

INVESTIGATING LINGUISTIC RELATIVITY: A RESEARCH METHODOLOGY*

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Abstract

This paper aims at providing a basic rationale for methodological concerns in empirical investigations of the relation between language and thought. It will be assumed that the existence of such a relationship may be valid, and further that language may assume some causal effect within it. This paper thus revives the notion of linguistic relativity as exposed by Benjamin Lee Whorf (1956). Slobin's 'Thinking for Speaking' research (1996 & 2000) on this topic will be reviewed critically, with the aim of altering the methodology followed so as to avoid circularity of argument. Throughout this paper, I will argue that any empirical research testing the potential influence of language on thinking must (a) provide non-linguistic stimuli, and (b) obtain non-linguistic data, so that test-subjects' cognitive behaviour is not biased at any point by linguistic input during task performance. This paper will present the design of one such experiment. It will then discuss some preliminary results, and suggest potential conclusions.

1. Introduction

The present paper addresses the issue of the relation in human cognition between language and thinking. It seeks to investigate by scientific means the potential for linguistic influence on cognitive activity and putative reflexes. This topic, also known as linguistic relativity (Whorf, 1956; Lucy, 1992a), cuts across the fields of linguistics, psychology, and cognitive science in general.

Linguistic relativity was formulated by Benjamin Lee Whorf in the 1930s (Whorf, 1956: 214). The claim is that the structures of language influence the way we think about reality. In brief, the claim relies on the fact that languages are classificatory systems, in the sense that languages classify experience and the outer world at large, and further, that languages do so in differing manners.

For instance, the concept of number is not used in the same fashion by all languages (it may or may not be marked, or it may be marked but in differing allocations). Tenses represent another typical example, among many others.

Ultimately, linguistic relativists conclude that the picture of the world that is depicted by our languages becomes different according to our linguistic input. It is the same world, but viewed differently, with aspects of it being highlighted more than others and being given differential salience. What Whorf and other relativists claim is that language has come so far as to manipulate the human mind, in that humans would tend to take the linguistic picture to be the true picture of the universe. In other words, human thinking is claimed to be relative to our linguistic perspective onto the world.

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What is meant by thinking is ‘conceptualising’ – and not neurological processes of thought, or the actual content of thought itself. Relativists do not claim that language determines what we think about, but rather it claims that language influences and guides, or channels, the *way* we think about the world, and the way we conceptualise this world.

Linguistic Relativity is an old and controversial claim, which has largely been discarded in the modern era, mainly due to the failure of its proponents to provide adequate evidence for its validity. Yet, many studies have been carried out in order to try and give solid scientific grounding to the hypothesis. Most of them have sadly run into methodological pitfalls, and hardly any may be considered a true contribution to linguistic relativity, in that those studies remain inconclusive (see Lucy, 1992a, for a critical review of past research) – hence the importance of the issue of methodology in investigating linguistic relativity.

The fatal flaw consists of circularity of argument, meaning that researchers have tended to simply assume the validity of relativity, and have hence used linguistic stimuli and examined linguistic behaviour in their experiments. As a result, they never showed conclusively that language influences the way we think, but rather they have merely illustrated linguistic diversity.

In this paper, I will briefly discuss some existing studies (Slobin, 1996 & 2000) to illustrate the kind of methodology that is implemented in contemporary investigations of the relation between language and thought. Through critical appraisal, I will then suggest some basic components for a rigorous methodology in such investigations. Finally, I will illustrate these methodological concerns with a specific case study and some preliminary data speaking to the issue of the potential link between linguistic representations and cognitive conceptualisations.

2. Theoretical Considerations

Most studies in linguistic relativity adopt a comparative approach. Indeed a comparative epistemology remains the most efficient approach to linguistic relativity, as contrasts allow similarities and differences to be established. Ultimately, if any linguistic influence on cognition is to be found at all, it would be most saliently observable where diversity in linguistic patterns occurs across languages.

