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Contents

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Ways to go:

Methodological considerations in Whorfian studies on motion events

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Abstract

Do language-specific patterns of motion event encoding along the lines of Talmy's (2000) typology of verb-framed (V) vs. satellite-framed (S) languages influence nonlinguistic cognition? Finkbeiner *et al.* (2002), Gennari *et al.* (2002), and Papafragou *et al.* (2002) found language-specific effects in similarity-judgment tasks only under prior verbal encoding or commitment of targets to memory. However, these studies raise methodological concerns: Gennari *et al.*'s participants found same-path variants more similar to targets than same-manner variants independently of language, while Finkbeiner *et al.*'s study produced the inverse pattern and Papafragou *et al.*'s results showed no significant preference either way. We conducted a similarity-judgment task which systematically varies types of manners and paths in 17 genetically and typologically diverse languages. We found an effect of language, which, however, is not directly based

on the V/S-distinction. V–languages fall into a group whose speakers strongly prefer same-manner choices and one whose speakers show a weak preference for same-path choices. Speakers of S–languages do not differ significantly, as a whole, from either group. Moreover, there are significant effects of finer-grained contrasts in path and manner that further call into question the generalizations offered in the previous studies.

1. Introduction

A number of recent studies have examined possible relativistic effects of the typological differences in the linguistic "framing" of motion events (Talmy, 2000). Languages differ in the encoding of the "path" of a motion event – in (1), OUT-OF-THE-BOX. "Satellite-framed" (S) languages such as English encode this information outside the main verb root:

(1) The ball <u>rolled</u> **out** of the box

In contrast, "verb-framed" (V) languages lexicalize path information in the verb root. Consequently, they require a separate expression for the "manner" of the motion event – in (1), rolling. In Spanish, this information requires minimally a gerund:

(2) La pelota **salió** de la caja <u>rodando</u>
the ballexited of the box rolling
'The ball rolled out of the box'

The additional syntactic position renders manner in V–languages less "codable". Consequently, manner is encoded more routinely in S–language discourse (Slobin, 1996, 2003). Thus, the question arises whether S–language native speakers also pay more

attention to manner when committing a motion event to memory and/or comparing it to other events.

Finkbeiner *et al.* (2002), Gennari *et al*. (2002), and Papafragou *et al.* (2002) elicited forced-choice similarity judgments in triads, where participants had to compare a target motion event to one variant altering the manner and one changing the path. Finkbeiner *et al.* examined monolingual English (S) and Japanese (V) speakers, and English/Spanish (V) and English/Japanese bilinguals and found a relativist effect when the targets were presented prior to their variants: all groups preferred same-manner variants, but the monolingual English speakers showed a significantly stronger manner bias than the other groups. However, this effect evaporated when targets and variants were presented simultaneously so that there was no need for linguistic encoding. Gennari *et al.* found a significantly stronger same-path bias in Spanish speakers than in English speakers, but only when participants verbally described the targets before their similarity judgments were recorded. A possible flaw in Gennari *et al*.'s design involves variants that differed from the targets not merely in manner, but in the actions of external agents (e.g., DRAG vs. CARRY a stool). Papafragou *et al*. found English and Greek native speakers make same-manner choices at about chance level. However, their treatment of Greek as a V–language conflicts with Talmy's (2000: 66) characterization of Greek as a language in which V-type and S-type descriptions of most events are equally colloquial.

These studies point to shallow relativistic effects which depend on the online use of language. However, there are some inconsistencies: Gennari *et al.* found a path bias for all groups, Finkbeiner *et al.* a manner bias, and Papafragou *et al.* no bias. This raises two questions: First, to what extent are the results artifacts of the particular populations

chosen? The nonlinguistic effects can be attributed to linguistic types more confidently depending on (a) the number of languages in the sample representing each type and (b) the degree to which each population representing a particular type shows the same or similar patterning in their nonlinguistic behavior (cf. Lucy, 1992: 84-126). Broader samples are all the more important in view of the intra-typological variation in motion event framing in language (cf. Bowerman *et al.*, 2002). Second, to what extent are the results artifacts of the relative saliency of particular path and/or manner contrasts? None of the three studies controlled for effects of individual contrasts.

To shed more light on these concerns, we conducted a similarity-judgment task analogous in design to those reviewed above with native speakers of 17 genetically and typologically diverse languages – to our knowledge, the largest sample of languages ever used in a Whorfian study. To control for the effects of individual manner or path contrasts, we cross-classified six path types with four manner types, realizing all possible combinations in our stimulus set and counterbalancing for frequency of occurrence.

2. Method

2.1. Participants

The participants were 12 adult native speakers of each language; see Table 1 for an overview of languages, genetic affiliation, home country of the population tested, the collaborators who collected the data, V/S-classification and source of the classification.

Table1: Overview of Languages

Language	**Affiliation**	**Country**	**Contributor**	**Type**	**Source**
Basque	Isolate	Spain	I. Ibarretxe	V	Ibarretxe 2004
Catalan	Romance	Spain	M. Martínez / M. Sauret / Bohnemeyer	V	Talmy 2000
Dutch	Germanic	Netherlands	D. v. Exel/ Bohnemeyer	S	Talmy 2000
French	Romance	France	A. Kopecka	V	Talmy 2000
German	Germanic	Germany	K. Samland / Eisenbeiss	S	Talmy 2000
Hindi	Indo-Iranian	India	Narasimhan	V	Narasimhan 2003
Italian	Romance	Italy	M. Martínez / M. Sauret / Bohnemeyer	V	Talmy 2000
Jalonke	Mande	Guinea	F. Lüpke	V	Lüpke 2005
Japanese	Isolate	Japan	S. Kita	V	Talmy 2000
Lao	Tai-Kadai	Laos	N. Enfield	serial	Enfield (in press)
Polish	Slavic	Poland	A. Kopecka	S	Talmy 2000
Spanish	Romance	Spain	M. Martínez / M. Sauret / Bohnemeyer	V	Talmy 2000
Tamil	Dravidian	India	Narasimhan	V	Talmy 2000
Tidore	West Papuan	Indonesia	M. v. Staden	V	M. v. Staden, pc
Tiriyó	Carib	Brazil	S. Meira	S	S. Meira, pc
Turkish	Altaic	Turkey	A. Özyürek	V	Talmy 2000
Yukatek	Mayan	Mexico	Bohnemeyer	V	Bohnemeyer (in press)

The sample comprised 12 V-languages, 4 S-languages, and 1 language, Lao, which uses "serial-verb constructions" as in (3) to integrate manner and path, constituting an intermediate category both on Talmy's typology and on Slobin's correlates (Ameka & Essegbey, 2001; Zlatev & Yangklang, 2003).

(3) *Sii*^{3} *-dèèng*^{3} *king*^{4} ***khùn***^{5} *paj*^{3} *paaj*^{3} *sii*^{3} *-thalêê*^{2} …

colour-red roll ascend go tip colour-sea

'The red thing rolls up to the top of the sea-colored thing…' (Enfield, in press: 47)

2.2. Materials

The materials consisted of 72 triads. The targets were 24 motion-event video-animations which systematically varied:

(i) four manners of motion (SPIN, ROLL, BOUNCE, SLIDE),

(ii) three scenarios with different "ground" objects (inclined ramp; field with tree and rock; field with hut and cave), and

(iii) two directed paths (motion UP/RIGHT, DOWN/LEFT)

For each of these targets (e.g. tomato-ROLLs-UP-RAMP, see Figure1), we created a same-manner(&different-path) variant (e.g. tomato-ROLLs-DOWN-RAMP), and three types of same-path(&different-manner) variants (here, BOUNCE/SLIDE/SPIN-UP-RAMP). This resulted in 72 triads with a target clip, a same-manner variant and one of

the three same-path variants. The variants were presented side by side, 1 second after the target-clip presentation ended (see Figure 1).

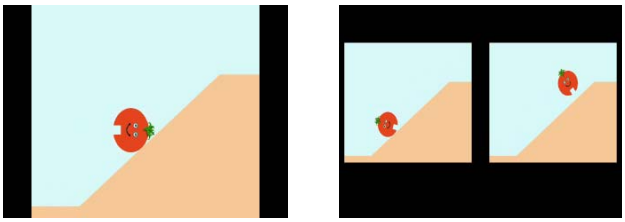

Figure.1. Example item: ROLL UP target (right), ROLL DOWN and BOUNCE UP variants (left)

The 72 triads were distributed across 6 randomized presentation lists in a Latin-square design. Each list was given to two participants per language (in reverse presentation order). Each list contained 12 triads, with the target clips combining the four manners of motions with the three scenarios so that each participant saw all 12 combinations in the target clip. The number of UP/RIGHT and DOWN/LEFT motions in the target- and variant-clips as well as the manners of motions in the different-manner variants was counterbalanced across the lists, as was the position in which the variants were presented on the screen. The position of the ground objects remained the same in all clips. Our minimal variations in the triad clips allow us to take into account the effects of different manners, paths and scenarios, but make our test triads quite similar. Therefore, we added 38 filler triads to each list, which involved other types of events and variations (e.g. replacing either the agent or the goal in a possession-transfer event with another character) and served to prevent the participants from settling into a fixed response

pattern. Instructions to participants were translated into their native languages. See Bohnemeyer, Eisenbeiss & Narasimhan (2001) for further details.

