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Evidentiality in Language and Cognition:
The View from Construal Level Theory

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Abstract

This paper addresses the question of whether the presence of grammatical category *evidentiality* in language, traditionally defined as an expression of information source, affects cognitive performance. Our research paradigm bridges together two theoretical perspectives from linguistics and cognitive psychology: (i) the position that evidentiality encodes epistemic commitment, specifically, that evidential forms present events as less certain and psychologically more distant from the here and now; (ii) the assumption that manipulation of psychological distance affects how events are perceived by the speaker, originating from Construal Level Theory. Results from Study 1 provide experimental support for the hypothesis that evidentiality implies psychological distance: evidential forms consistently trigger the perception of an event as being less certain, further remote in time and space, and involving distant social relations. However, Study 2 shows that evidentiality does not affect the level of abstraction with which an event is conceptualized, thus arguing against the Sapir-Whorf hypothesis.

Keywords: Evidentiality; epistemic commitment; Construal Level Theory; the Sapir-Whorf hypothesis.

Evidentiality as Grammatical Category

About one sixth of the world's languages have evidentiality, a grammatical category that marks the source of information (Aikhenvald, 2004). In English the source of information is encoded lexically: we say *I saw that it rained* if we had directly perceived the event and *I heard from John that it rained* to report a second-hand account of the event. Unlike English, languages like Bulgarian, Korean, and Turkish encode the source of information grammatically by a piece of morphology that usually attaches to the verb (just like tenses in English do). Thus, the speaker of Bulgarian would say *valja* if she saw that it rained and *valjalo* if she heard from someone or inferred that it rained. Consequently, while in languages like English the expression of information source is optional, in languages like Bulgarian verbal forms express this information obligatorily.

The question we address in the paper is this: Does grammatical encoding of evidentiality in language have any observable cognitive effects, as suggested by Whorf (1956)?

Does Evidentiality Affect Thinking?

Unlike more traditional linguistic categories, such as grammatical gender, evidentiality has received less attention in the literature on the Sapir-Whorf hypothesis (cf. Boroditsky, Schmidt, & Phillips, 2003 on gender). Recently, however, the topic started to generate more interest. Papafragou et al. (2007) compared how English and Korean children monitor information sources. Unlike English, Korean grammatically encodes the distinction between information acquired directly and through hearsay. If evidentiality facilitates cognitive performance, then Korean children should perform better on tasks that test children's ability to differentiate between direct information and hearsay. The results showed that English and Korean children perform similarly on these tasks, contrary to the prediction of the Sapir-Whorf hypothesis. The authors concluded that the development of the specific cognitive skill – monitoring of information source – is not affected by the presence of evidentiality in language.

Aksu-Koç, Ögel-Balaban, and Alp (2009) reached a different conclusion about the effect of evidentiality on cognitive performance. They report that Turkish children show better memory retention about information source compared to their English peers (cf. Drumey & Newcombe, 2002). The authors attribute these differences to language: unlike English, and like Korean, Turkish grammatically encodes information source. Aksu-Koç et al. (2009) conjecture that the presence of a grammatical category that encodes the way in which information was acquired, i.e. through direct perception or indirectly, facilitates memory for information source in Turkish children. This effect, however, is short-lived and disappears by the age of 6, at which point English and Turkish children perform similarly on memory retention tasks.

This discussion suggests that the results of the previous studies are inconclusive about the effect of evidentiality on cognitive performance. In what follows, we attempt to shed more light on the relation between evidentiality and cognition. Unlike Papafragou et al. (2007) and Aksu-Koç et al. (2009), who study evidentiality from a developmental perspective and focus exclusively on children (cf. also Fitneva 2008 on Bulgarian), we adopt an experimental paradigm that targets adults. The question of whether

evidentiality might affect cognitive processing in adults is usually preempted by the assumption that information source monitoring is an easy task for any adult, irrespective of whether her language has grammatical category evidentiality or not. In this study we take a different methodological stance. Our approach is motivated by recent work in theoretical linguistics, which suggests that besides information source evidentiality encodes epistemic commitment as part of its meaning. This perspective opens up previously unexplored opportunities for experimental research on evidentiality and its cognitive correlates.

