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The relation between language, culture, and thought

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The relationship between culture, language, and thought has long been one of the most important topics for those who wish to understand the nature of human cognition. This issue has been investigated for decades across a broad range of research disciplines. However, there has been scant communication across these different disciplines, a situation largely arising through differences in research interests and discrepancies in the definitions of key terms such as 'culture,' 'language,' and 'thought.' This article reviews recent trends in research on the relation between language, culture and thought to capture how cognitive psychology and cultural psychology have defined 'language' and 'culture,' and how this issue was addressed within each research discipline. We then review recent research conducted in interdisciplinary perspectives, which directly compared the roles of culture and language. Finally, we highlight the importance of considering the complex interplay between culture and language to provide a comprehensive picture of how language and culture affect thought.

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The relationship between culture, language, and thought has long been one of the most important topics for those who wish to understand the nature of human cognition [1–7,8••,9–12]. This issue has been investigated for decades across a broad range of research disciplines. However, there has been scant communication across these different disciplines, a situation largely arising through differences in research interests and discrepancies in the definitions of key terms such as 'culture,' 'language,' and 'thought' [13••].

Researchers who investigate the so-called Whorfian hypothesis within the tradition of cognitive psychology generally focus on the influence of particular segments of language (e.g., particular lexical or grammatical categories) on perception, categorization, and knowledge representation [10,14,15], and do not consider how the linguistic categories under investigation are rooted in a broader cultural value system, nor do they consider how language-specific cognition interacts with culture-specific thinking styles. Cognitive psychologists often use the term 'culture' to mean 'a collection of knowledge which only humans have attained through history' to discuss the nature of human cognition as opposed to cognition in non-human species [16].

By large contrast, in cultural psychology, culture means 'narratives' [1,17], 'meaning systems' [2,3], 'systems of thought' [18,19], 'cultural worldview/epistemology' [18,20,21••,22], 'communication styles' [23], or 'self-construals' [6]. 'Language' is considered to be an inseparable collection of elements consisting of words, grammar, pragmatics, and narrative styles, together functioning as a medium through which cultural views and culture-specific epistemologies are reflected [17,24]. Many cultural psychologists indeed take for granted that language is part of culture and hence do not mention the role language may play when discussing how culture influences thought (e.g., [25,26]).

This article first reviews recent trends in research on the relation between language, culture, and thought to capture how cognitive psychology and cultural psychology have defined 'language' and 'culture' and how the issue has been addressed within each research discipline. We then review recent research conducted in interdisciplinary perspectives, which directly compared the roles of culture and language. Finally, we highlight the importance of considering the complex interplay between culture and language to provide a comprehensive picture of how language and culture affect thought.

Trends in cognitive psychology

In the field of cognitive psychology, researchers have long disagreed whether cross-linguistic diversity in linguistic codification is directly reflected in speakers' 'thought' *outside the realm of language use* [11]. The traditional debate focused on whether perception and cognition are determined by language to the degree that speakers of different languages have incommensurably varied conceptual representations and cognitive styles. Evidence accumulated over the past decades has lead researchers to reject this strong version of the Whorfian hypothesis [27–32,33•,34–36]. Malt and colleagues demonstrated that cross-linguistic similarity is much more pronounced in

non-linguistic sorting (i.e., when participants sorted objects/actions into groups based on similarity) than in naming (i.e., when participants categorize objects or actions by labels) [37–39], and emphasize that non-linguistic representations are more readily shared across different language communities than linguistic representations.

Gleitman and colleagues also maintain that in most studies that reported the Whorfian effect, language-specific differences arose because language is implicitly used to perform the task, even though participants were not aware of it. In their view, a majority of results in the literature showing cross-linguistic differences are not qualified to be taken as evidence for the Whorifan hypothesis; instead, they should be seen as the 'language-on-language' effect [34].