An initial step in investigating linguistic relativity is hence to identify an area of linguistic divergence, which is pervasive and salient enough in both languages so as to generate potential cognitive implications for their respective speakers. The study therefore needs to narrow its focus of investigation to a particular linguistic aspect present in both languages, yet differing in the way it is manifested.

2.1. Motion Events

The specific aspect to be examined in this paper is the morphosyntactic realisation of *motion events* in Germanic and in Romance languages – as defined by Talmy (1985: 60):

we treat a situation containing movement or the maintenance of a stationary location alike as a 'motion event'.

The reasons for choosing this particular aspect are threefold. First, motion events are referred to in language with a high level of frequency. This ensures that they are a good representative of actual language use, so that if there is some influence on cognition then it is likely not to be a marginal one. Secondly, as Slobin (2000: 122) notes:

The domain of motion is an ideal arena for the Whorf hypothesis – in ways in which the color domain was not – because there are no biologically-determined concepts here waiting to be labelled.

And third, motion events are expressed differently in the above-mentioned language families, thus identifying an area of cross-linguistic divergence and laying the foundations for a comparative study.

Talmy (1985: 61) details the several semantic components that enter into the lexical make-up of a motion event, i.e. *Figure* and *Ground*, *Motion* and *Path*, and *Manner* and *Cause*. This paper will concentrate on two of those notions, namely Path and Manner,¹ e.g.

- | | | | | | |
|-----|----|-------|--------------------|------------------|-------------------------------|
| (1) | a. | John | kicked
[manner] | the door | open.
[path] |
| | b. | Jean | a ouvert
[path] | la porte | d'un coup de pied
[manner] |
| | | 'John | opened | the door | with a kick' |
| (2) | a. | She | flew
[manner] | across
[path] | the Channel |
| | b. | Elle | traversa
[path] | la Manche | en avion
[manner] |
| | | 'She | crossed | the Channel | by plane' |

(1) and (2) above illustrate how motion events follow different lexicalisation patterns in English and French, and more generally in Germanic and Romance languages respectively.

The typical lexicalisation pattern of motion events in English, e.g. (1a) and (2a), requires the main verb to express the Manner – conveying the action of the motion event – whilst some other linguistic category (typically a preposition – also referred to as 'satellite') expresses the Path; whereas in French, e.g. (1b) and (2b), the typical lexicalisation pattern requires the main verb of the sentence to express the Path – conveying the result of the motion event – whilst some adjunct expresses the Manner.

Following the above divergence, Talmy (1985) established a typological categorisation of the lexicalisation patterns of motion events in the world's languages. For the present study, the two relevant patterns are: (i) languages that typically conflate Manner in the motion verb – also called *satellite-framed languages* – such as English, and (ii) languages that

¹ For reference, Manner is defined as referring to "a subsidiary action or state a Patient manifests concurrently with its main action or state", and Path is defined as referring to "the variety of paths followed, or sites occupied, by the Figure object" (Talmy, 1985: 128-9).

typically conflate Path in the motion verb – also called *verb-framed languages* – such as French.²

Psychologically speaking, this lexicalisation pattern is interesting because the main verb of a sentence bears not only functional salience, but also and more importantly semantic and hence psychological salience. The semantic component expressed by the main verb of the sentence is assumed to have more cognitive salience than the semantic components expressed by other grammatical functions. French phrases expressing the Manner of motion tend to be adjuncts; in other words, French grammar renders the Manner of motion events peripheral and dispensable, whereas English grammar makes it salient and indispensable through its encoding in main verbs.

In the present context, this would imply that the concept of Manner is more salient to English language users than to French language users, and that the concept of Path is more salient to French language users than to English language users.