Evidentiality and Psychological Distance

The idea that evidentiality encodes epistemic commitment is rooted in the observation that the source of information correlates with information reliability and its status in the belief system of the speaker: information perceived directly is more reliable than information acquired through hearsay or inference. This observation led to an important theoretical claim: in some languages evidentiality is not simply a marker of information source but a grammatical expression of epistemic commitment. One such language is Bulgarian (Izvorski, 1997; Smirnova, 2013). In Bulgarian, non-evidential (indicative) forms encode that the speaker is fully committed to the truth of the information she reports; this type of commitment is equivalent to knowledge (cf. English *It rained*). *Valja* 'it rained' from section 1 is an example of such a non-evidential (indicative) form in Bulgarian. On the other hand, evidential forms, such as *valjalo* 'it rained (I heard/inferred)', grammatically encode a weaker epistemic commitment, the closest equivalent in English being utterances with modal verbs (cf. English *It must have rained*).

By virtue of encoding epistemic commitment, evidential forms in Bulgarian belong to the group of linguistic devices that express *displacement*, i.e. the ability of the speaker to distance herself from the here and now. While the observation that evidential forms imply "psychological distancing from the event" goes back to at least Slobin & Aksu (1982, p. 196), it has not been experimentally tested. In what follows, we first test the hypothesis that evidential forms in Bulgarian imply greater psychological distance compared to non-evidential forms (Study 1). We then test whether manipulation of psychological distance by means of evidential vs. non-evidential forms gives rise to observable cognitive effects (Study 2). Our theoretical assumptions about cognitive effects associated with manipulation of psychological distance originate from Construal Level Theory, to which we turn next.

Construal Level Theory of Psychological Distance

According to Construal Level Theory (Trope & Liberman, 2008; Trope & Liberman, 2010), people's thinking about events, places, and other individuals depends on how close these entities are to one's "egocentric reference point", i.e. me, here, and now. Entities within the immediate reach from this center activate low-level construal, or concrete mode of thinking; those further away from the egocentric reference point activate high-level construal, or a more abstract mode of thinking. Intuitively, when making plans for a trip this weekend, we think about specific details (where is my toothbrush?), while planning a trip one year from now triggers different sorts of questions (shall I drive or fly?).

Construal Level Theory (CLT) recognizes four different dimensions on which entities in our psychological space can be located: spatial, temporal, social, and hypothetical. Each of these dimensions has a common center – the "egocentric reference point". Entities on these four dimensions can be perceived as being proximal or distal to our reference point. A concert tomorrow is an example of a proximal distance on the temporal axis, while a similar event a year from now exemplifies a distal relation to the center. Similarly, factual events and those that are certain to occur are close to the egocentric reference point on the hypothetical dimension, while events to which we assign lower probability of occurrence are psychologically further away.

Interrelation between Psychological Distances

One powerful prediction of CLT is that distances on different psychological dimensions are interrelated. This means that distal or proximal distance of an entity on one dimension (e.g., hypothetical) affects how close or further away this entity is perceived on other dimensions (spatial, temporal, and social). For example, Wakslak and Trope (2008) showed that when people think about events that are less likely to occur (hypothetically distal), they expect them to take place in a far away place (spatial distance), to be distant in time (temporal distance), and to affect people who are not in their immediate social circles (social distance).

Of particular interest to this study are experiments in which language was used to prime psychological distance. In a series of studies, Stepan, Liberman, and Trope (2010) used politeness to manipulate psychological distance on the social dimension (polite language implies greater psychological distance), and tested whether it would affect perceived psychological distance on the spatial and temporal dimensions. They found that when subjects read descriptions of actions in polite and more normative language, they assumed that the actions would be performed in a more distant future (temporal distance), while a less polite description of an action triggered the perception about a closer temporal location of the event (temporal proximity). The authors also found similar effects of politeness on physical distance: polite forms were consistently associated with greater physical distance, while less polite colloquial forms were associated with a closer spatial relation.

Building on this paradigm, we hypothesize that evidentiality, in virtue of being a grammatical expression of epistemic commitment, can be used to manipulate psychological distance on the hypothetical dimension, just as politeness in language was used to manipulate distance on the social dimension in Stepan et al. (2010). Assuming that psychological distances are interrelated, as predicted by

CLT, we expect that evidentiality should also affect perception of psychological distance on physical, temporal, and social dimensions. We test this hypothesis in Study 1.

Psychological Distance and Levels of Abstraction

People, events, and entities can be represented at different levels of abstraction (cf. *playing the ball* vs. *exercising* as a description of the same events). According to CLT, what level of abstraction or construal level is activated to conceptualize a particular entity depends on psychological distance of this entity from the self-centered reference point. Greater psychological distance activates high-level construal – the entity is perceived more abstractly, while psychological proximity to the self-center triggers low-level construal or more concrete mental representation. For example, if we think about a concert one year from now, we are more likely to think about the central features of this event – the performer and the location – rather than about more specific details, such as how to get there and whether to take an umbrella. The latter acquire significance when the event becomes temporally proximal.