A number of recent studies using verbal interference (i.e., linguistic interference, shadowing) found that Whorfian effects disappear when implicit linguistic labeling is inhibited, or in 'purely non-linguistic' contexts [35,40–47]. However, the results of recent work using neurophysiological measures have found that lexical categories are accessed automatically in the brain in tasks in which no language is invocated [48–51]. Thus, it may not be feasible to argue that influence of thought has to be established in purely 'non-linguistic' processes [13••,33•,52••]. These studies led some researchers to argue that language is highly integrated into domain-general cognitive functions and automatically modulates online cognitive processes [49,52••,53].

Accordingly, much of the recent research has been conducted to uncover when and how language modulates perception, reasoning, learning, and other cognitive functions as well as conceptual representations instead of asking whether the Whorfian hypothesis in the traditional sense is tenable. Taking the domain of color as an example, researchers have argued that language (i.e., names of color categories) does not make us inherently sensitive or insensitive to color boundaries, but rather modifies our color processing on the spot as visual input is received [54,55]. Categorical perception of color is eliminated when the use of language is inhibited by verbal interference, suggesting that language is used when we naturally perceive colors [35]. Further, categorical perception is often pronounced in the right visual field, when information is being processed in the language-dominant left hemisphere [35,56]. Research using neurophysiological measures has also demonstrated that even when participants are engaging in a purely non-linguistic color discrimination task, the 'language' regions of the brain are still automatically activated to access lexical categories [48,50].

Studies targeting bilingual individuals have further highlighted the transient task-dependent nature of the Whorfian effects [47,57,58]. Boutonnet and colleagues compared the electrophysiological responses of English-Spanish bilinguals and English-monolinguals [53]. Participants judged whether a target picture belonged to the same category as two previously shown pictures. Although the task was carried out only in English, a negative ERP modulation was found in the bilinguals when the grammatical gender class of the target picture was different from that of the first two in Spanish. This suggests that the grammatical gender information of Spanish is automatically recruited in the bilinguals when processing English.

Developmental researchers are interested in when and how the Whorfian effects arise during the course of development [59–64]. They have shown that language and concepts bootstrap one another and that acquisition of language may make children more or less sensitive to particular conceptual distinctions [65–69]. For example, Göksun et al. [70] demonstrated that language may shift the ways in which preverbal infants process motion events. At 14 months of age, English-reared and Japanese-reared infants are equally sensitive to whether someone is walking across a bounded space (e.g., a railroad track) or a flat, unbounded space (e.g., a grassy field) — instances that are denoted by two separate verbs in Japanese (*wataru* and *tooru*, respectively) but not in English. By 19 months of age, however, the two groups diverge, and only Japanese-reared infants maintain sensitivity to the different types of grounds [70].

It is important to note that many other developmental researchers investigate how language acquisition in a broad sense affects cognitive development [13••,71•,72,73]. Studies with deaf children who have received only impoverished linguistic input by their hearing parents [74•,75,76] showed that these children have a disadvantage in memorizing or understanding spatial locations [66,74•] and exact number representations [76].

Cognitive development in bilingual children has also attracted the interest of researchers. Bialystok and colleagues suggest that bilinguals' experience with juggling two languages may result in cognitive advantages in domains [77•] such as executive function [78–80] and theory of mind [81]. Although the role of language in this broad sense does not have to be connected to the Whorfian hypothesis, it should be included in the discussion of the relation between thought and language.

As stated earlier, researchers in cognitive psychology generally have not considered the role of culture when exploring the relation between thought and language. While many developmental psychologists emphasize the role of culture in the process of cognitive development [16,71•,82], what they mean by 'culture' is inherited

knowledge from previous generations, which does not entail diverse culture-specific epistemologies. In other words, most researchers do not consider the diversity of culture-specific values and epistemologies in their investigation of the ways children acquire knowledge from 'culture.'

