true answer. Only when the presupposition is true, can the question be answered positively. For the answer to the question, the question must be logically true.

These three levels are arranged in a progressively less public and more private order. The question-answer fact is the most public and least private, and it is all knowable among the cognitive subjects who are not involved in this question-answer dialogue. The background knowledge is intermediate in publicness and privateness, and it is known within the community of question-answer participants, but not to other cognitive subjects. The presupposition is the most private and the least public, and it is confined to the individual information state of the question-answer cognitive subject. The difference between the publicness and privateness of question contexts influences the distinction between question contexts, and the three levels of question contexts are divided to quantify the different question contexts. For individual question-answer subjects such as the questioner or the answerer, the difference in presupposition means the different contexts. For the question-answer

community, the difference in background knowledge means the different contexts. Depending on the variation of question presuppositions and background knowledge, there may be many different possible question contexts. Different question contexts constitute different possible worlds in which questions exist, and questions have different understandings and answers in different possible worlds.

2.2 Possible World of Questions

The possible world is proposed by Leibniz in "Discourse On Metaphysics", Leibniz believes that our world is the best of all possible worlds. In 1968, Richard Montague used Pragmatics (Richard Montague, 1968). In 1969, the represent of David Lewis made the world a widely known philosophical possible creed (David Lewis, 1969). Lewis believes that there are other possible worlds besides the real world. There may be countless other ways of being, which is a quantification of being.

The possible world can be roughly understood as the way this world may exist, and the world living in it can be imagined as somewhat different from its actual situation. A proposition is what a sentence says about the world on a specific occasion. For every proposition, a set of possible worlds can be found in which the proposition is true, and call this set the truth set of the proposition. One way to characterize a proposition is to give its truth value set, that is, the set of possible worlds in which the proposition is true. Similarly, the characteristics of a possible world can be represented by a set of propositions that are true in this world. A proposition is a function of the possible world to the truth value.

A conceptualization of knowledge as an objective informational notion is the cornerstone of all the usual possible-worlds treatments of knowledge and other epistemic concepts. "Basically, what it amounts to is to characterize someone's, say *a*'s, knowledge at a certain time *t* by means of the states of affairs or courses of events ('possible worlds') it admits of as distinguished from those it excludes." (Jaakko Hintikka, 1983) An object should exhibit differences or display its unanticipated properties in different conditions or different contexts. All empirical knowledge is relative to various objects, conditions, historical or cultural contexts, and changes with context. We cannot and need not resort to artificial language to disambiguate words; the richness of context itself already sets up a flexible, vivid, and transformable possible world for words. Therefore, its effective meaning can only be obtained in specific contexts.

"The denotation of an interrogative in a given world is the proposition expressing the complete true answer to the question in that world." (Maria Aloni, 2005) Question identification interpretation is closely linked to answers in the contextual world. Question comprehension depends on the assumed method of identification, and the assumed method of identification depends on the context. Therefore, the understanding of the question depends on the context. Different approaches to the identification of questions are valid in specific different contextual worlds. In different possible worlds, participants' cognitive states are the same, but their truth values change as the context changes. The understanding of the question changes depending on the identification method given by the context. There are multiple possible answers to the question, and each answer has a possible world corresponding to it.

The possible answers to the question and the possible worlds constructed by the context are a mapping relationship.

It is clear from this subsection that question contexts can be divided into question-answer facts, background knowledge, and question presupposition, and different question contexts exist in different possible worlds of questions. There are several different possible worlds for the same question, and the same question is understood and answered differently in different possible worlds. The problems of how to deal with the many possible worlds, how the understanding of the question and the possible worlds should be related, and what is the relationship between different possible worlds and different answers need to be supported by the propositional set theory. Through propositional set theory, a mathematical logic treatment, different possible worlds can be combined in an orderly way, and different answers can be found for the same question in different possible worlds.

3. Proposition-set Theory and Question Answering

3.1 Proposition-Set Theory

In general, the context in which a speech act occurs can be represented by a set of possible situations or possible worlds, and an approach called the proposition-set theory of contexts. The set of contexts contains all contexts in which the questioner's question-answer speech act may exist. The objective information about the existence of the question is contained in all possible worlds.

Every relevant or irrelevant proposition taken for granted by participants in a question-answer conversation is true in all possible worlds that define the context. Since speakers in the actual world take for granted when they talk about what they are talking about, they will speak not only in the actual world but also in each of the possible worlds that define their contexts. In each possible world in the set of contexts, a question-answer conversation is taking place with a context represented by its own set of contextual propositions.

A question has multiple possible answer propositions, and all of them synthesize the set of answer propositions for that question. In different possible worlds, different answers are true. The set of possible answers to the inquisitive question and the set of possible worlds of the context are in one-to-one correspondence, with each possible answer mapped to a possible world in which that possible answer is true, and only one possible answer is true in each possible world. In different possible worlds, different answers are true. The answer to a question results from a mutual mapping between the set of possible world propositions and the set of answer propositions.