2.3. Procedure

2.3.1. *Pre-experimental elicitation task*

Cross-linguistic differences in the expression of the concept of similarity might influence how participants interpret the task. For example, one of the constructions used to express similarity in Tiriyó involves pretence (Sergio Meira, p.c.). When somebody says “B is more like A than C” what she means is ‘B is only pretending to be like A, but C is really like A’. Participants interpreting the task in the sense of detecting pretenders might systematically identify the *less* similar variants. Hence, before running the task, each contributor/experimenter was asked to determine with a different set of native speakers how the concept of graded similarity is expressed in the respective language. A brief questionnaire with instructions for evaluation was provided to the experimenter for this purpose.

2.3.2. Similarity-judgment task

The tasks were performed on a PC-laptop with color screen. Instructions were presented verbally and five practice triads gave participants the chance to familiarize themselves with the procedure and to ask questions. The triads were stored as individual files in ordered lists on the experimenter’s PC and the experimenter started the presentation of each triad with a mouse-click when participants were ready. After watching each triad,

the participant had to point to the variant most similar to the target scene. Halfway through the experiment, participants were allowed a brief break. The experimenter noted down the response on a separate coding sheet and entered them into a standardized SPSS-file, which was later merged with the files of the other languages.

3.Results

For each participant, we calculated the proportion of same-manner choices and entered it into a one-way ANOVA, which revealed a significant main effect of the variable LANGUAGE ($F_{(16,187)}$=1.813, $p<.05$). The percentages for individual languages and p-values for post-hoc pairwise comparisons with independent-samples t-tests are presented in Table 2.

Table 2: Percentage of same-manner choices and p-values for pairwise t-test comparisons between languages[1]

language	class	same-manner choice (in %)	Yuk.	Bas.	Tam.	Ita.	Tir.	Jap.	Ger.	Tid.	Dut.	Cat.	Lao	Hin.	Tur.	Spa.	Fre.	Pol.
Jalonke	V	43	1.00	.816	.597	.470	.221	.361	.215	.056	.065	.061	**.050**	.055	**.049**	**.032**	**.002**	**.000**
Yukatek	V	43	-	.835	.644	.512	.341	.398	.263	.098	.095	.087	.078	.079	.075	.051	**.007**	**.000**
Basque	V	46		-	.833	.671	.565	.536	.392	.194	.169	.156	.146	.144	.140	.100	**.021**	**.003**
Tamil	V	49			-	.798	.703	.634	.467	.223	.195	.179	.166	.164	.159	.112	**.019**	**.001**
Italian	V	52				-	1.00	.828	.674	.427	.349	.327	.315	.306	.301	.227	.065	**.011**
Tiriyo	S	52					-	.781	.571	.218	.212	.192	.171	.174	.166	.111	**.010**	**.000**
Japanese	V	56						-	.860	.623	.507	.480	.470	.454	.450	.355	.135	**.034**
German	S	58							-	.744	.599	.567	.556	.535	.531	.418	.149	**.026**
Tidore	V	63								-	.783	.741	.732	.701	.697	.545	.175	**.017**
Dutch	S	66									-	.961	.960	.923	.922	.772	.368	.101
Catalan	V	67										-	1.00	.962	.961	.809	.397	.113
Lao	serial	67											-	.960	.960	.804	.382	.094
Hindi	V	67												-	1.00	.847	.428	.127
Turkish	V	67													-	.845	.422	.121
Spanish	V	70														-	.558	.190
French	V	78															-	.426
Polish	S	85																-

[1] P-values ≤.05, two-tailed, are printed in boldface. If all potential comparisons (n=136) were taken into account in our discussion, this p-value would have to be adjusted to .00037 (Bonferroni). Note, however, that our discussion is based on a small number of planned comparisons.

Table 2 does not show a simple categorical V/S-distinction. Rather, we find a continuum with 3 out of 4 S-languages in the middle and V-languages distributed across the entire scale. Given this pattern, we explored other aspects of motion events and their encoding that could influence participants' preferences, using additional ANOVAs as post-hoc tests.[2] A PATH-IN-TARGET-CLIP X LANGUAGE ANOVA did not reveal a significant main effect of PATH-IN-TARGET-CLIP (UP/RIGHT: 59% same-manner choice, DOWN/LEFT: 62%, $F_{(1,187)}$=2.411, p=.122), nor an interaction with LANGUAGE ($F_{(16,187)}$=1.051, p=.405).

SCENARIO-IN-TARGET-CLIP also did not interact with LANGUAGE ($F_{(32,374)}$=.993, p=.481), but produced a significant main effect ($F_{(2,374)}$=23.322, p<.001): Participants' percentages of same-manner choices for the ramp triads (53%) were significantly lower than the values for the triads with horizontal movement (tree-rock: 63%; $t_{(203)}$=4.697, p<.001; hut-cave: 66%; $t_{(203)}$=6.204, p<.001). The tree-rock scenes elicited lower percentages of same-manner choices than the hut-cave scenes (63% vs. 66%), but the difference was not significant ($t_{(203)}$=1.637, p=103).

MANNER-IN-TARGET-CLIP also produced a significant main effect ($F_{(3,561)}$=2.411, p=.003): percentages of same-manner choices for the triads with a bouncing motion in the target clip (65%) were significantly higher than the values for the ROLL-triads (56%; $t_{(203)}$=3.638, p<.001) and the SLIDE-triads (60%; $t_{(203)}$=2.011, p=.046); and the difference between the BOUNCE-triads and the SPIN-triads (50%) was marginally significant

[2] Numbers of participants per language and test items per participant were constrained by considerations of field compatibility (six of the populations were tested in the field). Therefore, we did not perform an overall ANOVA for all factors and their interactions, but only calculated one overall ANOVA with the factor LANGUAGE and considered the other factors only in an explorative post-hoc analysis, which will be the basis for further studies.

($t_{(203)}$=1.898, p=.059). The other pairwise comparisons for manners of motion in the target did not reveal any significant differences (all p-values >.05). There was no interaction with LANGUAGE ($F_{(48,561)}$=.606, p=.984); i.e., the manners of motion seem to influence similarity judgments independently of participants' native language.

However, it might be that similarity judgments in triad tasks are less influenced by the manner in the target than by the *contrast* between the two manners of motion in the target and in the same-path/different-manner variant. In our experiment, not everyone had been shown each of the six manner contrasts (BOUNCE-ROLL, BOUNCE-SLIDE, BOUNCE-SPIN, ROLL-SLIDE, ROLL-SPIN, SLIDE-SPIN) in each scenario (ramp, hut-cave, tree-rock) as this would have involved presenting a target more than once to each participant. However, in the combined data set from all presentation lists, all combinations of manner contrasts between target and different-manner variant were shown in each scenario. Thus, we could perform a CONTRAST X LANGUAGE ANOVA on the basis of the means for the 72 triads, which produced a significant main effect of CONTRAST ($F_{(5,66)}$=3.536, p=.007) and an interaction with LANGUAGE ($F_{(80,1056)}$=2.127, p<.001). The descriptive results are presented in Table 3. A more detailed analysis of the behavior of all six contrasts in all 17 languages would go beyond the scope of this paper. But note that some of the languages exhibited clearly different patterns of manner preference for the six manner contrasts. For instance, among V-languages, French and Japanese speakers had significantly higher same-manner choice percentages for the SPIN-SLIDE contrast (92%, 63%) than for the ROLL-SLIDE contrast (58%, 25%; between-item-comparison: $t_{(22)}$=4.195, p<.001, $t_{(22)}$=3.761, p=.001). In contrast, Turkish and Italian native speakers exhibited significantly higher same-manner

choice percentages for ROLL-SLIDE (88%, 63%) than for SPIN-SLIDE (54%, 25%; $t_{(22)}$=3.370, p=.003. $t_{(22)}$=3.200, p=.004). Moreover, whether we observed significant differences between S- and V-languages depended on the manner-contrast involved: for instance, for SPIN-SLIDE, speakers of German (S) chose same-manner 63% significantly more than speakers of Italian (V, 25%; within-item-comparison: $t_{(11)}$=4.180, p=.002). For ROLL-SLIDE, we observed the opposite pattern (German 29%, Italian 63%; $t_{(11)}$=3.546, p=.005), and for ROLL-SPIN, we did not find a significant difference (German 63%, Italian 50%; $t_{(11)}$=1.149, p=.275).