The hypothesis about the interrelation of psychological distance and construal level was confirmed in a number of studies. We specifically focus on experimental paradigms that use categorization and action identification as a measure of abstraction. In one study Liberman, Sagristano, and Trope (2002) used categorization tasks to investigate the relation between construal level and psychological distance on the temporal dimension. The participants were asked to plan various leisure activities that were supposed to take place in the near or in the distant future. Following this task, participants classified objects thematically related to the planned activities into categories. The authors found that those who planned activities for the distant future tended to classify objects into broader, more abstract categories compared to the participants who planned activities for the near future. A similar effect was observed by Wakslak et al. (2006), who used psychological distance on the hypothetical dimension for priming construal level. The study found that when participants considered a less likely scenario, they tended to use broader categories, thus showing that greater psychological distance on the hypothetical dimension activates high-level construal.

In action identification tasks participants are usually presented with two alternative description of an action – a concrete vs. a more abstract one. The choice of the description is taken to manifest activation of low vs. high-level construal. In one study by Liberman and Trope (1998) participants were asked to think about activities in the distant vs. in the near future. Following this task, participants were presented with an action (cf. "locking a door") and were asked which of the two alternative descriptions is a better match for that action. One of the alternatives described the action in greater detail, and was taken to manifest low-level construal (cf. "putting a key in the lock"), while the second alternative abstracted over details and represented the action in terms of high-level

construal (cf. "securing the house").[1] The results showed that participants who were primed with a distant future scenario tended to choose more abstract descriptions of the action. Subsequent studies confirmed the association between the level of abstractness on action identification tasks and psychological distance for the hypothetical (Wakslak et al. 2006), spatial (Fujita et al. 2006), and social dimensions (Liviatan, Trope, & Liberman, 2008).

Building on previous work within the CLT paradigm, we hypothesized that if evidentiality implies psychological distance, it should affect performance on categorization and action identification tasks. Study 2 addresses this question experimentally. In what follows, we present experimental results of Study 1 followed by Study 2.

Study 1

Method

Participants Forty-six volunteers were recruited using Google Ad Words and redirected to a survey link on the Qualtrics website. All participants indicated that they were native speakers of Bulgarian.

Design and Procedure We constructed four short stories, each describing a hypothetical event. Each story was designed to target a particular dimension: hypothetical, social, temporal, and spatial. The story targeting psychological distance on the hypothetical dimension described a situation where two people made conflicting claims about the results of a recent soccer game. One person used an evidential utterance, while the other person used a non-evidential (indicative) utterance. The participants were asked whose claim was more likely to be true.

The story targeting the social dimension described two people who made the same claim about a third person. One of the speakers used the evidential form, while the other used a non-evidential form. The participants were asked to estimate which of the two speakers was more likely to be a close relative to the third person.

In the scenario targeting the temporal dimension, a person talked about two events in the past, one described with the evidential, and the other one without. The participants were asked which of the events happened further in the past.

Finally, the spatial dimension scenario described two people watching a soccer game on a stadium. They made the same claim about a player, but one of the speakers used an evidential utterance, while the other speaker used a non-evidential sentence. The participants were asked which of the two speakers was physically closer to the player.

In order to control for content effects, each scenario had two variants that were run between subjects. For example, in

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[1] The intuition behind the alternative formulation is that a more concrete description is associated with the *how* aspect of the action (cf. lock a door by putting a key in the lock), while a more abstract level of thinking would activate the *why* question (cf. lock a door in order to secure the house).

Version 1 of the hypothetical dimension scenario the sentence "Real Madrid won against Milan" was in the evidential form, while "Milan won against Real Madrid" was in a non-evidential (indicative) form. In Version 2 grammatical markers were reversed, so that "Milan won against Real Madrid" was in the evidential form.

All answers were marked on a 6-point scale, where the poles contrasted competing interpretations. In the hypothetical distance scenario, 1 was "For sure Real Madrid is the winner" and 6 was "For sure Milan is the winner". Notice that if an answer is due to cultural knowledge or norms, then one of the poles will be consistently chosen over the other, regardless of the version. For example, if more people think that Milan is a better team than Real Madrid, Milan would be consistently chosen as a winner with high degree of certainty in both versions. If answers are random or due to non-consensual subjective knowledge, then the means will not be statistically different from chance in both versions. If, on the other hand, the judgments are driven by evidentiality, then the answers between the two versions will differ.

Results

We first ran a 2x4 mixed design ANOVA, where the within-subjects factor was the 4 dimensions (hypothetical, social, temporal, and spatial), while the between-subjects factor was the version. The dependent variable was the answers on the 6-point Likert scale. There was a significant between-subject effect ($F(1, 44) = 255.57$, $p<.05$, all tests are two-tailed), indicating that the answers in the two versions differed.