Trends in cultural psychology

Cultural psychologists within the social psychology discipline have been interested in how culture affects 'thought.' For many of these researchers, 'culture' mainly refers to macro-level thinking patterns such as attitude, values, and beliefs; and 'language' is used as a simple cue, something used to prime certain attitudes, social judgments, or causal attributions [83–95]. For example, Srull and Wyer found that presenting subjects with an emotionally charged word (e.g., *hostility*) influenced their impressions of a hypothetical person [92]. Here, the focus is on the effect of language on socio-cultural behaviors, rather than on effects of language on cognition in general.

Alternatively, researchers consider culturally unique epistemologies and discourses as a higher level of linguistic phenomena, which people internalize through repeated interactions with other members of a given cultural/linguistic community [13••,23,24,96,97]. Here, researchers treat 'language' as a collection of narratives that reflect culture-specific value systems and epistemologies [98–100,101••]. For example, living in cultures where people share a holistic epistemology, East Asians are thought to be exposed to a bundle of discourses and practices in which sensitivity to background information is highly valued. In contrast, European and American cultures value an analytic thinking style and hence objects are singled out from the background in everyday discourse [19].

In recent decades, cultural psychologists have begun to capture the influence of culture on fine, micro-level cognitive processes, employing methodologies commonly used in cognitive psychology and neuroscience. A plethora of evidence from behavioral studies suggests systematic cultural differences in attention [19,101••,102–107], categorization [108,109], causal attribution [110], and inferences of other people's attitude [111]. Recent advances in cultural neuroscience have further elucidated such cross-cultural differences in ERP patterns [112–115,116•,117,118•,119], brain structure [120], and the pattern of neural activations shown in (functional) MRI images [121] (see also articles in this Current Opinions issue by Han & Humphreys, Kitayama, King, Hsu, & Liberzon, and Ji & Yap).

As noted earlier, researchers in cultural psychology tend not to consider the influence of language separately from the influence of culture. However, Senzaki and colleagues recently demonstrated that East Asians showed attention patterns consistent with their cultural values — that is, high sensitivity to background information — when asked to describe animation vignettes verbally as compared to when they observed them [101••]. This result suggests that habitual exposure to a particular discourse style reflecting cultural values may shape thought, and in turn, culture-specific behavioral patterns may be enhanced with culture-specific narratives, and further directs us toward the important possibility that language and culture bootstrap each other in forming culture-specific attention, perception, and mode of thinking (see also [13••,33•]).

Interaction between culture and language

Although few in number, researchers from both the cognitive and cultural psychology sides have begun to ask overarching questions from interdisciplinary perspectives. For example, in contrast to the general tendency in cognitive psychologists not to consider culture-specific effects on thought, Medin and colleagues have highlighted the role of culture-specific epistemology on knowledge representation and acquisition [20,21••,53,122••]. Here, also different from cultural psychologists with the social psychology background, their interest is how culture-specific epistemology affects knowledge representation, memory organization, ecological reasoning, and high level semantic processing. In a series of studies, they found that Susan Carey's well-known theory of early conceptual development — that young children begin with human-centered, psychology-based understanding of biology [123] — was not found in children raised in an indigenous community in North America [124]. They concluded that concepts of human-nature relations are largely different across people living in technology-oriented urban cultures, where humans are seen as a unique existence independent of the living environment, and those living in rural areas, where humans are seen as a part of the ecological system in nature [21••,125].

Importantly, this group of researchers also examined the effect of language on children's understanding of natural kind categories and category-based inference [126,127]. For example, availability of the superordinate category labels overarching human kinds and non-human animals (i.e., the term 'animal' in English) prompt children's inductive generalizations from human to non-human animals and subsequent understanding of the broad category of 'living things', as compared to when the language lacks such superordinate terms. However, the casual relationship between culture and language (here, whether availability of labels for a given superordinate concept reflected culture-specific values or epistemologies) has not yet been addressed.