Similar research on those lexicalisation patterns has suggested that English speakers seem to assert actions and imply results, whereas French speakers seem to assert results and imply actions (Slobin, 1996: 84). Could this mean that English speakers for instance – because of the morphosyntax of their language – think more in terms of action than in terms of result? And could this mean that speakers of those two language groups have developed different cognitive reflexes whereby they systematically and unconsciously analyse motion events in certain ways rather than others, meaning that cognitive perception, processing, and further conceptualisation of motion are conditioned by the lexical constructs imposed by the morphosyntax of the language in question?

2.2. Slobin's (1996 & 2000) Research

The present research was originally inspired by Slobin's 'Thinking for Speaking' theory (1996 & 2000), which will constitute here our illustration of circular research.

2.2.1. Slobin (1996)

Slobin (1996) asked test-subjects to depict in linguistic terms visual scenes involving motion events, and noticed from his elicited narratives that Spanish speakers express the notion of Path much more than the notion of Manner when describing motion scenes; whereas the reverse is true for English speakers.

His comparative study consisted in presenting a non-linguistic stimulus, namely a series of drawings in a sequence, and in asking subjects to describe the scenes through the medium of language. He paid special attention to spatial and temporal expressions (i.e. prepositions, verbs, tenses, modes, and aspect). His a priori hypothesis was that "in acquiring a native language, the child learns particular ways of thinking for speaking" (1996: 76), and this is confirmed by his results to the extent that "even pre-schoolers give evidence of language-specific patterns of thinking for speaking" (1996: 77); that is, as early as 3 years of age, children have become sensitive to grammatical distinctions in communicating about non-linguistic events that ought to be similar to all members of the species. Indeed, as Slobin explains (1996: 88),

² Verb-framed languages include Semitic, Polynesian, and Romance languages; and Satellite-framed languages include Chinese, and all Indo-European languages (except Romance).

there is nothing in the pictures themselves that leads English speakers to verbally express whether an event is in progress, or Spanish speakers to note whether it has been completed.

Although Slobin's research is insightful and may be seen to contribute to the advancement of linguistic relativity, it does not explicitly show whether and how language, or *speaking*, affects cognition. Rather, it shows how speakers are predisposed to attend to certain aspects of experience due to grammatical artefacts; in this sense, it does not prove any cognitive implication resulting from the use of language. It only points to correlates between grammar and thought. And even that much is unconvincing as there may be "nothing in the pictures themselves that leads English speakers to verbally express whether an event is in progress (...)" (ibid.), but there definitely *is* something in the language they use that leads them to verbally express that an event is in progress, for instance. This something is precisely the lexicalisation patterns mentioned above, which speakers *must* follow in speech. This does not prove either that speakers of different languages are more sensitive or pay more attention to certain aspects of the same reality than to other aspects.

In other words, Slobin's research lacks sound empirical evidence, and relies too much on intuitive speculation and deductions from correlations. His argument is partly supported by empirical evidence, but largely remains intuitive:

I am convinced that the events of this little picture book are experienced differently by speakers of different languages (1996: 88, emphasis added).

The problem in Slobin's study stems from his departing from a non-linguistic stimulus to arrive at a linguistic result (which was predictable) and from there to deduce (non-linguistic) patterns of habitual thinking. In short, his argument is circular.

Overall, what Slobin demonstrated is that speakers have to think about language itself in order to speak. This thinking becomes systematised to a certain degree in the process of language acquisition and use, and varies cross-linguistically according to specific grammars.

To sum up, Slobin (1996) only shows how a specific language asks its users to highlight Path/Manner according to their native input. This does not by any means posit any cognitive consequences, and as such does not provide evidence for linguistic relativity.

The reason for these limited conclusions I believe to be due to the fact that Slobin observed linguistic behaviour rather than non-linguistic behaviour. Indeed, if the relativist's purpose is to show that different languages engender different ways of thinking, then their likely evidence ought to consist of those very ways of thinking. Observing linguistic behaviour merely helps document linguistic diversity, not putative divergences.