A series of post-hoc independent samples t-tests revealed that the effect was significant for hypothetical distance ($t(45)=9.64$, $p<.05$), social distance ($t(45)=10.16$, $p<.05$), temporal distance ($t(45)=20.83$, $p<.05$), and spatial distance ($t(45)=10.31$, $p<.05$). All differences were in the predicted direction: evidential forms were consistently associated with greater hypothetical, social, temporal, and spatial distance. Further tests revealed that for both versions the mean answers were also statistically different from chance, where chance was interpreted as the mean of the Likert scale at 3.5. For more details refer to Figure 1.

Somewhat unexpectedly, there was also a significant within-subjects effect ($F(3, 132) = 3.29$, $p<.05$), indicating significant differences between the four dimensions of psychological distance, and marginally significant interactions ($F(3, 132) = 3.29$, $p=.09$). It is difficult to interpret these results, since they might be due to genuine differences between dimensions or to different sensitivity of the scenarios, the question to which we return later.

To summarize, the results of this study demonstrated that evidentiality affects perception of psychological distance. There was a strong consensus that information marked by evidentials implies lower probability of occurrence, increased social distance, increased temporal distance, and greater spatial distance. A natural follow-up question is if the observed relation between evidentiality and psychological distance has deeper psychological effects.
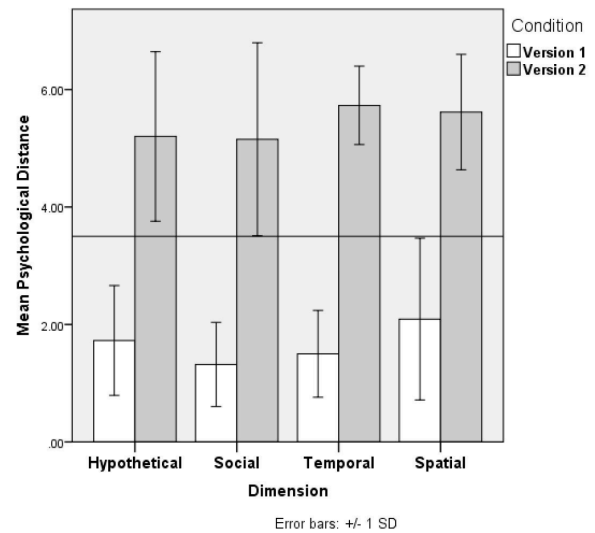

Figure 1: The mean answers for each of the four dimensions. The subjects answered on a 1 to 6 Likert scale. For Version 1, low numbers indicate stronger association between evidentiality and psychological distance, while in Version 2 higher numbers indicate the same association. The larger the difference between the two versions is, the more the effect is due to the experimental manipulation rather than to the scenario content.

Study 2

In this study we investigate if evidentiality affects the level of abstraction, as measured by performance on action identification tasks (Study 2a) and categorization (Study 2b).

Study 2a

Method

Participants One hundred and eighty volunteers were recruited using Google Ad Words, and redirected to a survey link on the Qualtrics website. All participants indicated that they were native speakers of Bulgarian.

Design and Procedure In this study we used action identification task as a measure of construal level. Our study was modeled after Liberman and Trope (1998): participants were presented with a target action and two alternative descriptions. The two descriptions differed in the level of abstraction. For example, the alternatives to "studying" were (i) "reading a textbook" (low-level construal) and (ii) "doing well in school" (high-level construal). Since evidentiality implies greater psychological distance (Study 1), we hypothesized that when the actions are presented in the evidential form, it will lead to a preference for more abstract action descriptions.

We constructed 18 target actions, each supplemented with two alternative descriptions, a more specific one (for low-level construal) and a more abstract one (for high-level construal). Within each triad all actions were in the same form, either evidential or non-evidential. In two between-subject conditions, each participant received either 10 evidential and 8 non-evidential forms or vice versa.

Results

For each participant we computed the proportion of abstract choices in evidential triads and the proportion of abstract choices in non-evidential triads. If evidentiality primes construal level, then the first proportion should be higher than the second. However, the observed difference was not statistically reliable (M=.02, S.D.=.26, t(179)=1.30, p=.20). These results indicate that while evidentiality affects perception of psychological distance, it does not have the same priming effect as more explicit instructions that target distal relation on the hypothetical, social, temporal, and spatial dimensions, used in previous studies. In the next study we investigate the effect of evidentiality on construal level by using categorization as a measure of abstractness.