Other groups of researchers, both from the cultural psychology sides and cognitive psychology sides, have attempted to evaluate the influence of culture and

language more directly. Ji and colleagues [108] and Saalbach and Imai [31,32,59] examined the mutual relationship of culture and language on the conceptual relations people use in organizing object concepts. Following the prediction of Nisbett and colleagues [128] that Westerners should form categories based on taxonomic kinds while East Asians should prefer thematic relations, Ji and colleagues examined whether the language used during the research session (e.g., Mandarin or English) changes the participants preference of conceptual relation (taxonomic vs. thematic) used in categorizing objects [108]. Their results indicate that English–Mandarin bilinguals switch their preferred mode of conceptual relations according to the language used in the particular experiment session. Thus, consistent with results from bilingual research in cognitive psychology and neuroscience, it was found that the culturally preferred mode interacts with the language used for the task.

Saalbach and Imai tested German speakers (Westerners), Chinese speakers (East Asians), and Japanese speakers (East Asians) on a range of tasks including categorization, similarity judgments, and inductive reasoning; these contrasted the influence of grammatical categories (e.g., classifier categories in Chinese/Japanese and grammatical gender categories in German) against the culturally influenced cognitive styles [31,32]. They found that, at a global level, all three groups were similar in preferring thematic over taxonomic relations in forced choice categorization, and in relying on taxonomic rather than thematic relations in similarity judgments and inductive reasoning. However, there were cross-linguistic/cultural differences as well: thematic preference was larger both in Japanese and Chinese speakers as compared to Germans (reflecting culturally influenced cognitive style that East Asians pay stronger attention to relation between objects), but membership of classifier categories affected the Chinese speakers but not the Japanese speakers (revealing language-specific influence).

The interaction between culture and language was also seen in young children's verb learning. In view of the holistic-vs.-analytic contrast between East Asians and Westerners, it was predicted that Chinese-reared and Japanese-reared children should learn a novel verb more readily than English-reared children because the former should pay attention to the action more readily than the latter [129]. However, Imai et al. found that Chinese children paid stronger attention to the *object* than English-reared or Japanese-reared age-peers, and mapped the novel word to the object even though the argument structure of the sentence clearly indicated that the word was a verb [130]. This strong bias to map any word, be it a noun or a verb, to an object may be because the object naming bias children universally possess [131,132] is magnified by the particular linguistic property of the Chinese language — the property that nouns and verbs cannot be distinguished by morphological form. This suggests that the influence of language sometimes works on its own, and takes precedence over culture-specific cognitive biases.

Concluding remarks and directions of future research

The wall between cognitive psychology and culture psychology has begun to crumble as researchers on both sides reach toward common grounds where they can stand on the same plane to investigate the role of culture and language, sharing theoretical assumptions and methodologies for overarching questions both at the macro and micro level of knowledge representations and cognitive processes. The studies examining the effect of culture and language simultaneously indicate that language and culture-specific cognitive biases/mode of thinking *can* play an important role on cognitive processes and knowledge representation independent of each other.

However, it is far more likely that culture and language work conjointly in various ways. Future research must not only consider the relation between language and thought or culture and thought, but also should attempt to gain deeper understanding of the relation between the two. One of the possible scenarios is that language and culture bootstrap one another. Culture-specific behavior, value systems, or epistemology arise as a consequence of adaptation to environment [133,134] and influence the shaping of linguistic structures [145]; language, in turn, strengthens the cognitive biases to the culture [101••].

In advancing research in this direction, it is also necessary to develop a theoretical framework that explains not only how cultural diversity arises but also why specific psychological processes are preserved and are resilient to change within a given linguistic and cultural community. Research in cultural evolution [135–140] may shed light on the dynamic relation between culture and language. Researchers have discussed when and how knowledge emerges [141], and when and how knowledge is biased [142,143], by combining simulation modeling techniques and behavioral experimentation. Recently, the concept of cultural evolution has also improved our understanding of the emergence of linguistic structures [144,145]. Much future work is required to specify the details on how the complex interplay among language, culture, and universally-shared cognitive constraints accounts for universality and diversity in cognitive process and conceptual representations. For this goal, further interdisciplinary perspectives and collaborations are urgently needed.

Conflict of interest statement

Nothing declared.

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