2.2.2. Slobin (2000)

Slobin (2000) elaborates further on his 'dynamic approach to linguistic relativity' by looking at *linguistic* data drawn from picture-elicited oral narratives, creative fiction, translation, spontaneous conversation, parent-child discourse, text-elicited imagery recollections, and gestures accompanying speech.

In his comparative examination of motion events in satellite- versus verb-framed languages, he concludes (2000: 133) that “the considerable range of evidence examined here is at least *suggestive* of rather divergent mental worlds of speakers of the two language types” (emphasis added).

Yet, note again that his evidence revolves around linguistic data and hence his argument remains circular to a large extent, i.e. it assumes that linguistic differences lead to variation in cognitive perceptions and concludes therefore that such variation results from linguistic differences.

3. Experimental Procedure

As detailed above, the danger to be avoided in this type of research is circularity. To be conclusive, we must recognise that linguistic relativity cuts across the fields of both linguistics and psychology, and hence that the testing of linguistic effects on cognition must be cognitive by definition.

My intention is thus to alter Slobin’s methodology in order to take his conclusions one step closer towards potential relativity.

This project presents an experiment in which the stimuli are visual (mute video clips), and the task (similarity judgements) is cognitive (i.e. associative reasoning). In other words, both the stimuli and the task involve no linguistic interaction whatsoever. Thus we can see whether cognitive perception parallels linguistic structure *without* relying on language itself.

To sum up, the empirical tests involve (a) a non-linguistic stimulus, (b) a non-linguistic sorting task, and finally (c) some cognitive data.³

3.1. Comparative Epistemology

As mentioned previously, the first point in methodological concerns about linguistic relativity is that empirical studies must be comparative, i.e. they must contrast at least two languages and cognitive data from speakers of those different languages. For the sake of methodological rigour and validity, the idea in relativist experimenting is to present the same reality to speakers of different languages, and if one succeeds in obtaining different cognitive conceptualisations which in turn parallel the respective languages, then one may establish through those initially cognitive contrasts that thinking may be relative to language.

3.2. Language Choice

The choice of languages is a crucial initial consideration in methodology. The present choice of the French and English languages and their respective speakers is driven here by two main considerations:

(a) the researcher's fluency in both languages, which constitutes a pre-requisite for establishing differences in linguistic patterns, and equally for ease of carrying out the experiments, and

³ Additionally, an *a posteriori* linguistic monitoring of the test-subjects' choices during performance will be carried out.

(b) arguably, if linguistic relativity wishes to see the day as a valid theory, the data ought to be drawn not only from extremely divergent languages (e.g. Whorf's Hopi vs. English (Whorf, 1956); Lucy's Yucatec Maya vs. English (Lucy, 1992b)) but also, and more importantly, from closely-related languages. If indeed different cognitive performances arise across speakers of closely-related languages, then linguistic relativity stands as a theory in general, encompassing remote languages – whereas the reverse does not necessarily obtain. This concern is theoretical, though, as it is likely that if linguistic relativity were a matter of fact, then it would surely be a matter of extent too.

3.3. Motion Events

As mentioned earlier, the first trick is to find a morphosyntactic pattern that is consistently realised differently across the two chosen languages, and that is used extensively enough in the languages under study, so that this pattern constitutes a good representative of actual language use as it stands.

3.4. Methodology

The experiment I suggest will aim at collecting some cognitive data – as opposed to linguistic data – in order to avoid circularity as mentioned above. This means that the stimuli, the task to be performed, and the data to be obtained will involve no language whatsoever.

3.4.1. Test-Subjects

One of the first considerations concerns the need for test-subjects. Ideally one needs as many test-subjects as possible, so that the data obtained may be generalised to represent the whole language community under study.

Another point is the need for monolingual speakers,⁴ or possibly multilingual speakers as long as their languages fall within the same category of lexical patterning of motion events – i.e. all of the test-subject's languages are either satellite- or verb-framed languages.