Study 2b

Method

Participants A hundred and twenty eight participants from the pool for Study 2a participated in the current experiment.

Design and Procedure For this study we used breadth of categorization as a measurement of construal level. This study was modeled after previous work within CLT, where participants are presented with a list of objects and are asked to sort them into groups. It has been found that when thinking about psychologically distant events participants sort items into fewer, broader categories, while when thinking about psychologically closer events subjects form multiple, narrow categories. The effects are robust and have been found for the temporal (Liberman et al., 2002), spatial (Henderson, et al., 2006), and hypothetical dimensions (Wakslak et al., 2006).

In the current study we presented subjects with a scenario describing a camping trip. After reading the scenario, the participants were presented with a list of 20 items, and asked to combine them into as many groups as they deemed necessary. In a between-subjects design we manipulated if the scenarios were written in evidential or non-evidential form.

Results

The dependent measure for this analysis was the number of categories constructed by the participants. If evidentiality primes high-level construal, we should expect a smaller number of categories in the evidential condition. In the evidential condition participants constructed 5.36 categories on average (S.D.=1.39) and in the non-evidential condition

5.63(S.D. = 1.48), with the difference not being statistically reliable (t(126)=.99, p=.324). Similarly to Study 2a, in the current study we did not find evidentiality to have priming effects on the level of construal.

Discussion

In two experimental studies we investigated whether evidentiality affects cognitive performance. We adopted a novel experimental paradigm, which bridged together two different theoretical perspectives from linguistics and cognitive psychology: (i) the claim that evidentiality grammatically encodes weaker epistemic commitment, and that weaker epistemic commitment in turn implies greater psychological distance; and (ii) the assumption that psychological distance can be manipulated and that this manipulation has observable effects on how speakers conceptualize events, adopted from the CLT framework.

We had two research questions. First, we were interested if there is experimental support for the claim that evidentiality affects perception of psychological distance. The results of Study 1 confirmed this hypothesis. We found that evidential forms consistently affect participants' perception of the event: it is perceived not only as less certain, as we would expect given that evidentiality encodes weaker epistemic commitment, but also implies greater physical, temporal, and social distance between the speaker and the event. These results support the analysis of evidentiality as an expression of epistemic commitment in the theoretical linguistics literature. Moreover, by showing that evidentiality consistently implies greater psychological distance not only on the hypothetical but also on the spatial, temporal, and social dimensions, we also provided support for the core assumption in CLT that psychological distances are conceptually interrelated.

The affirmative answer to the first question raised the second question, namely, if evidentiality can prime high-level construal. We assumed that evidential forms would activate more abstract perception of the event, similarly to how scenarios involving more distant temporal or spatial events activated high-level construal in previous studies conducted within the CLT framework. However, we did not find any reliable effects supporting such expectations. In Study 2a participants did not use more abstract descriptions for information presented in the evidential form, and in Study 2b they did not form fewer, broader categories.

Conclusion

Our study has the following theoretical and methodological implications. On the methodological side, the new inter-disciplinary paradigm adopted here broadens the domain of experimental research on evidentiality. Specifically, the assumption that evidentiality expresses epistemic commitment opens up previously unexplored possibilities for studying effects of evidentiality on cognitive performance in adults.

Our theoretical finding that evidentiality does not affect construal level or the degree of abstraction with which an

event is perceived suggests that evidentiality has no effect on cognitive performance, as measured by categorization and action identification tasks. These results argue against the Sapir-Whorf hypothesis.

An alternative interpretation, suggested by a reviewer, is that the tasks used in this study are not sensitive enough to detect possible cognitive effects of evidentiality on cognitive performance. While in Study 1 we established a link between evidentiality and the four dimensions of psychological distance, our theoretical perspective suggests that this link is driven by hypotheticality, since evidentiality grammatically encodes a weaker epistemic commitment on the hypothetical dimension only. Yet hypotheticality, when encoded grammatically, might have a weaker priming effect compared to other dimensions. Indeed, as Trope and Liberman (2010) pointed out, psychological dimensions differ in their prominence and the degree to which they affect cognitive performance. For example, the spatial dimension is considered to be more basic compared to e.g. the temporal dimension (cf. Casasanto & Boroditsky, 2008). As for hypotheticality, Trope and Liberman (2010) observe that "it is least prominent" (p. 444), and that its influence might be weaker compared to that of other dimensions. It is thus possible that the hypothetical dimension might not be robust enough to trigger observable cognitive effects on action identification and categorization tasks. In our follow-up studies we will address this concern by testing the possible language-cognition link with a broader range of cognitive tasks.

Acknowledgments

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