Table3: Percentage of Same-Manner Choices for Languages and Contrasts

		same-manner choice (in %)						
Language	class	overall	SLIDE -ROLL	SLIDE -SPIN	ROLL-SPIN	ROLL-BOUNCE	BOUNCE-SLIDE	BOUNCE-SPIN
Jalonke	V	43	38	33	50	46	46	46
Yukatek	V	43	38	46	33	38	33	71
Basque	V	46	46	46	50	46	33	54
Tamil	V	49	21	50	58	63	63	38
Italian	V	52	63	25	50	46	42	88
Tiriyo	S	52	63	58	42	29	63	58
Japanese	V	56	25	63	50	71	67	58
German	S	58	29	63	63	67	75	54
Tidore	V	63	63	75	58	67	46	67
Dutch	S	66	67	63	54	58	67	88
Catalan	V	67	50	63	71	75	63	79
Hindi	V	67	67	63	58	58	75	83
Lao	serial	67	79	50	71	63	58	79
Turkish	V	67	88	54	54	50	67	92
Spanish	V	70	75	58	58	79	67	83
French	V	78	58	92	83	79	92	63
Polish	S	85	83	75	79	92	88	96
Overall			56	57	58	60	61	70

4. Discussion

We argue that strong claims regarding the (in)validity of the Whorfian hypothesis in the encoding of motion events cannot be made on the basis of a limited number of languages or a restricted range of manner and path contrasts. Findings from our survey of 17 areally and genetically diverse languages reveal a very high degree of intra-typological variation in how participants prefer to compare motion scenes on the basis of manner vs. path. Speakers of V-languages range along a continuum in their preference for manner of motion as the basis for classifying two motion events as being similar. With the exception of Polish speakers, the level of manner preference in speakers of S-languages does not differ significantly from speakers of languages at either end of the continuum. The danger of basing strong claims on two or three languages becomes immediately obvious when examining the patterns in Table 2. If only Polish (an S-language) and Yukatek (a V-language) had been selected to test for language-specific performance effects in our nonlinguistic task, the highly significant difference between speakers of these two languages in their degree of manner preference would have supported a strong version of the Whorfian claim. Conversely, had we chosen only to contrast German (S) with Spanish (V) using the identical stimuli and experimental procedure, we would have reached the opposite conclusion, since speakers of these languages do not differ significantly from one another in the frequency with which they base their similarity judgements on manner of motion.[3]

Our findings on the effects of particular *subtypes* of manner and path shed new light on prior claims and empirical findings regarding the influence of language on cognition in

[3] We are grateful to Melissa Bowerman for bringing this to our attention.

the domain of motion. We did not find any main effects of direction of motion (UP/RIGHT vs. DOWN/LEFT) and no interaction of direction with language. But we did find a language-independent bias across speakers of all languages towards relatively fewer same-manner choices in triads involving motion up or down the ramp. A possible explanation of this effect is that the ramp scene involves only a single referential ground – the ramp – as opposed to two grounds in the scenes involving horizontal motion (tree-rock, hut-cave). So path is conceptually easier to diagnose in the ramp scenes. We also found that target events which involve bouncing movements uniformly elicited a higher percentage of same-manner choices. Thus, independently of language, triad stimuli featuring manners as salient as our bouncing scenes should raise the percentage of same-manner choices, whereas stimuli featuring scenes as simple as our ramp scene should lower the number of same-manner choices. This dependence of participants' performance on the particular manners and paths featured in the stimuli might explain why Gennari *et al*. (2002) found a language-independent path bias, while Finkbeiner *et al* (2002) found a language-independent manner bias. A further consideration has to do with the format of the stimuli. In contrast to the study by Gennari *et al.*, which involved still pictures and revealed a language-independent bias for path, our study and that of Finkbeiner *et al*. employed animations which might have boosted the salience of the manner of motion due to lesser naturalness, accounting for the relatively high proportion of same-manner choices in the two studies, even for most of the V-languages. Further research is required to examine the role of such factors.

Furthermore, there is within-language and cross-language variation in speakers' attention to manner depending on the particular *contrast* between the manner shown in the target

and in the different-manner variant (Table 3). E.g., a comparison of the German and Italian participants' performance on the SPIN-SLIDE contrast alone suggests the predicted Whorfian effect, whereas ROLL-SLIDE reveals an effect in the opposite direction, and there was no effect for ROLL-SPIN. Just like the above-mentioned effects from individual path types, these effects from individual manner contrasts show that designs carefully balanced for particular kinds of paths and manner are an indispensable prerequisite to any generalizations about relativistic effects from the linguistic encoding of path and manner *per se*.

Further research is also required to examine the source of the language effect we found. It cannot simply be attributed to the V/S-distinction. If manner were more salient for speakers of S-languages, speakers of V-languages should have made fewer same-manner choices than speakers of S-languages. However, this was true for only four V-languages (Basque, Jalonke, Tamil, and Yukatek). The differences between these V-languages and the other V-languages cannot straightforwardly be accounted for in terms of socio-cultural factors such as literacy or urbanization. For instance, the Basque participants were uniformly fully literate, whereas the Yukatek participants were not; yet both populations produced low numbers of same-manner choices. We are currently investigating whether there is a linguistic predictor beyond the binary V/S-dichotomy, a typological property of the linguistic encoding of motion events that sets these four languages apart from the other V-languages. Future research will also focus on possible linguistic determinants of other aspects of the intra-typological variation in nonlinguistic performance. We found populations to differ significantly in how (dis)similar they found particular pairs of manners, which could be linked to lexicalization patterns in individual

languages. For instance, speakers of a language which lexicalizes the SLIDE-ROLL distinction might be more likely to attend to the distinction between the corresponding manners of motion than speakers of a language which has a single lexical term for both types of manner.

Our study raises important methodological considerations which need to be taken into account in any study investigating the influence of language on thought. Strong claims in support of, or against, the Whorfian hypothesis in the domain of motion will be premature until further research has clarified the impact of factors such as those identified above.

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Theorizing L2 metalinguistic knowledge

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Abstract

In this article, an empirically grounded theoretical conceptualization of the construct of L2 metalinguistic knowledge is proposed. Existing findings about the nature and role of metalinguistic knowledge in SLA suggest that the use of such knowledge in L2 learning and performance cuts both ways: Metalinguistic knowledge is potentially beneficial, but likewise has its limitations. Drawing on the assumptions of a usage-based model of language, the characteristics of (implicit) linguistic knowledge and (explicit) metalinguistic knowledge are contrasted. A revised definition of the construct of metalinguistic knowledge is put forward, according to which metalinguistic knowledge, like linguistic knowledge, varies along the parameters of specificity and complexity. Moreover, it is suggested that, unlike linguistic knowledge which is characterized by prototypical category structure, metalinguistic knowledge is characterized by scientific category structure. It is argued that this circumstance may help explain both the strengths and the weaknesses of metalinguistic knowledge in L2 learning and use.

1. Introduction

The aim of this article is to offer a theoretical account of the construct of metalinguistic knowledge, or explicit knowledge about language, in the area of second language acquisition (SLA). Despite considerable empirical evidence about the observable part of explicit knowledge in second language (L2) learning and use, theoretical proposals attempting to explain the processes and representational states which might underlie describable behavioural phenomena are still in relatively short supply (but see N. Ellis, 2005).

Thus, drawing on cumulative empirical findings from existing SLA research and theoretical premises of the usage-based model of language, the present article suggests that focusing on the similarities and differences of implicit and explicit knowledge may help provide useful insights into the nature and role of metalinguistic knowledge in L2 learning and performance. In particular, it is argued that although (explicit) metalinguistic and (implicit) linguistic knowledge representations both vary in terms of specificity and complexity, the two types of knowledge differ in terms of category structure. While (implicit) linguistic knowledge is characterized by flexibility, prototypicality, and context dependency, (explicit) metalinguistic knowledge relies on stable and discrete 'scientific' categories. It is suggested that this conceptualization may help account for both the facilitative potential and the apparent limitations of metalinguistic knowledge in SLA.

2. Construct definitions

Explicit knowledge is defined as declarative knowledge that can be brought into awareness and that is potentially available for verbal report, while implicit knowledge is defined as knowledge that cannot be brought into awareness and cannot be articulated (e.g. Anderson, 2005; Hulstijn, 2005). Accordingly, explicit learning refers to situations "when the learner has online awareness, formulating and testing conscious hypotheses in the course of learning". Conversely, implicit learning "describes when learning takes place without these processes; it is an unconscious process of induction resulting in intuitive knowledge that exceeds what can be expressed by learners" (N. Ellis, 1994: 38-39; see also N. Ellis, 1996; Hulstijn, 2005).

