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The Influence of Contextual Variation in Communication: The Context Grafting Hypothesis Based on Relevance Theory

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Abstract. While Relevance Theory posits that intent recognition necessitates positive cognitive effects (inference, enhancement, and replacement), which means changes in assumptions, everyday observations suggest that assumptions have long-term stability. This paper resolves the paradox by arguing that, in the pursuit of optimal relevance, listeners often receive only a portion of the implicated premises and fill in the gaps with assumptions from their own context, resulting in the incomplete transmission of the set of assumptions. This process is described in this paper as the Context Grafting Hypothesis. Process above leads to misinterpretations of intent, a weakening of evidence, and, consequently, negative cognitive effects, which classified as Assimilation Bias and Rejection bias in this article. The paper further proposes "the completeness of the transmission of the set of assumptions" as a criterion for measuring positive cognitive effects and, based on this, research directions were proposed that involve experimentally verifying and directly applying the aforementioned standards across multiple fields.

Keywords: Relevance Theory, Optimal Relevance, Pragmatics, Assumptions, Contextual Change

1. Introduction

1.1. Theoretical overview

Relevance Theory was systematically proposed by Sperber and Wilson in 1986 and is one of the most influential theories in contemporary pragmatics [1]. It has been widely applied in fields such as the philosophy of language, psycholinguistics, cognitive science, and translation studies [2, 3].The theory posits that the goal of communication between two parties is to identify each other's intentions, and that the production of positive cognitive effects is a necessary condition for identifying those intentions; positive cognitive effects include inference (the acquisition of new assumptions), enhancement (the mutual reinforcement of new and old assumptions), and replacement (the substitution of old assumptions with new ones), all of which necessarily involve changes in assumptions (propositions taken to be true) [1, 4].

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1.2. Identification of the problem

This paper notes a noteworthy phenomenon: in everyday communication, participants' sets of assumptions tend to remain stable over the long term and rarely undergo significant changes. A simple reflection will reveal that the set of propositions one considers to be true does not change arbitrarily. If this phenomenon is acknowledged, then the communication methods employed in daily life may be not as likely to achieve the positive cognitive effects anticipated by Relevance Theory as expected; that is, communicators often cannot succeed in truly discerning each other's intentions in everyday interactions. This implies that the efficiency with which everyday communication achieves the communicative goals set by Relevance Theory may be lower than theoretically expected, although this inference remains to be further validated through empirical investigation.

1.3. Research objectives

Starting with an explanation of this phenomenon, applying Relevance Theory to improve everyday communication holds great potential. By clarifying the mechanisms at work in a specific aspect of communication, this paper proposes the "Context Grafting Hypothesis" to explain the specific mechanisms through which contextual differences between communicators influence communication, and offers several actionable research directions. Contextual differences refer to the discrepancy between the speaker's cognitive context and the listener's.

2. Relevance theory and cognitive effects

Relevance Theory characterizes communication as a process of moving from the explicit to the inferred: the speaker conveys their communicative intent through overt signals, while the listener uses these signals—that is, the literal meaning, or the information directly conveyed by the speaker through language—as clues to infer, in reverse, the information the speaker has not explicitly stated (including presuppositions logically related to the literal meaning and implicatures not logically related to it), thereby identifying the speaker's intent [1, 5]. The speaker's cognitive context consists of all implicated assumptions—i.e., propositions that must be accepted as true to derive the literal meaning. Relevance Theory holds that whether the listener's assumptions change during the communicative process determines whether the listener can identify the speaker's intent; this change—or lack thereof—is referred to as the "cognitive effect": the interaction between new and old assumptions can produce three types of positive effects—inference, enhancement, and substitution; conversely, it produces negative cognitive effects such as rejection or repetition. The stronger the positive cognitive effect, the more the listener's assumptions are altered; negative cognitive effects do not alter the listener's assumptions. Specific cognitive effects are shown in Table 1.

Table 1. Cognitive effects for each category

Positivity and Negativity	Name	Specific Manifestations
Positive	inference	Derive a new assumption based on both the new and old assumptions, and accept it
Positive	enhancement	New assumptions reinforce belief in old assumptions.
Positive	replacement	The new assumptions overturned the old ones.
Nagitive	repetition	New assumptions and old assumptions are not contradictory, but the connection between them is not strong enough to produce a synergistic effect.

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Table 1. (continued)

Nagitive	rejection	The new assumptions conflict with the old assumptions, but the conflict is not strong enough to overturn the old assumptions; instead, it is overturned by the old assumptions.