3.2 The Mapping of Questions to Answer

"The set of suitable individual concepts depends on the perspective taken on the (relevant) individuals in a particular utterance context." (Maria Aloni, 2005). The understanding of questions in question-and-answer depends on the possible worlds in which they are located. In different possible worlds, participants' information states are the same, but their truth values change as the possible worlds change.

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In terms of proposition set theory, questions should be answered from a mapping relationship between two propositional sets. The possible worlds of the question form a proposition set, the question is understood differently in each possible world, and the question gets the corresponding question understanding in a possible world for that possible world. Questions have different understandings in different possible worlds, and different question understandings have different question answers. The set of possible answers to a question also forms a set of propositions corresponding to the set of propositions in the possible worlds. Every possible world has a question understanding, and every question understanding has its question answer. Therefore, every possible world has a question-answer. The set of propositions of possible worlds of questions and the set of propositions of answers to questions and answers form a mutual mapping relationship.

As shown in the figure below (Q: Question; W: World; QN: Question understanding; A: answer), question understanding is a function of the mapping of the question through the possible worlds. Questions form different question understandings through different possible worlds, and different question understandings map to different answers：
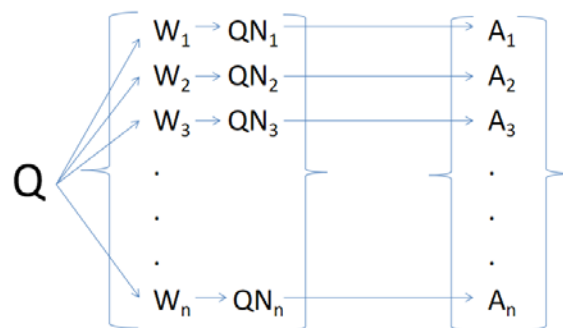

Figure 1. Question Understanding and Answers Mapping

The following is illustrated by case studies:

Example: Who is the chairman of this scientific congress?

Background: The International Solvay Institute is holding the fifth Solvay Conference on Physics, and Hendrik Lorentz is the chairman of this conference.

Scene 1: A newspaper journalist A is preparing promotional materials for this conference, and the editor of the newspaper asks journalist A: "Who is the chairman of this scientific congress?"

Question understanding 1: What is the name of the chairman of this scientific congress?

Answer 1: The appropriate answer to this question at this point would be "Hendrik Lorentz".

Scene 2: During a break in the meeting, a young scholar wants to talk to the chairman of the meeting and asks journalist A: "Who is the chairman of the scientific congress?"

Question understanding 2: Which person in this room is the chairman of this scientific conference?

Answer 2: The appropriate answer to this question at this point would be "That person (pointing to Hendrik Lorentz)."

Analysis: In Scene 1, name identification is an effective method of question understanding. In this context, knowing the name of the person is proof of knowing who the chairman of the scientific conference is, without the need to identify him. In Scene 2, appearance identification is a valid method of question understanding, in which the identification is sufficient to know who the chairman of the congress is, without the need to know the name. If someone knows that Hendrik Lorentz is the chairman of the fifth Solvay Conference on Physics, but does not recognize the conference chairman.

As can be seen, the answers to the same question, with the same information available to the respondent, vary according to the scene, with no change in background. In the above case, journalist A can identify both the name and the appearance of the chairman. But in the possible worlds composed of different scenes, the respondent gives different answers to the same question. It can be seen that the answers change with the possible worlds.

4. Conclusion

In this paper, we have put forward a promising approach that context theory can be used to address the problem of question comprehension in natural language. In natural language, analyzing the context of the question allows for understanding and answering the question itself. The paper thus advances the current research into Linguistic question pragmatics.

This study has shown that questions can be divided into polar questions, alternative questions, concealed questions, and inquisitive questions in syntax, and be divided into polar and inquisitive questions which have several characteristics such as inquisitiveness, informativeness, compliance, and transparency in pragmatics. The study has also shown that the question context consists of question-answer facts, background knowledge, and question presuppositions. The paper concludes with proposition set theory to provide a framework of possibilities for the understanding of the question.

This paper has provided a deeper insight into characteristics of *wh*-questions which are informative and inquisitive in unity, and shed new light on the question context which is composed of question-answer facts, background knowledge, and question presupposition.

Several issues are not addressed in this study. How to classify different contexts according to the change of the question context level? Should there be different question contexts for different agents? Does the division of the question context need to be unified? If so, how to unify it? I suggest that the study of changes in the question context level involves the cognitive state of subjects and requires cooperation with the brain neuroscience, the computer science, and other disciplines. It is a feasible path to conceptualize the cognitive subject's perception of question context change through computational modeling and logical analysis.

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