3.4.2. Stimuli

The stimuli must be non-linguistic, so as not to bias test-subjects whilst performing the task at hand. As far as motion events are concerned, visual stimuli in the form of video clips are ideal, since they render the motion much more realistically than static pictures in a book for instance (e.g. Slobin, 1996).

The stimuli in this experiment consist of mute video clips displaying short and simple motion events. The video clips are organised in sets of 3 and there are a dozen such sets, e.g.

- | | | |
|-----|--|---------------------------------------|
| (3) | (a) he is cycling up the hill | (a) il monte la colline à vélo |
| | (b) he is cycling down the hill | (b) il descend la colline à vélo |
| | (c) he is walking up the hill | (c) il monte la colline à pied |

⁴ The criteria used for establishing monolingualism are (i) a single native language, and (ii) no fluency in another language, unless the lexicalisation pattern it/ they follow(s) in the morphosyntactic realisation of motion events is the same as that of the native language.

- | | | |
|-----|---|---|
| (4) | (a) he is limping towards her
(b) he is walking towards her
(c) he is limping away from her | (a) il s'avance vers elle en boitant
(b) il s'avance vers elle (en marchant)
(c) il s'éloigne d'elle en boitant |
| (5) | (a) he knocked the chair over
(b) he pulled the window shut
(c) he knocked the door shut | (a) il renverse la chaise violemment
(b) il ferme la fenêtre en la tirant
(c) il ferme la porte d'un coup sec |
| (6) | (a) he kissed her goodbye
(b) he waved her goodbye
(c) he kissed her hello | (a) il la salua en l'embrassant
(b) il la salua d'un signe de la main
(c) il l'accueillit en l'embrassant |

In each set of video clips, it was ensured that the same person performs each action. In each set, the props and settings are either the same in all three instances, or all different. These decisions were driven by a wish to ensure that test-subjects' attention does not get distracted away from the phenomenon under study, namely the motion events being displayed (e.g. no set displays a staircase in two video clips, and a garden in a third video clip).

3.4.3. Quality Assurance

Linguistic monitoring of the mute video clips was carried out in both languages by speakers who had not been briefed on the study. They were individually instructed to describe what they had seen on the television screen.

The purpose of such linguistic monitoring was purely methodological, i.e. for the sake of quality assurance. Designing the video clips was an act of translation from a given linguistic pattern into visual material. The linguistic monitoring enabled a back-translation from the visual material into language. The main point was therefore to ensure that the second act of translation matched the initial one, so that anyone watching the video clips would interpret their visual content as intended. When monitors' descriptions failed to match the intended visual content, the video clips were carefully re-made and re-tested.

Finally, having English and French speakers translating the visual content of the video clips back into natural language was insightful also because it provided preliminary confirmation of the lexicalisation patterns of motion events in both languages. Note that this kind of performance was what Slobin (e.g. 1996) used as data, whereas here it merely serves quality assurance purposes.

3.4.4. Task

The type of response desired in this study is non-linguistic behaviour and cognitive data. The task consists of a similarity judgement test, or sorting task, or triads' test – and thus involves associative reasoning and vision – but no language.

Test-subjects are asked to associate two video clips (out of the three shown) in terms of similarity (thus leaving one video clip as the odd one out of the three), using the number and letter code corresponding to the chosen video clips (e.g. (3a) and (3b); (4a) and (4c)).

It is also worth re-iterating that in each set of video clips, it is always possible to associate two motion events in terms of Path *and* two in terms of Manner – regardless of whether the language is French or English.

Another point here is that the instructions given by the researcher should be as succinct as possible, detailing only the task at hand but not the stimuli themselves. Performance should be purely spontaneous, and the very choice of language to be used when instructing test-subjects is another, potentially fatal, issue to bear in mind.