It is assumed that focused attention is a necessary requirement for bringing representations or processes into conscious awareness, i.e. for knowledge or learning to be explicit. In accordance with existing research, three separable but associated attentional sub-processes are assumed, that is, alertness, orientation, and detection (Leow, 1997, 2000; Rosa & O'Neill, 1999; Schmidt, 2001; Tomlin & Villa, 1994). In this conceptualization of attention, alertness refers to an individual's general readiness to deal with incoming stimuli; orientation concerns the allocation of resources based on expectations about the particular class of incoming information; during detection, attention focuses on specific details. Detection is thought to require more attentional resources and to enable higher-level processing (Robinson, 1995). Stimulus detection is not equivalent with noticing, which is defined as awareness in the sense of (momentary) subjective experience. (Schmidt, 1990, 1993, 2001). Proponents of the noticing hypothesis argue that, in practical terms at least, noticing, or attention at the level of awareness, is required for L2 learning to take place (Carr & Curran, 1994; Schmidt, 1990, 1993, 2001).

It is worth noting that the concepts of attention, noticing, and awareness, as well as their application in SLA, remain controversial (for critical reviews, see Robinson, 2003; Schachter, 1998; Simard & Wong, 2001). Nevertheless, a working definition is needed to allow for a clear discussion. Thus, for the purpose of the present article, it is assumed that the fine line between focused attention in the sense of stimulus detection and focused attention in the sense of noticing may be regarded as the threshold of conscious awareness, that is, the point of interface between implicit and explicit processes and representations.

The present paper is primarily concerned with the notion of L2 metalinguistic knowledge. Metalinguistic knowledge is a specific type of explicit knowledge, that is, an individual's explicit knowledge about language. The definition of metalinguistic knowledge used here is indebted to the proposed characterizations of explicit L2 knowledge put forward by R. Ellis (2004: 244-245) and Hu (2002: 355). Metalinguistic knowledge is defined as a learner's explicit or declarative knowledge about the syntactic, morphological, lexical, pragmatic, and phonological features of the L2. Metalinguistic knowledge includes explicit knowledge about categories as well as explicit knowledge about relations between categories.

3. Metalinguistic knowledge in SLA: Empirical evidence

The notion of explicit L2 knowledge has consistently attracted the interest of researchers working in the area of SLA and applied linguistics more generally. Over the past two decades in particular, this interest has generated an impressive amount of empirical research, which

has greatly enhanced our understanding of the role of explicit knowledge in L2 learning, as well as the relationship between L2 learners' proficiency and their metalinguistic knowledge.

Pedagogically oriented research concerned with the relationship between learners' L2 proficiency and their metalinguistic knowledge has mostly employed test-based measurement in either cross-sectional or longitudinal research designs (e.g. Alderson, Clapham, & Steel, 1997; Bialystok, 1979; Elder & Manwaring, 2004; Elder, Warren, Hajek, Manwaring, & Davies, 1999; Green & Hecht, 1992; Klapper & Rees, 2003; Renou, 2000; Sorace, 1985). The tests of metalinguistic knowledge administered in these studies typically required participants to judge the grammaticality of L2 sentences, to identify errors, to correct these errors, and to state the violated pedagogical grammar rules.

Conversely, empirical research concerned with the effects of explicit and implicit knowledge and learning in SLA has relied on experimental designs. Normally, such studies draw on a classic pretest-posttest paradigm; they tend to involve young, educated language learners, often at university level, and typically focus on the acquisition of between one and three morphosyntactic features, or a small set of vocabulary items, in the context of a single L1-L2 combination. Usually, short-term treatments ranging from one to ten hours in length are administered. Experimental treatments have included classroom-based instruction (e.g. Hu, 2002; Mondria, 2003; Swain, 1998; Williams & Evans, 1998), computer-based instruction with either a pedagogical orientation (e.g. Collentine, 2000; Gass, Svetics, & Lemelin, 2003; Nagata & Swisher, 1995; Sanz & Morgan-Short, 2004) or a more openly psycholinguistic purpose (e.g. N. Ellis, 1993; Robinson, 1997), and laboratory-based treatments in conjunction with the collection of concurrent or retrospective verbal protocol data (e.g. Camps, 2003; Leow, 1997, 2000; Rosa & O'Neill, 1999).

The most uncontroversial cumulative finding resulting from such research has borne out the theoretically motivated prediction that attention (in the sense of stimulus detection) is a necessary condition for the learning of novel input (Doughty, 2003; N. Ellis, 2001, 2002a, 2002b, 2003, 2005; MacWhinney, 1997). Moreover, it has been found that any type of form-focused instructional intervention is more effective than mere exposure to L2 input (DeKeyser, 1994, 2003; Doughty, 2003; R. Ellis, 2001, 2002; Norris & Ortega, 2001). As it is the intended purpose of all types of form-focused instruction to direct L2 learners' attention to relevant form-meaning associations in the linguistic input, this is not a particularly surprising outcome.

Beyond the empirically and theoretically substantiated claim that attention (in the sense of stimulus detection) is a necessary requirement for input to become intake, the picture is much less clear, however. In other words, findings regarding explicit knowledge, i.e. knowledge above the threshold of awareness, yield a more complex and sometimes even apparently contradictory pattern of evidence. The main findings which are relevant to the present discussion are outlined in the following.

- **Explicit and implicit L2 knowledge are distinguishable but interacting constructs.**

In a laboratory-based study involving 51 beginning learners of L2 Welsh (N. Ellis, 1993), participants were exposed to various treatments ranging from implicit learning intended to reflect naturalistic acquisition to explicit learning focusing on the rules underlying the targeted L2 feature, that is, soft mutation of consonants occurring in certain grammatical constructions. On the basis of participants' performances, it appeared that explicit and

implicit knowledge could be dissociated, since learners seemed to be able to use either explicit or implicit knowledge successfully. At the same time, transfer from one type of knowledge to the other was possible, indicating an interface between explicit and implicit knowledge (for a full account of how the explicit/implicit interface can be conceptualized, see N. Ellis, 2005).

This conclusion is consistent with investigations of automaticity in processing in the area of cognitive psychology more generally. In certain experimental designs, contributions from unconscious, automatic (implicit) processes can be dissociated from consciously controlled (explicit) processes. By the same token, experimental evidence relating to so-called ironic processes suggests that automatic (implicit) and controlled (explicit) processes may interact. Ironic processes typically occur when individuals are tired or under stress, i.e. in situations which render people more likely to make the very errors they normally try hard to avoid. Applied to the area of L2 learning, it can be argued that the control processes usually responsible for the selection of correct language forms are not functioning properly, e.g. because of fatigue, or because the communicative situation is too demanding. This results in backsliding, that is, inaccurate performance based on implicit processes taking over from temporarily inoperative controlled processes (see Segalowitz, 2003).

In a psychometric study aimed at developing improved test-based measures of explicit and implicit L2 knowledge, R. Ellis (2005) found that a two-factor solution accounted for nearly 75% of the variance in participants' performance, with each factor loading strongly on tests intended to assess implicit and explicit knowledge respectively. While there was some doubt about the type of knowledge accessed by learners judging grammatical versus ungrammatical sentences in an untimed grammaticality judgement test, the remainder of the test battery

seemed to tap either primarily explicit or primarily implicit knowledge, as desired. Thus, it may be concluded that explicit and implicit knowledge are indeed distinguishable constructs. In addition, it is worth noting that a factor analysis carried out by Alderson et al. (1997) in the context of a large-scale correlational study employing extensive test-based measurement likewise revealed two distinct factors, one loading on metalinguistic variables, the other loading on L2 proficiency variables.

- **Metalinguistic knowledge and L2 proficiency are positively correlated.**

Following the administration of a comprehensive test battery to 509 tertiary-level learners of L2 French at seven British universities, Alderson et al. (1997) found significant positive correlations between participants' performance on a test of metalinguistic knowledge and various measures of written L2 proficiency. Correlations between learners' metalinguistic knowledge and L2 proficiency ranged from 0.34 for grammar test performance to 0.47 for C-test performance. A partial replication of this study conducted by Elder et al. (1999) with 334 tertiary-level learners of L2 French, Italian, and Chinese in Australia led to comparable correlation coefficients. In a more recent study involving 91 university-level learners of L2 Chinese, Elder and Manwaring (2004) identified correlations ranging from 0.69 to 0.76 between participants' performance on written L2 assessment tests and a test of metalinguistic knowledge.