This theory is based on the premise that the language in daily communication must be understood and reacted to in a fast manner and that the users must seek to maximize the ratio of the cognitive effects to mental effort (this ratio is referred to as "relevance"—the greater cognitive effects produced, the less mental effort required, and the higher the relevance). Consequently, it concludes that in order to achieve better cognitive effects while minimizing mental effort and ensuring that concurrent tasks are not negatively affected, listeners will often select the first interpretation they can understand—one that meets their expectations and is derived from the speaker's intended assumptions—as the interpretation and assumptions they believe the speaker expressed. This is known as optimal relevance. In less demanding activities, like reading or studying, individuals will try to make as many inferences as possible to have the most optimal cognitive impact possible [1]. This is known as maximum relevance. Because this paper emphasizes everyday communication, the discussion will be on the process of striving to achieve optimal relevance.

3. The context grafting hypothesis

It has been observed that in the process of seeking optimal relevance, listeners tend to accept the first assumptions they infer that satisfy their expectations, along with the intention they convey. This seems to suggest that certain presuppositions particularly those requiring multi-step inference are not actually deduced by the listener during this process. However, such omissions do not necessarily make the speaker's words incomprehensible to the extent that the listener would need to ask for clarification or confirmation; therefore, it is highly likely that a process of contextual supplementation occurs here. That is, constrained by the mental effort required for optimal relevance, listeners after deducing up to a certain point graft their own cognitive context onto the assumptions expressed by the speaker, thereby filling in the missing assumptions.

In other words, to correctly understand the meaning and intent of what the speaker says, it is not enough to receive a single assumption; one must receive a set of assumptions. This set constitutes the minimal set of assumptions required to understand the speaker and is a subset of the speaker's cognitive context. However, due to constraints, the assumptions the listener actually receives are only one or a portion of this minimal set; the remaining parts are replaced by propositions from the listener's own cognitive context. The above process can be summarized in the following proposition:

Proposition 1 (Context Grafting Hypothesis): Under optimal relevance, the set of assumptions that a listener can acquire through inference is a subset of the minimal set of assumptions required to understand the speaker; the listener will supplement this set by filling in assumptions from their own cognitive context to ensure that the speaker can be understood. This applies under the condition that, in everyday contexts, listeners are constrained by time and cognitive resources. A testable prediction is that, under experimental conditions where cognitive load is artificially increased, the bias rate in comprehension should be significantly higher, and the direction of bias should be systematic rather than random. e.g., using a dual-task paradigm (reading while memorizing digits) and measuring interpretation bias via a subsequent questionnaire.

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4. Independent analysis of bias mechanisms

If this hypothesis is accepted, then it is not surprising that listeners often fail to correctly infer the set of assumptions and intentions the speaker intends to convey.

The bias generated by the process described by the hypothesis is not random; rather, it is directed in such a way that the assumptions conveyed by the speaker become, to some extent, more similar to the listener's existing assumptions, because the listener will only perceive a portion of the received set of assumptions as new. This weakens the impact of the new assumptions received, giving rise to two types of biases:

(1) Assimilation Bias: This bias occurs when new assumptions are similar to prior assumptions. The dilution of new assumptions by prior assumptions may prevent the listener from noticing new evidence, thereby failing to produce the enhancement effect;

(2) Rejection bias: This bias occurs when the new assumptions contradict the original assumptions. The absence of the speaker's original assumptions which were not received may disrupt the chain of evidence, and since they cannot be supplemented by the listener's prior assumptions, the new assumptions appear illogical and are rejected.

When this process occurs during the optimization of optimal relevance, it is highly likely to produce negative cognitive effects, which is consistent with empirical research and explains why positive effects are less common in everyday communication, thereby leading to the long-term stability of the set of assumptions [6].

At the same time, it is important to note that the meaning of words in a sentence may also undergo certain changes due to differences in context [7]. Since this change results from words transitioning from the speaker's context to the listener's context, it causes the meaning of the sentence to shift further toward the listener's pre-existing assumptions, thereby increasing both the frequency and severity of the aforementioned bias.

5. Discussion

5.1. Criticism of the "mutual knowledge" theory

Some scholars have attempted to use the "mutual knowledge" theory to resolve this issue, that is, to construct an ideal state in which communication is based on the exchange of codes grounded in a specific set of assumptions that are certain to both parties the basis of "mutual knowledge." However, for either party in the communication, this certainty requires certainty regarding the proposition that "the other party knows these assumptions," and the certainty of this proposition, in turn, rests on the certainty of the proposition "the other party knows that I know the other party knows this proposition." The certainty of each such proposition must be based on another proposition; thus, establishing certainty regarding mutual knowledge would require relying on an infinite number of certain propositions. In the pursuit of optimal relevance, the finiteness of cognitive resources renders such infinite confirmation impossible. In other words, precisely because listeners are constrained by the upper limit of mental effort in everyday communication and cannot verify each meta-proposition in the chain one by one, this infinite regress is practically infeasible, thereby rendering the premise of the "mutual knowledge" theory untenable [2].