3.4.5. Hypothesis

In the case of English, test-subjects are hypothesised to associate in terms of Manner, so that we would expect the video clips in bold in (3) to (6) above to be paired as having greater similarity. This prediction is based on the fact that English syntax tends to stress Manner rather than Path through the main verb of a sentence, and thus the corresponding cognitive concept of Manner is expected to be the most salient aspect of a motion event to English speakers.

In the case of French, test-subjects are hypothesised to associate in terms of Path similarity. Note that the associations expected from speakers of each language respectively vary consistently – in bold in the examples above.

3.4.6. Post Linguistic Monitoring

Finally, once the task is completed, test-subjects are informally interviewed concerning the task. The goal of this monitoring is to assess the areas of difficulty which they encountered and to monitor their very understanding of the test as well as their performance.

3.5. Empirical Study

The empirical study is designed to proceed in two phases: (i) an intralingual study – phase I, and (ii) an interlingual and contrastive study – phase II.

Phase I of the empirical testing deals with English only and is thus an intralingual study. The aim of Phase I is (a) to ensure that actual performance patterns are uniform across English speakers (including speakers of different dialects of English)⁵, and (b) to test the validity of the above hypothesis concerning performance.

If both (a) and (b) are fulfilled, thus obtaining a consistent parallel between cognitive and linguistic patterns, we may reach an initial conclusion, namely that language seems to exert some influence on cognitive representation and processing.⁶

In the case where (a) is fulfilled but (b) is not, Phase II of the testing should proceed, in order to possibly unveil a potential for universal patterns in the cognitive processing of motion events. The further testing of monolinguals of other languages would ideally be undertaken.

⁵ Empirical tests are to be carried out in the UK and in the USA with a sample of both British and American English speakers.

⁶ In the alternative case, where uniformity in performance does not obtain across speakers, diversity occurrences will be analysed, individual monitoring of performance will be carried out, and the overall methodology should be rethought and amended (e.g. administering of tasks, design of stimuli, etc.).

Phase II will therefore proceed once Phase I (a) is validated. Phase II involves reproducing phase I with monolingual speakers of various dialects of French⁷, i.e. the *same* stimuli (video clips) will be used.

Phase II of the empirical testing deals with both English (as it takes Phase I as an integral part of the study) and French, and thus constitutes a comparative study.

The aims⁸ of Phase II are (a) to test the validity of the initial hypothesis concerning Path salience in French, and (b) to confirm the hypothesised cognitive contrast between French and English speakers concerning the conceptualisation of motion events.

If both are fulfilled, thus obtaining once again a consistent parallel between cognitive and linguistic patterns, and further, obtaining a clear contrast between the cognitive performances of English and French speakers, then it may confidently be concluded that (i) linguistic patterns exert some influence on cognitive representations, (ii) linguistic relativity obtains between languages that are as closely-related as French and English, and (iii) we may finally claim the validity of linguistic relativity as a theory.

In the alternative case, where (a) is not fulfilled, then (b) is likely not to obtain. One possibility is that regardless of their mother tongue, test-subjects will have followed a universal pattern of motion event analysis and conceptualisation. Yet other patterns may present themselves as well.

3.5.2. Preliminary Results & Analysis

This section presents some initial empirical data and offers a preliminary discussion based on both the theoretical considerations concerning methodology outlined above, and on the actual empirical reality of those considerations.

The empirical tests were first carried out with a British English-speaking sample consisting of twenty-two test-subjects. Overall, test-subjects understood the task very easily, though they found performing the test difficult at times. As the task progressed, most test-subjects were able to infer that Path and Manner in motion events were the focus of the test. They also clearly realised that there were always two ways one could decide to pair the stimuli.

The results indicate that test-subjects positively associate in terms of Path and Manner similarity, thereby confirming that methodological control over contextual variables (as detailed in 3.4.2.) was successful – except in the case of sets (3) and (4). Yet there seems to be no definite preferred pattern of association amongst the present sample of English speakers. This initial batch of results appears to be totally inconclusive.

