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## HOW THINKING DETERMINES LANGUAGE: THE RELATIVITY OF LANGUAGE RELATIVITY

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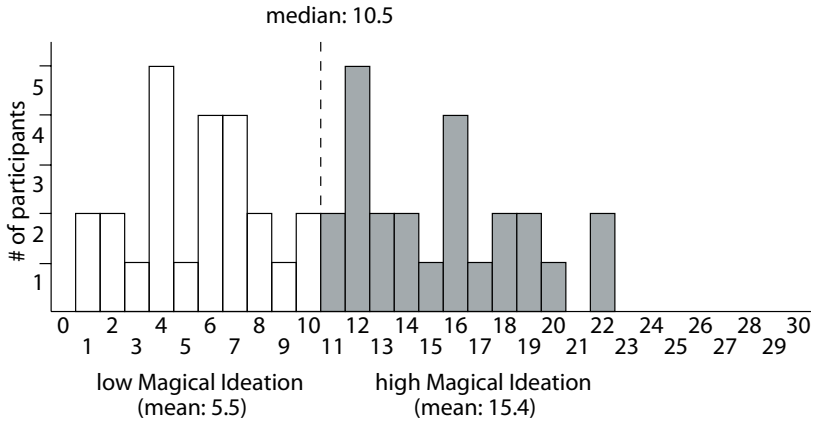
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THE LINGUISTIC RELATIVITY HYPOTHESIS proposes that structural differences among natural languages influence the way their respective speakers think about reality. According to the possibly most famous advocate of linguistic relativity, Benjamin Lee Whorf (1956:212–13) the ‘[f]ormulation of ideas is not an independent process... but is part of a particular grammar, and differs, from slightly to greatly, between different grammars’. Although not always stated explicitly, the argument is usually assumed to be uni-directional: language infiltrates thinking, not the other way round. Contemporary empirical evaluations of linguistic relativity can be broadly classed into three types: a *structure-centred approach* beginning with an observed difference between languages and seeking evidence for their impact on thinking, a *behaviour-centred approach*, which attempts to explain a marked behavioural difference between speakers of different languages with dissimilar language practices, and a *domain-centred approach*, which looks at a specific area of cognition and then compares the respective encoding conventions in different languages, and their possible influence on behaviour (Lucy 2001:13488–89).

Domain-centred studies have, amongst others, examined colour perception, quantity awareness and spatial reasoning: Kay and Kempton (1984) found that verbal colour distinctions enhance the ability to categorize and memorize colours. Lucy (1992:23–84) demonstrated that memorizing quantities was facilitated by a vocabulary for number distinctions. Levinson and Schmitt (1993) found that speakers of languages which used body co-ordinates for spatial reasoning replicated a layout of three toy animals differently from those who spoke languages which predominantly used cardinal or topographic features to describe spatial arrangements. Kita and Özyürek (2003) found that the gestures of speakers of different languages depended on the vocabulary their languages provided. When asked to describe a cartoon depicting a bird swinging on a swing speakers of English drew a curved line in the air to illustrate the movement. Turkish and Japanese-speaking participants, however, made straight horizontal back and forth movements in the same task, according to the authors because their respective languages lack a verb meaning ‘to swing’.

However, other studies failed to find group effects when comparing the behaviour of speakers from two structurally distinct languages. Papafragou, Massey and Gleitman (2002:199–13) compared the reasoning about motion by native speakers of English and Greek, languages which differ strongly in the encoding of manner and direction of motion. While the participants’ verbal descriptions of line drawings



**Figure 1.** Distribution of Magical Ideation scores of the 48 participants.

illustrating movement differed, their performance in a non-linguistic recognition task involving the same pictures or similar ones depicting either a path or a manner change did not. The speakers of both languages attended to these features to the same degree. Thus, according to the authors, ‘the lexical patterning of the specific languages did not bleed into subjects’ performance in tasks that do not call on the linguistic categories specifically’ (2002:213). Furthermore, the results of many studies which did find language-group effects also revealed considerable variance within the groups and even within individuals across trials. Levelt (1996:99) found that less than one in four Dutch speaking participants consistently used the same frame of reference for spatial descriptions.

It may be speculated that such within-group but between-subject differences reflect disparities in their respective past or present language environments, e.g. exposures to a dialect or a second language. However, it may also be hypothesized that such differences between individuals reflect contrasts in thinking patterns which are not merely the outcome of different forming through language, i.e. that language-independent thinking styles influence behaviour, including the use of language.