- **Metalinguistic knowledge varies in terms of specificity and complexity.**

Drawing on both test-based measurement and verbal protocol analysis, Roehr (2005) investigated metalinguistic knowledge in L1 English learners of L2 German at a British

university. Participants' responses to items on a test of metalinguistic knowledge which required the description and explanation of highlighted L2 errors revealed differences in terms of specificity. For instance, in response to a test item targeting L2 word order in subordinate clauses introduced by the conjunction *da* (as), some learners formulated highly specific metalinguistic rules which included the actual lexical items of the task sentence (e.g. "*Da* changes the word order"), while other learners produced more schematic metalinguistic rules which generalized beyond the task sentence (e.g. "A subordinating conjunction sends the verb to the end of the clause") (Roehr, 2005: 48).

Stimulated recall data in which participants retrospectively verbalized their thought processes leading to the resolution of test items targeting L2 adjectival inflection revealed differences in terms of complexity of use of metalinguistic knowledge. Thus, some learners provided metalinguistic descriptions which did not move beyond the phonological and orthographic surface patterns of the target sentence (e.g. "I was looking at the endings … and the words … all have -en, -en, -en on the end. … So I thought I'd put that, -en"). Other learners produced metalinguistic explanations which moved beyond surface patterns but nevertheless drew on inappropriate metalinguistic categories. Conversely, yet other learners managed to formulate metalinguistic rules linking language form and function in an appropriate way (Roehr, 2005: 78-79).

Likewise drawing on verbal protocol analysis, Rosa and O'Neill (1999) studied contrary-to-fact conditional sentences in the past in L1 English learners of L2 Spanish at a US university. Participants' relative levels of metalinguistic awareness were assessed with the help of think-aloud protocols. Learners showed either no apparent awareness, awareness at the level of noticing, or awareness at the level of understanding. Awareness in at the level of noticing was

operationalized as mentioning the targeted L2 feature, while awareness at the level of understanding was operationalized as formulating the underlying pedagogical grammar rule. Arguably, mentioning the targeted L2 feature may be interpreted as specific and minimal use of metalinguistic knowledge, while formulating a pedagogical grammar rule typically entails more schematic and complex use of metalinguistic knowledge.

- **Use of metalinguistic knowledge can be understood in terms of hypothesis-testing and monitoring operations.**

In a case study of three L1 English university-level learners of L2 German, Roehr (2005) identified two uses of metalinguistic knowledge on the basis of the participants' retrospective verbal reports on their approaches to the resolution of various form-focused tasks. Metalinguistic knowledge could be employed for the purpose of deliberate step-by-step analysis of a task sentence and the subsequent construction of a response; by the same token, metalinguistic knowledge could be used for the purpose of post-hoc monitoring of spontaneous output.

In a discussion of the various ways in which explicit knowledge may be brought to bear on L2 learning and use, N. Ellis (2005) argued that metalinguistic knowledge can be employed, among other things, for the analysis of input, the creative construction of utterances, and for the monitoring of output. The processes of input analysis and creative construction refer to the learner's deployment of explicit knowledge in the context of analogical reasoning. To aid comprehension, the learner formulates and tests hypotheses; to aid production, the learner scaffolds the building of linguistic constructions (N. Ellis, 2005: 320, 328-330). The process of monitoring refers to situations in which explicit knowledge is brought into the learner's

awareness at an appropriate moment and thus allows them to influence the processing of a language form and its corresponding interpretation in such a way that erroneous implicit habits are counterbalanced (N. Ellis, 2005: 330-331).

Along similar lines, Swain (1998) conceptualized the use of metalinguistic knowledge in L2 learning and performance in terms of problem-solving operations, even though this assumption did not constitute the main focus of her study. Swain (1998) argued that output-based classroom activities encouraged the formation and testing of hypotheses during metatalk, i.e. when learners talk about the language they are producing, question their language use, or correct either themselves or each other.

- **Use of metalinguistic knowledge is associated with consistent performance and certain decisions.**

In the context of a psychometric study involving 91 learners of L2 English, R. Ellis (2005) found that, contrary to his original hypothesis, tests of implicit knowledge did not result in more certain learner responses than tests of explicit knowledge. Likewise, the hypothesis that tests of implicit knowledge would lead to more systematic responses than tests of explicit knowledge was not fully supported. These results are broadly consistent with Roehr's (to appear) analysis of verbal protocols from L1 English learners, which led to the finding that, in case of form-focused tasks targeting L2 German adjectival inflection, reported use of metalinguistic knowledge co-occurred more frequently with consistent than inconsistent performance across two trials. Moreover, reported use of metalinguistic knowledge during task resolution co-occurred more often with certain than with uncertain learner decisions.

In a classroom-based study in a Canadian immersion setting, Swain (1998) investigated learners' use of metatalk during collaborative language activities. The author concluded that metatalk may not only facilitate learning, but also seemed to result in the long-term retention of solutions to language problems. This finding appears to further support the apparent link between learner certainty and consistency of performance on the one hand, and use of metalinguistic knowledge on the other hand.

- **Use of metalinguistic knowledge is associated with successful L2 performance.**

In a study of the effects of different types of computer-generated feedback, Nagata and Swisher (1995) worked with 32 L1 English university-level learners of L2 Japanese. The L2 feature under investigation was particle use with passives. Two experimental groups were respectively exposed to traditional feedback which simply informed learners of their errors as and when they occurred, and intelligent feedback which additionally provided detailed metalinguistic information on the nature of learner errors. Participants in the latter experimental condition performed significantly better on both immediate and delayed posttests.

Leow (1997) addressed the question of how different levels of awareness might influence L1 English learners' mental representations and use of L2 Spanish irregular verbs in the past tense. Based on test scores and think-aloud protocols from 28 university-level learners, it was concluded that higher levels of learner awareness did indeed lead to improved posttest scores on both multiple-choice recognition and written production tasks.

In a series of experimental studies conducted over six years and involving a total of 160 tertiary-level learners of L2 German, Smith (in preparation) investigated the effects of a computer-based treatment on participants' performance on a range of L2 morphosyntactic features. Learners' scores on discrete-item tests showed significant improvements for the experimental groups which participated in a set of metalinguistic corpus-tagging activities.

Williams and Evans (1998) studied the performance of 33 learners of L2 English from a variety of Asian L1 backgrounds on two L2 features, participial adjectives of emotive verbs and passive constructions. In case of the first targeted feature, learners receiving explicit instruction outperformed learners exposed to input flooding, even though there was no significant difference between the two experimental conditions in case of the second targeted L2 feature.

- **Use of metalinguistic knowledge does not guarantee successful L2 performance.**

Doughty (1991) found equal gains in performance across two experimental groups comprising 20 university-level learners of L2 English from various L1 backgrounds. Focusing on restrictive relative clauses (e.g. *I know the people who you talked with*), learners receiving meaning-oriented instruction with enhanced input and learners exposed to rule-oriented instruction with explicit explanation of the targeted L2 feature showed equal gains in performance.

By the same token, Sanz and Morgan-Short (2004) found support for the null hypothesis that providing learners with explicit information about the targeted L2 feature either before or during exposure to input-based practice would not affect their ability to interpret and produce

L2 sentences containing the targeted L2 structure, as long as learners received structured input aimed at focusing their attention appropriately. The study was carried out with 69 L1 English learners of L2 Spanish and concentrated on preverbal direct object pronouns. The researchers concluded that structured input practice which made linking form and meaning task-essential, as proposed in processing instruction (VanPatten, 1996, 2002, 2004), appeared to be sufficient for successful learning. Additional explicit information about the targeted L2 feature did not enhance participants' performance any further.

The ambiguous relationship between use of metalinguistic knowledge and successful L2 performance was likewise underlined by Green and Hecht (1992), Camps (2003), and Roehr (2005, to appear). In accordance with the consensual finding that learners' error correction ability, which may well be based on implicit L2 knowledge, and metalinguistic explanation ability, which necessarily draws on explicit L2 knowledge, do not seem to go hand in hand (Alderson et al., 1997; Elder & Manwaring, 2004; Renou, 2000; Sorace, 1985), Green and Hecht (1992) reported an ambiguous relationship between explicit and implicit L2 knowledge: While successful rule formulation typically co-occurred with successful error correction, successful error correction could be associated with the formulation of correct rules, the formulation of incorrect rules, or no rule knowledge at all.

In a study involving 74 L1 English learners of L2 Spanish focusing on third person direct object pronouns, Camps (2003) collected both concurrent and retrospective verbal protocol data. He reported that references to the targeted L2 feature co-occurred with accurate performance in 92% of cases; yet, no reference to the targeted L2 feature still co-occurred with accurate performance in 69% of cases.

Roehr (to appear) studied retrospective verbal reports from ten L1 English learners of L2 German following the completion of form-focused tasks targeting adjectival inflection. She found that although reported use of metalinguistic knowledge co-occurred more frequently with successful than with unsuccessful item resolution overall, fully correct use of metalinguistic knowledge still co-occurred with unsuccessful item resolution in 22% of cases. Along similar lines, anecdotal evidence from the language classroom suggests that, on occasion, learners may use their metalinguistic knowledge to override more appropriate intuitive responses based on implicit L2 knowledge (Gabrielatos, 2004).