⁷ Empirical tests are to be carried out in France and in Québec (Laval), Switzerland, or again Belgium (depending on the ease of obtaining monolingual French speakers in areas other than France – although bilingual test-subjects might qualify if their other language is a Romance or other verb-framed language) – thus obtaining cognitive samples from French and Montreal/ Swiss/ Belgian French speakers.

⁸ Note that uniformity in performance patterns is assumed here as it did obtain with the sample of English speakers, but were it not to obtain, methodological clarification would be required.

Table 1. Preliminary Results with English-Speaking Test-Subjects

SET	A & B	A & C	B & C	Not Sure	Expected combination
SET 1		11	11		A & C
SET 2	7		15		A & B
SET 3 *	2	11	9		A & B
SET 4 *	6	5	9	2	A & B
SET 5	1	21			B & C
SET 6	2	19	1		A & C
SET 7	13	9			A & B
SET 8	21	1			A & C
SET 9	16	6			A & C
SET 10	8	14			A & C
SET 11	10		12		A & B
SET 12	7		15		B & C
SET 13	8	14			A & C

Shaded boxes correspond to impossible combinations, i.e. the pairing of two video clips where there are neither Path nor Manner similarities; framed boxes correspond to the hypothesised associations for English-speaking test-subjects; bold figures indicate overall preferred association pattern; and SET * indicates a set of stimuli that is flawed due to unexpected distractors, rendering the results incoherent (this was established through post linguistic monitoring).

Indeed at first glance, English-speaking test-subjects seem to make more-or-less free associations. We obtain a total of 110 associations in terms of Manner, and 130 associations in terms of Path. This may be explained by the fact that English morphosyntax allows Path to be expressed by the main verb of the sentence as well, just as in French, e.g.

(7) she exited running

(8) he opened the door with a kick

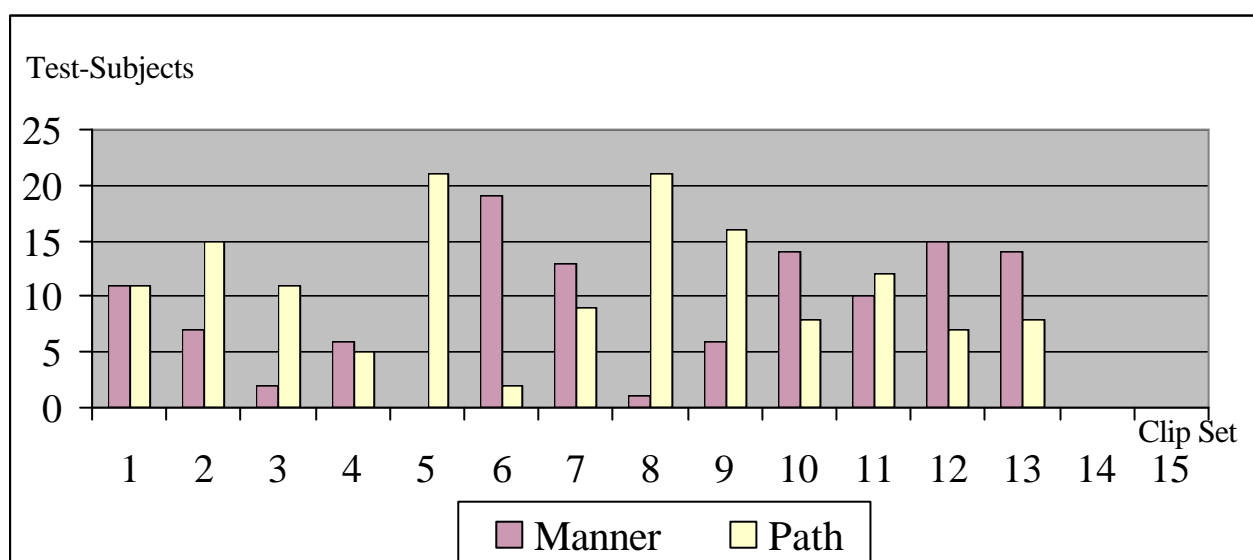
If this is the case, then French data ought to be more conclusive in terms of preference for Path, as the French language does not permit as much flexibility in morphosyntactic manipulation as the English language does,⁹ e.g.