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5.2. Response to potential counterexamples

If changes in everyday assumptions are too minor or too trivial to be detected, does the above argument fail? In response to this concern, we offer the following three points: (a) the question "what is the other party's intention?" is itself a form of assumption; (b) if we acknowledge that a change in a single assumption alone is sufficient to identify intention, Relevance Theory would fall into a circular argument， because identifying intention itself presupposes a change in assumptions; (c) therefore, recognizing intention necessarily requires changes in assumptions of a certain type and quantity, and precisely what kind of change is sufficient to recognize intention， and whether such changes are perceptible， remains to be studied. Thus, this concern is insufficient to refute the argument presented in this paper.

The preceding argument focuses primarily on the listener's misinterpretation, overlooking the speaker's role. It must be acknowledged that speakers possess the ability to adjust the cognitive context and adapt to listeners to reduce bias; however, this requires some understanding of the listener's context. Since context itself constitutes a set of assumptions, this brings us back to the question of how a person interpret the set of assumptions conveyed by others: for a speaker to adjust their utterance to fit the listener, they must first reason about the listener's current set of assumptions, and this reasoning process is equally constrained by the speaker's cognitive resources, thereby facing the same risk of contextual grafting. Therefore, while the speaker's active role may mitigate the risk of interpretive bias caused by contextual grafting, it cannot fundamentally eliminate it [8].

6. Outlook

The Context Grafting Hypothesis provides a criterion: the more completely the set of assumptions the speaker intends to convey is transmitted to the listener, the more likely it is that the cognitive effects will be positive. Although this criterion remains difficult to operationalize it is extremely challenging to list all the assumptions that are implicated and to distinguish which parts have already been conveyed—it establishes a preliminary approach to quantification. Based on this, this paper proposes the following research directions.

Firstly, the direct application of this criterion. The cognitive contexts that are relevant to a particular topic to some degree, and the number of context-inconsistent inferences that can be drawn per unit of time under stress, can also be determined ahead of time, through reflection. If two people have previously identified such cognitive contexts and had their number of inferences per unit time under stress determined then, when they communicate, one can mix the inferences that the other has been able to obtain from their limited number of inferences with their own remaining inferences. Thus a prediction of the set of assumptions turned out to be possible after the grafting process and, from this set of assumptions a prediction of the other party's intended meaning that they are likely to understand is possible. The actual inferred intention can be compared to this prediction to either improve the model or suggest ideas on how to communicate more effectively.

Second, conduct a test of testable predictions in the hypothesis through the design of an experiment. Randomly allocate participants to high cognitive load condition (e.g., simultaneous memory task) and low cognitive load condition and ask them to read communication material that includes presuppositions and make judgements about speaker intention. The hypothesis is that the high-cognitive-load group will show a greater proportion of comprehension bias and that this bias will be systematic (in the direction of assimilation/rejection) and not random [9].

Third, discuss the use of the Context Grafting Hypothesis in cross-cultural communication. The hypothesis can give a shared cognitive model to explain cultural comprehension biases of

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participants from various cultural backgrounds and help to design cross-cultural communication aids [10].

7. Conclusion

Drawing on Relevance Theory, this paper analyzes the reasons why negative cognitive effects occur frequently in communication and proposes the Context Grafting Hypothesis: under optimal relevance, the set of assumptions that a listener can acquire through inference is a subset of the minimal set of assumptions required to understand the speaker, and the listener supplements this set by filling in assumptions from their own cognitive context.

In addition, this paper makes the following two theoretical contributions. First, it identifies the assimilation and rejection biases as two systematic comprehension biases in everyday communication, and thus accounts for why the positive cognitive effects are not more routinely produced in everyday communication than Relevance Theory predicts. Second, it introduces the "completness of the transmission of the set of assumptions" as an operational measure for the evaluation of cognitive effect in communication, a first step towards quantification and as a theoretical approach to the application of Relevance Theory to real-life communicative situations. The theoretical developments paved the way for creating tools that could be applied in practice, helping to communicate and giving direction for future empirical research.

There are also some drawbacks of the current study. This heterogeneity is not accounted for in the existing framework, that is, the same set of assumptions are given equal weight, when in fact some of these assumptions may be more important to comprehending the words than others. It remains to be investigated how much these two kinds of bias are due to incomplete assumptions. Second, although the dichotomy between assimilation and rejection bias is analytically useful, it may not represent the entire set of types of bias; intermediate or compound forms of bias may exist which warrant further development of the taxonomy. Additional studies could lead to the discovery of more phenomena that can be explained by this theory. Third, the Context Grafting Hypothesis is theoretically proposed and, while a testable prediction about "cognitive load" and "comprehension bias" is provided, empirical work is still needed. A focus of future research should be an experimental test of the hypothesis in different communicative contexts and further fine-grained measures of the completeness of the transmission of assumption-sets. These will play a critical role in bringing the current theoretical framework into 'real' communication tools and evaluating the validity and applicability of the framework.

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