One way to investigate the possible influence of different preferred styles of thinking is to compare the linguistic performance of two groups which are dissimilar in one quantifiable characteristic for which no claim has been made that it is determined or strongly shaped by the person’s linguistic experience. An area which lends itself as a basis for such an investigation is schizotypal thinking, i.e. the degree of proneness to schizophrenic-like reasoning about reality. In samples drawn from a normal population from a single language group it is common to find both highly skeptical thinkers who dismiss any reasoning which contradict conventionally accepted forms of causality and strong believers in supernatural phenomena and analogous sensations as well as persons with intermediate scores (for the distribution pattern of the population from the study presented below see **Figure 1**). Idiosyncratic belief formation has been proposed to be an effect of overinterpretations of the synchronicity of

co-occurring events and an urge to build links between concepts. A right-hemispheric processing bias has been suggested as an underlying cause for such increased association-building (Leonhard & Brugger 1998:180). The authors' hypothesis is based on their own and previous laterality research, which showed that the left hemisphere tended to be better at detecting links between closely related concepts, whereas the right hemisphere was superior in discovering associations between distant concepts. They found that performance differences between persons with, respectively, high or low schizotypy scores in lateralized tests were usually significant only in the right but not in the left hemisphere.

If idiosyncratic belief formation is indeed an expression of being 'driven by the power of coincidence', as Skinner (1977) formulated it, differences in semantic processing should be observable, supporting the notion that thinking may influence language, rather than being a mere slave of linguistic framing. In order to assess possible differences in semantic processing, a test design was chosen which assessed both divergent and convergent thinking. The two terms, which were coined by J.P. Guilford in the 1950s, refer to the ability to generate new ideas (divergent thinking) and to reality test them (convergent thinking) in order to determine if they will work (Gale 1998).

## 1. METHOD.

1.1. PARTICIPANTS. 25 women (aged 20 to 48 years, mean: 27.4; 12 to 24 years of education; mean: 16.7) and 23 men (aged 20 to 49 years, mean: 31.5; 12 to 24 years of education, mean: 17.4), all right-handed and with no history of neurological or psychiatric illnesses took part in this study. All participants were native speakers of Swiss or Standard German and had been recruited via blackboards, predominantly in university environments. They were not offered any form of payment and all provided written consent to participate.

1.2. TESTING INSTRUMENTS AND PROCEDURE. *Handedness* was assessed using the 13-item manual preference questionnaire by Chapman and Chapman (1987). For every one of the questions (e.g. With which hand would you throw a snowball to hit a target?) the participants state whether they use their right hand (one point), either hand (two points) or their left hand (three points). Right-handedness is defined as an overall score of not more than 17. Handedness was controlled for, as it is known to correlate with hemispheric dominance for language processing (Hartje 2002:69–75).

*Schizotypy* was assessed using Eckblad and Chapman's (1983) Magical Ideation Scale (MI), a 30-item questionnaire about hallucination-like experiences (e.g. 'Some people can make me aware of them just by thinking about me'), belief in supernatural phenomena (e.g. 'I have worried that people on other planets may be influencing what happens on earth'), and conventionally invalid forms of causation (Duchêne, Graves & Brugger 1998:58). The MI scores served to group the participants into a low magical ideation (score < median) and a high magical ideation group.

The *Word Halo Test* (WHT, Armstrong & McConaghy 1977) was used to quantify *divergent* thinking. In this task, subjects were given a target word and five near-synonyms as in (1) and were asked to mark those words which they perceived as being equal or almost equal in meaning to the target. Any choice from zero to all five items was possible.

- (1) *great*: huge – world-wide – infinite – precious – intense<sup>1</sup>

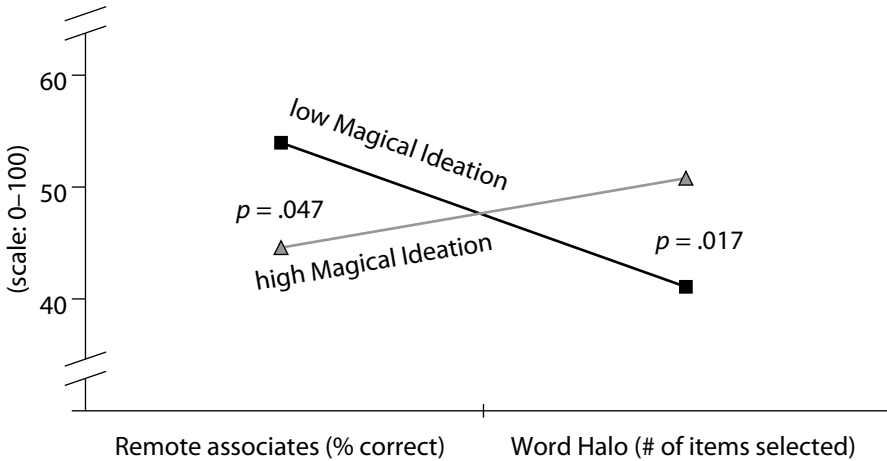
As no German version of the WHT had been available, an initial set of 44 items was created using entries from a thesaurus (Radzweit & Spalier 1982). The order of the near-synonyms taken from the thesaurus was randomized for every item to ascertain that synonym position and semantic distance to the target word did not correlate. Unlike the original version of the test, only nouns were used as stimuli. The initial set of items was given to 31 participants in a pretest. For the main experiment those 20 items of the pretest were selected which had shown the highest variance with respect to the number of selected synonyms.