In summary, available empirical evidence regarding the role of explicit L2 knowledge in language learning and use suggests that metalinguistic knowledge may be a double-edged sword. Whilst the facilitative effect of focused attention in the sense of stimulus detection is all but undisputed, the impact of higher levels of learner awareness and more explicit types of learner knowledge which go beyond focused attention both in the sense of stimulus detection and in the sense of noticing is less clear.

On the one hand, explicit and implicit knowledge appear to be separable constructs which are nevertheless engaged in interplay; metalinguistic knowledge and L2 proficiency have been found to correlate positively and significantly. Moreover, use of metalinguistic knowledge appears to co-occur with consistency, systematicity, and certainty of decision on the part of the learner. Finally, there is evidence for an association between use of metalinguistic knowledge and successful L2 performance. On the other hand, empirical findings likewise suggest that use of metalinguistic knowledge by no means guarantees successful performance, and that high levels of learner awareness may not only be unnecessary, but possibly even detrimental in certain situations. Hence, (use of) metalinguistic knowledge in L2 learning and

performance appears to be both potentially facilitative and subject to limitations. In the following, it will be argued that this circumstance may be accounted for by contrasting (explicit) metalinguistic knowledge with (implicit) linguistic knowledge as conceptualized in a usage-based model of language.

4. Theoretical assumptions about the nature of linguistic knowledge in the usage-based model

The usage-based model of language is a summary term subsuming three more specific strands of linguistic theory, that is, cognitive grammar (Langacker, 1991, 1998, 1999, 2000), construction grammar (Goldberg, 1995, 1999, 2003), and radical construction grammar (Croft, 2001). At the level of grammatical theory, these three approaches have somewhat different emphases (Croft & Cruse, 2004); at the more general level of cognitive theory, however, all these orientations jointly endorse a usage-based account of language.

The usage-based model makes several fundamental assumptions about the nature of language: First, interpersonal communication is seen as the main purpose of language. Second, language is believed to be shaped by our experience with the real world. Third, language ability is regarded as an integral part of general cognition. Fourth, all linguistic phenomena are explained by a unitary account, i.e. there are no clear-cut boundaries between phonology, morphology, syntax, semantics, and pragmatics. Hence, in the usage-based model, language is characterized as a quintessentially functional, input-driven phenomenon (Achard & Niemeier, 2004; Barker & Givón, 2002; Bates & Goodman, 2001; Bybee, 1995, 2002; Bybee &

McClelland, 2005; Goldberg, 1999, 2003; Hopper, 1998; Kemmer & Barlow, 2000; Langacker, 1991, 1999, 2000; Taylor, 1998, 2002; Tomasello, 1998, 2003).

Two specific theoretical consequences arising from these general premises are relevant to the current discussion, namely, first, the process of categorization and the representation of knowledge in terms of prototype categories, and second, the notion of linguistic constructions as conventionalized form-meaning pairings varying along the parameters of specificity and complexity.

In the usage-based model, the representation and processing of language is understood in terms of general psychological mechanisms such as categorization, schematization, and entrenchment (Langacker, 1999, 2000). Categorization is seen as the most fundamental cognitive operation which underlies schematization and entrenchment. Categorization can be defined as a comparison between an established structural unit functioning as a standard and an initially novel target structure. When the standard can be fully recognized in the target, categorization is very straightforward. When a discrepancy is discovered between the specifications of the categorizing standard and the target, a case of extension applies. Radial categories result, that is, chains of extensions radiating outwards from a central or prototypical unit.

To illustrate, an individual's concept of the category [TREE] may function as a standard. [2] The concept is highly schematic, as it contains all and only the information that is common to the instantiations of the category [TREE] that have been encountered previously. When encountering a new entity whose characteristics are fully compatible with the concept, the new entity will be categorized as an instance of the [TREE] schema. Thus, an entity which is

fundamentally tree-like in shape, size, colour etc. will likely be categorized without difficulty; an entity which displays some but not all the characteristics of a prototypical tree, e.g. BONSAI, may be categorized as a more marginal example. Finally, an entity which resembles the prototype only at a very high level of abstraction, e.g. FAMILY TREE, constitutes an extension of the category [TREE].

Prototypicality is said to characterize all cognitive categories; thus, both conceptual and linguistic knowledge is believed to be organized in terms of prototype categories (Dirven & Verspoor, 2004; Manning, 2003; Taylor, 1998, 2003; Tomasello, 2003; Ungerer & Schmid, 1996). A prototype can be defined as the best example of a category, i.e. prototypical members of cognitive categories have the largest number of attributes in common with other members of the category and the smallest number of attributes which also occur with members of neighbouring categories. In terms of attributes, prototypical members are thus maximally distinct from the prototypical members of other categories. To illustrate by means of a well-known example, ROBIN or MAGPIE are prototypical members of the category [BIRD] for British speakers of English, while PENGUIN constitutes a marginal category member (Ungerer & Schmid, 1996).

Accordingly, the prototype model of categorization posits that category membership is a matter of degree and cannot be understood as a clear-cut yes/no distinction. It follows from this that category boundaries are fuzzy, and that categories may merge into one another. To a certain extent, prototypes are fluid rather than fixed reference points for categories, since they shift with the linguistic and conceptual context in which they are used. Therefore, context-dependency is a key characteristic of prototype categories (Ungerer & Schmid, 1996). To the extent that language use can be understood in terms of categorization, context dependency is

equally crucial in language acquisition (de Bot, Lowie, & Verspoor, 2005; N. Ellis, 1998, 2001, 2002a, 2002b, 2003; Elman, 2001; MacWhinney, 1998; Tomasello, 2003; on the role of context more generally, see also Atkinson, 2002; Larsen-Freeman, 1997). [3]

The phenomena of entrenchment and schematization likewise apply to both conceptual and linguistic knowledge structures. Schematization is formally defined as "the emergence of a structure through reinforcement of the commonality inherent in multiple experiences", while, at the same time, experiential facets which do not recur are filtered out. Correspondingly, a schema is "the commonality that emerges from distinct structures when one abstracts away from their points of difference by portraying them with lesser precision and specificity" (Langacker, 2000: 4).

Linguistic schemas are believed to arise out of specific instances which are taken directly from experience with language in use (Kemmer & Barlow, 2000; Taylor, 2002). To illustrate, a large number of encounters with specific utterances such as *I sent my mother a birthday card* and *Harry is sending his friend a parcel* lead to entrenchment. Gradually, constructional subschemas such as *send*-[NP]-[NP] and finally the wholly general ditransitive schema [V]-[NP]-[NP] are abstracted. Fully entrenched constructions, both general and specific, are described as conventional units. Accordingly, a speaker's linguistic knowledge can be defined as "a structured inventory of conventional linguistic units" (Langacker, 2000: 8).

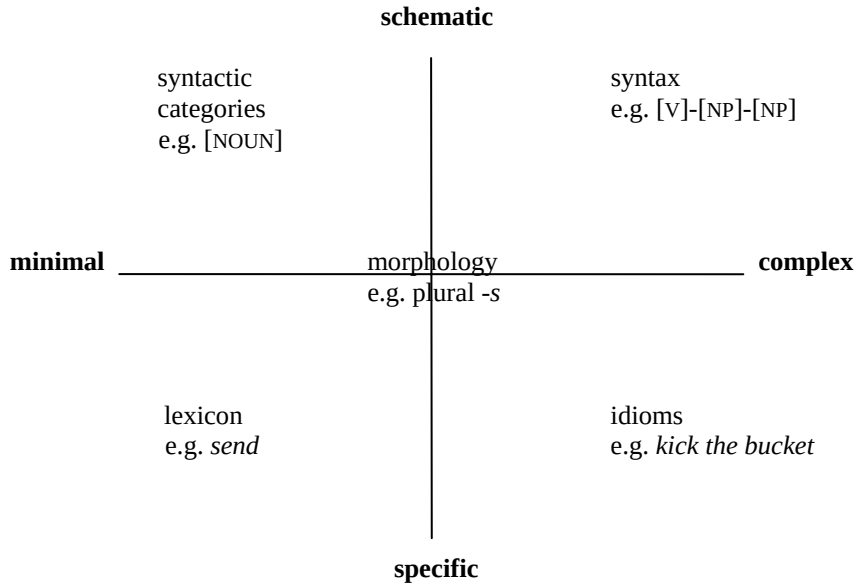
The usage-based model assumes that specific instantiations of constructions and constructional schemas at varying levels of abstraction exist alongside each other, so that the same linguistic patterns are potentially represented in multiple ways. Thus, it is assumed that

linguistic knowledge is represented in a vast, redundantly organized, hierarchically structured network.