(9) * elle courut sortie/ sortant/ dehors
 'she ran outside'

⁹ Such tests however have yet to be carried out.

- (10) * il frappa la porte ouverte/ l'ouvrant
'he knocked the door open'

The present results nonetheless suggest that there are preference patterns for either Path or Manner in most sets of stimuli. What is unclear however is precisely the factor responsible for these preferences – as preference seems to alternate more-or-less freely, language is an unlikely candidate – i.e. there are 5 sets showing Path preference quite neatly {(2), (5), (8), (9), (11)}, and 5 lots showing Manner preference {(6), (7), (10), (12), (13)}¹⁰ – see graph 1 below. In other words, given the data so far, the working hypothesis has not been confirmed, as there seems to be no obvious parallel between cognitive performance and linguistic patterns.



Graph 1. Lexicalisation Pattern Preferences for each set of stimuli.

An initial possibility in order to double-check these preference patterns is to conduct the study a second time with the same test-subjects to observe their 'new' preference patterns a few months after the first experiment. If their individual preference patterns differ, this may indicate that this kind of isolated testing (i.e. out of context) may be a source of unreliability for the data. Also one may include more test-subjects in the study to verify the presently obtained preference patterns. Another potentially fruitful possibility is to examine the stimuli individually, and to re-make a few video clips for quality purposes. Yet another suggestion might be to re-order the stimuli in each set, to ensure that test-subjects' short-term memory is not distracted by the order in which the stimuli are presented to them and that their decisions are not based on such distracted recall. Another idea would be to involve a control group of subjects, whose task would be to translate the visual stimuli into language, and then to perform the associations, as this could help make explicit the reasons for these unexpected associations. These are but a few suggestions, which may or may not turn out to be relevant, yet which highlight the difficulty of investigating the human mind and its inner workings.

¹⁰ Recall that sets (3) & (4) are flawed stimuli and hence are not included in the discussion.

Finally, a possibility offers itself to explain the unexpected irregularities in the data, namely that our initial assumption that the verb is the psychologically most salient element of the sentence is ill-founded. This would imply that the verb does not necessarily refer to what may be perceived as the most central element in visuo-spatial cognition. Therefore the hypothesis would be somewhat misguided, and finally our expectations cannot possibly be met.

Indeed, according to a recent study by McNeill on speech and gestures in motion events, English speakers present Path segments in gestures (2000: 48), and Spanish (i.e. Romance) speakers present Manner in gestures (2000: 53). This study claims that together with speech, gestures create one integrated system of meaning-making, so that speakers think “in terms of a *combination* of imagery and linguistic categorial content” (2000: 44). What this implies is that language is only one means of conveying meaningful information and that we also use gestures for instance to communicate about motion events, so that both Manner and Path are used in English and in Spanish, if only via different communicative media.

4. Conclusion

Because of its elusive nature, the human mind requires extremely careful and rigorous methodological attention when under study. In this paper I have provided an illustration of just this problem. I have also suggested a few guidelines to ensure a safe empirical journey in the winding maze of the human mind. This project aims to answer academic calls for more rigorous studies in linguistic relativity (e.g. Lucy, 1992a), and for a wider contribution to cognitive science and to the disciplines of linguistics and psychology. I further believe that if language exerts some form of power over our minds, this kind of hold cannot be simply ignored. The topic of linguistic relativity is not only about understanding linguistic representations and cognitive conceptualisations, rather it is about understanding ourselves through deciphering the perplexing workings of our own minds.

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