The *Remote Associates Test* (RAT, Mednick 1958), which was advertised by its author as a general measure of creativity, served as the basis for the assessment of *convergent* thinking. Subjects were offered three unrelated words, as in (2):

- (2) magic – board – death<sup>2</sup>

The task was to provide a matching fourth word, which could be associated with all three stimuli (e.g. black). As with the WHT, no German language samples had previously been developed. Therefore, an initial list of 45 noun-based items was created and subsequently reduced to 35 by two reviewers. Then, a pretest version of the RAT was carried out with twelve individuals who did not take part in the later experiment. After attempting the 35 items, they were told the expected solutions asked if they had found the them to be comprehensive. These quantitative and qualitative data were used to eliminate problematic items, e.g. those containing regionalisms or items for which the same non-expected answers had been provided by multiple participants. The remaining items were then classified as easy, medium or difficult, according to the number of correct replies. For the main experiment, four simple, ten medium and six difficult experimental as well as three trial-run items were selected. Alternative solutions which had been provided by the participants were evaluated by three examiners. One such reply was found to provide plausible associations to the corresponding three stimuli.

2. RESULTS. A one-factor analysis of variance revealed no significant differences between men and women for age, number of years of education, handedness, RAT, Word Halo or Magical Ideation. The mean MI value of the 25 women (11.6, SD = 6.3) did not differ significantly ( $t_{46} = -1.50$ ) from the mean of the 23 men (9.1, SD = 5.1).



**Figure 2.** RAT and WH results for persons with high and low magical ideation.

The low MI (14 men, 10 women) and the high MI groups (9 men, 15 women) did not differ significantly with respect to sex ( $\chi^2_1 = 2.09$ ), age ( $t_{46} = -.04$ ) or number of years of education ( $t_{46} = -.092$ ). Two-factor (sex and MI group) analyses of variance were carried out for the Word Halo and the RAT results. In both cases only a significant main effect for the group was found: In the Remote Associates Test the subjects scoring low on the MI Scale outperformed the highly magical group ( $F_{1,44} = 4.17, p = 0.047$ ). And in the Word Halo Test, persons scoring above the MI median selected significantly more of the offered near-synonyms ( $F_{1,44} = 6.94, p = 0.017$ ; see **Figure 2**).

3. DISCUSSION. The results of the Word Halo Test are in line with the findings by Lovibond (1966, in Armstrong & McConaghy 1977:439–40), who reported that persons demonstrating broad word halos also tended to define unusual and often inappropriate categories in the Object Sorting Test, in which objects which belong together have to be grouped accordingly. Armstrong and McConaghy suggested that both results reflected an ‘allusive’ style of thinking, a term they had coined for loose and unclear abstract thinking.

A connection between paranormal belief and association tendencies in a language task had previously been documented by Gianotti et al. (2001). In their bridge-the-associative-gap test, subjects who scored at the extreme ends of the Magical Ideation Scale had to provide a word that acted as a bridge between two given concepts (e.g. *foot* for *leg* and *shoe*). Only half of the items provided actually consisted of such indirectly linked concepts. For the non-related stimuli pairs, the high-scorers—the believers—made significantly more original (in the sense of infrequent) suggestions.

At first sight, the lower performance of the high magical thinkers in the Remote Associates Test seems to contradict the suggestion that schizotypal thought matches an increased tendency to associate distant or unrelated concepts. It is nevertheless

proposed that the observed double dissociation between WH and RAT results in high and low magical thinkers reflect the same underlying difference: persons scoring high on the MI scale generally showed a more pronounced spreading activation of semantic concepts, triggered by both the WH and the RAT stimuli. In the WHT this more intense divergent thinking process led to the acceptance of more near-synonyms. In the RAT, however, the activation of a multitude of related concepts seemed to impair their overall problem solving abilities. Presumably, they were less well able to inhibit further divergent processing in a way so that only concepts which were related to all the stimulus items retained a sufficient level of activation. In short, in comparison to low-magical individuals, highly magical thinkers on average are good in divergent but poor in convergent thinking.

It must be pointed out that the presented results stem from an investigation in the relationship between magical ideation and creativity. Possibly, the linguistic background of the participants was not rigidly enough controlled to prevent artefacts in the semantic processing data. Nevertheless, it seems unlikely that e.g. foreign language knowledge systematically influenced the outcome. Also, the groups of high and low magical thinkers were similar in every aspect which was measured.

The findings may be of value in two areas. Firstly, investigations in language relativity finding within-group variance may need to look beyond structural idiosyncrasies of the languages under investigations to explain such heterogeneity. Secondly, pre-onset differences in preferred thinking styles may in part explain the very different recovery patterns often found in clinical linguistic studies when comparing individuals with similar aetiologies.

Overall, the observed double dissociation in divergent and convergent thinking in persons with low and high magical ideation respectively suggests that a person's language may indeed be under the influence of a preferred thinking style, i.e. that to some extent thinking determines language.

<sup>1</sup> Example from Armstrong and McConaghy's (1977) original English-language test.

<sup>2</sup> Example from Mednick's (1958) original English-language test.

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