Conventional linguistic units, or constructions, are viewed as inherently symbolic (Kemmer & Barlow, 2000; Taylor, 2002), so that constructions at all levels of abstraction are pairings of form and meaning (Goldberg, 2003). Hence, even though a constructional schema at the highest level of abstraction such as the English ditransitive [V]-[NP]-[NP] no longer contains any specific lexical items, it is still endowed with constructional meaning. Accordingly, a construction is always more than the sum of its parts; beyond symbolizing the meanings and relations of its constituents, it has its own semantic profile (Goldberg, 1999; Langacker, 1991, 1999, 2000; Taylor, 1998; Tomasello, 1998, 2003; Tyler & Evans, 2004). At the most general level, the semantics of the English ditransitive schema [V]-[NP]-[NP] are captured by the notions of transfer and motion, for instance (Goldberg, 1995, 1999, 2003).

The unitary approach to language which characterizes the usage-based model is not only applied at the level of cognition, but also at the level of linguistic structure itself. Hence, syntax, morphology, and the lexicon are all accounted for by the same system (Bates & Goodman, 2001; Croft, 2001; Langacker, 1991, 1999, 2000; Tomasello, 1998); they are regarded as differing in degree rather than as differing in kind. Syntax, morphology, and the lexicon are conceptualized as a graded continuum of conventional linguistic units, or constructions, varying along the parameters of complexity and schematicity, as shown in Figure 1. [4]

Figure 1: Linguistic constructions in the complexity/schematicity continuum



As Figure 1 indicates, schematic and complex constructions such as the ditransitive [V]-[NP]-[NP] occupy the area traditionally referred to as syntax. Words such as *send* or *above* are both minimal and specific and occupy the area traditionally labelled lexicon. Morphemes such as English plural *–s* or regular past tense *–ed* are situated at the centre of the two clines, since instances of morphology are neither entirely specific nor entirely schematic; by the same token, they are neither truly minimal nor truly complex, but they are always bound. Lexical categories like [NOUN], [VERB], and [ADJECTIVE] are minimal but schematic, while idioms such as *kick the bucket* tend to be both complex and specific in that they allow for little variation. The example *kick the bucket* would only permit verb inflection in terms of person and tense, for instance, and thus ranges high on the specificity scale. At the same time, the construction *kick the bucket* can be considered as more complex than the constructions *send* or *above* because the latter cannot be broken down any further.

To summarize, the usage-based model assumes that categorization is a key mechanism in language representation and processing. As linguistic knowledge is regarded as an integral part of cognition, it is assumed that both linguistic and conceptual categories are characterized by prototype structure. Linguistic knowledge is conceptualized in terms of constructions, i.e. conventionalized form-meaning units varying along the parameters of specificity and complexity. These assumptions underlie the usage-based account of implicit phenomena of language use and, by implication, language learning. In the following, it will be shown how these premises of the usage-based model may equally help shed light on explicit phenomena in SLA.

5. Theoretical proposals about the nature and role of metalinguistic knowledge in L2 performance and learning

It is proposed that by considering the cumulative empirical findings outlined in section 3 in light of the theoretical assumptions of the usage-based model summarized in section 4, it is possible to arrive at a conceptualization of metalinguistic knowledge which may not only provide interesting insights into the representational nature of the construct, but may also help explain the apparent benefits and limitations of explicit processes of L2 performance and learning.

5.1 Metalinguistic representations

- Explicit and implicit L2 knowledge are distinguishable but interacting constructs.
- Metalinguistic knowledge and L2 proficiency are positively correlated.
- Metalinguistic knowledge varies in terms of specificity and complexity.

To begin with the last point, it appears that metalinguistic knowledge and linguistic constructions vary along the same parameters, that is, specificity and complexity. The usage-based model posits that linguistic constructions can be more or less specific as well as more or less complex (see Figure 1). By the same token, empirical evidence suggests that learners' metalinguistic knowledge can be more or less specific and more or less complex.

For the purpose of illustration, one might imagine the case of an educated L1 English-speaking learner of L2 German and consider their metalinguistic knowledge which takes the form of pedagogical grammar rules. Thus, a metalinguistic description or explanation can refer to specific instances, e.g. '*hin* expresses movement away from the speaker, while *her* expresses movement towards the speaker'. Alternatively, it can be entirely schematic and therefore involve no specific exemplars at all, e.g. 'a subordinating conjunction sends the finite verb to the end of the clause'. Both of these examples are additionally complex, i.e. they can be broken down into their constituent parts and require several mental manipulations during processing (DeKeyser, 2003; Stankov, 2003). However, a metalinguistic description can also be minimal, e.g. 'noun'. Various combinations of different levels of specificity and complexity seem possible – with the exception of both minimal and specific.

In fact, the joint characteristics of minimal and specific appear to be unique to lexical items, that is, linguistic constructions. By contrast, even entirely specific metalinguistic descriptions or explanations containing no schematic categories such as 'German *ei* is pronounced like English *I*' or 'English *desk* means *Schreibtisch* in German' involve a relation between two specific instances and can therefore still be broken down into their constituent parts. By the same token, a minimal description such as 'noun', which cannot be broken down any further, is schematic rather than specific. Accordingly, a further defining characteristic of metalinguistic knowledge may be formulated: Metalinguistic knowledge can vary in terms of specificity and complexity, but it minimally involves either a schematic category or a relation between two categories, specific or schematic.

Even though metalinguistic knowledge is comparable with linguistic constructions in terms of relative complexity and specificity, it can be argued that explicit metalinguistic knowledge differs from implicit linguistic knowledge in the crucial respect of categorization, that is, one of the key cognitive phenomena underlying linguistic processing and representation. As outlined above, the usage-based model posits prototypical cognitive categories. Since all knowledge representations – conceptual and linguistic – are interconnected in a vast, hierarchically structured and redundantly organized network, they are context-dependent. Accordingly, categories are flexible, and category boundaries are fuzzy.

By contrast, metalinguistic knowledge seems to be characterized by stable, discrete, and context-independent categories. Put differently, metalinguistic knowledge relies on what is normally labelled classic, categorical, or scientific categorization (Anderson, 2005; Bod, Hay, & Jannedy, 2003; Manning, 2003; Taylor, 2003; Ungerer & Schmid, 1996), rather than prototypical categorization. For instance, the metalinguistic category 'subordinating

conjunction' is stable and clearly defined; in the case of German, it is instantiated by a certain number of members, such as *weil* (because), *da* (as), *wenn* (if, when), etc. Although some instantiations occur more frequently than others, there are no better or worse category members; all subordinating conjunctions have equal status and are equally valid examples of their category, regardless of context.

Likewise, a description pertaining to the constructions *desk* and *Schreibtisch* (desk) is entirely stable and discrete when used for metalinguistic purposes. Accordingly, the explanation that 'English *desk* means *Schreibtisch* in German' is posited as a context-independent rule which does not take into account prototypicality. In order to achieve a finer descriptive grain, additional rules need to be formulated, e.g. 'in the context of English *check-in desk*, the word *Check-in-Schalter* needs to be used in German'. Conversely, the (implicit) linguistic knowledge of a proficient user of both English and German would accurately reflect the frequency distributions of the constructions *desk*, *Schreibtisch*, and *Schalter* in connection with the relevant referential meanings and suitable pragmatic contexts in which these constructions tend to appear.

By the same token, the linguistic construction [NOUN] and the metalinguistic description 'noun' can be contrasted. As all linguistic constructions are form-meaning pairings, the linguistic construction [NOUN] is not devoid of semantic content. Even though it has no specific phonological instantiation, it has been abstracted over a large number of exemplars occurring in actual usage events; accordingly, it is strongly associated with the semantics of its most frequent instantiations, such as lexical items denoting entities in the real world. Consequently, in the average user of English, the highly frequent and prototypical constructions *man*, *woman* and *house* can be expected to be more strongly associated with the

schema [NOUN] than the relatively rare constructions *rumination* or *oxymoron*, or the dual-class words *brush* and *kiss*, for instance. Likewise, in the average user of German, *Lachen* ('the laughing') is likely to be a relatively marginal instantiation of the category [NOUN], compared to the more common instantiation *Gelächter* (laughter). The marginal status of *Lachen* can be attributed to both its relative rarity and its homophone *lachen* (laugh), a prototypical verb. Thus, by dint of its association with various instantiations, their respective conceptual referents and contexts, the linguistic schema [NOUN] exhibits prototypical category structure.

The metalinguistic description 'noun', on the other hand, relies on scientific categorization. It may be defined by means of a discrete statement, e.g. as "a word … which can be used with an article" (Swan, 1995, p.xxv), or "a word that can be used to refer to a person or place or thing" (http://www.cogsci.princeton.edu/cgi-bin/webwn). Metalinguistic categorization is based on clear yes/no distinctions, and frequency distributions and contextual information are not taken into account. Thus, in metalinguistic terms, the constructions *man, woman, house, rumination, oxymoron, brush, kiss, Lachen,* and *Gelächter* all have equal status as members of the scientific category 'noun'.

Of course, use of scientific categorization does not mean that we as language users/language learners/language teachers are not aware of the relative inadequacy of such an approach; it only demonstrates that, in order to be useful, metalinguistic knowledge needs to assume ideal conditions of stability and discreteness. Otherwise, it would be of little practical value. For metalinguistic knowledge to be informative, the user needs to be able to decide whether a linguistic construction can be classified as a noun or not, otherwise a description or explanation such as 'the verb needs to agree in number with the preceding noun or pronoun'

cannot be implemented. Consequently, metalinguistic descriptions and explanations presented in a pedagogical context typically list exceptions, that is, collections of instances that do not fit neatly into the scientific taxonomy; the more exceptions there are, the more voluminous and the less useful the metalinguistic description becomes. Accordingly, another defining characteristic of metalinguistic knowledge may be formulated: Metalinguistic knowledge relies on scientific categories.

In light of this analysis, a revised definition of the construct of metalinguistic knowledge is proposed: Metalinguistic knowledge is explicit or declarative knowledge about the syntactic, morphological, lexical, phonological, and pragmatic features of the L2. It includes knowledge about categories as well as knowledge about relations between categories. Metalinguistic knowledge can vary in terms of specificity and complexity, but it minimally involves either a schematic category or a relation between two categories, specific or schematic. Metalinguistic knowledge relies on scientific categories, i.e. categories that are stable and discrete.

In sum, linguistic and metalinguistic knowledge do not only pertain to the same cognitive domain (language), but also vary along the same parameters – specificity and complexity. These circumstances are fully consonant with the empirically supported claims that the two types of knowledge are engaged in interplay and correlate positively. To the extent that they differ qualitatively – in terms of prototype versus scientific categories – linguistic and metalinguistic knowledge are distinguishable, however. Arguably, the proposed contrast between explicit metalinguistic and implicit linguistic knowledge cannot only be applied to mental representations, but also to mental processes.

5.2 Metalinguistic processing

- Use of metalinguistic knowledge can be understood in terms of hypothesis-testing and monitoring operations.
- Use of metalinguistic knowledge is associated with consistent performance and certain decisions.
- Use of metalinguistic knowledge is associated with successful L2 performance.
- Use of metalinguistic knowledge does not guarantee successful L2 performance.

In brief, the available empirical evidence indicates that, in L2 learning and performance, metalinguistic knowledge is both potentially facilitative and limited in its usefulness. It is proposed that these phenomena may be attributable to characteristics of explicit processing which arise from the differences in explicit and implicit knowledge representations outlined in the previous section.

Explicit knowledge can be conceptualized in terms of information that is selectively attended to, stored, and processed in working memory. Working memory is defined as "a limited capacity system allowing the temporary storage and manipulation of information necessary for such complex tasks as comprehension, learning and reasoning" (Baddeley, 2000: 418). Working memory refers to online cognition, i.e. the moment-to-moment monitoring, processing, and maintenance of information (Baddeley & Logie, 1999). It appears that deliberate problem-solving activity can be regarded as a conscious thought process based on the mental manipulation of information in working memory. Arguably, then, the use of metalinguistic knowledge during L2 performance for the purposes of hypothesis-testing and monitoring can be understood as an example of just such conscious thought processes. More

specifically, it appears that L2 learners' use of metalinguistic knowledge exemplifies general problem-solving behaviour as set forth in skill acquisition theory formulated within the ACT framework (Anderson, 1993, 1995, 1996, 2005). [5]

The idea of conceptualizing L2 learning more generally in terms of skill acquisition is not new (see, for example, DeKeyser, 1994; Johnson, 1996; McLaughlin, 1995; see also Segalowitz, 2003). By the same token, previous research specifically concerned with metalinguistic knowledge has referred to skill acquisition theory, either directly (Hu, 2002) or more indirectly (Butler, 2002). Thus, existing research tends to discuss both linguistic and metalinguistic processing in terms of problem-solving operations. By contrast, the present argument rests on the proposal that the application of ACT should be restricted to learners' use of metalinguistic knowledge only.

This approach is consistent with a recent account put forward by N. Ellis (2005), according to which implicit learning applies during fluent comprehension and production, while explicit processes are called upon in learners' conscious efforts to negotiate meaning, analyze input, and construct output. In other words, the processes of deliberate decoding of input, creative construction of output, and monitoring of spontaneous utterances seem to reflect the analogical reasoning and hypothesis-testing processes underlying general problem-solving: The use of metalinguistic knowledge is problem-solving in the linguistic domain.

It is not difficult to see how problem-solving behaviour as defined by ACT can be applied to a learner's use of metalinguistic knowledge during L2 performance. A brief glance at the typical format of metalinguistic descriptions and explanations shows that pedagogical grammar rules

can be converted into the problem-solving operators characteristic of IF-THEN production systems. Examples readily come to mind, e.g. in relation to L2 German:

'IF a subordinating conjunction introduces the clause,

THEN the finite verb needs to be placed at the end of the clause.'

or

'IF movement towards the speaker is expressed,

THEN the appropriate adverbial particle is *her*.'

and so forth.

While step-by-step decoding of L2 input and the deliberate construction of L2 output may require repeated cycles of hypothesis-testing until a solution is found, post-hoc monitoring of spontaneous utterances can essentially be understood as retrospective problem-solving during which the solution to a problem is evaluated for correctness. As the answer to the problem has already been provided, i.e. the utterance has already been produced on the basis of implicit knowledge, it does not have to be inferred by means of a search through the problem space. In fact, only one hypothesis needs to be tested and only one production system needs to be applied to confirm or disconfirm the intuitive utterance. Accordingly, monitoring is less time-consuming and labour-intensive than deliberate decoding of input and construction of output.

If considered in light of possible predictions arising from ACT, the finding that learners' use of metalinguistic knowledge appears to be associated with consistent performance and certain decisions is not surprising. To all intents and purposes, goal-directed problem-solving behaviour involving known operators should yield just such a performance pattern. If a learner follows an orderly path through the problem space, overall consistency of performance and certainty of decision are not unexpected.

The apparently paradoxical finding that use of metalinguistic knowledge is often associated with successful L2 performance, but does not guarantee successful L2 performance remains to be explained. In other words, why is it that metalinguistic knowledge is not inevitably beneficial and therefore of limited use in L2 performance?

Bearing in mind that use of metalinguistic knowledge may be understood as problem-solving behaviour in the linguistic domain, it can be argued that the scientific rules and categories typifying metalinguistic knowledge are characteristic of explicit reasoning processes, which are in turn subject to the capacity limits of working memory. Thus, the defining features of explicit representations and processes involving language may help explain not only the potential benefits, but also the observable limitations of metalinguistic knowledge in L2 learning and use.

As only a limited number of units can be active in working memory at any one time, complex conscious operations need to be performed in sequence, as exemplified by the IF-THEN productions posited in the ACT model. Abstract reasoning involving complex mental manipulations seems to be possible because of cross-modal binding, a mechanism which has been proposed as the neural correlate of consciousness (Dienes & Perner, 2003; N. Ellis, 2005; Engel, 2003; see also Baddeley, 2000). [6] Thus, even though the number of units that can be selectively attended to is limited, these units may be schematic and therefore subsume information at a high level of generality; additionally, they may be complex and therefore subsume various categories and relations between categories. In order to be amenable to consciously controlled problem-solving processes, i.e. explicit serial operations, however, it appears that knowledge about language is organized in terms of discrete and stable categories.

In this sense, IF-THEN productions used as problem-solving operators are subject to the same constraints as metalinguistic descriptions and explanations. Put differently, for rule-like, algebraic algorithms to be effective, scientific categorization seems to be required. At the same time, however, the assumptions of the usage-based model of language suggest that stable and discrete categories cannot fully capture the probabilistic, prototypical, and context-dependent nature of linguistic constructions. By implication, it would appear that metalinguistic production rules can only partially reflect the structure of implicit linguistic knowledge. In other words, the defining characteristics of metalinguistic knowledge representations seem to be partially responsible for the limitations of metalinguistic knowledge in L2 performance.

To exemplify, the prototypical category structures of the linguistic constructions *desk* and *Schreibtisch* (desk) include a wealth of information about appropriate pragmatic usage contexts of the linguistic forms based on cultural models relating to the meanings they symbolize. Accordingly, the implicit linguistic representations of a proficient user of English and German would include information about the suitability of the construction *desk* to describe an item of furniture commonly found in an office, as well as the place where you check in at an airport or see a bank clerk to open an account. Furthermore, the proficient user would hold information about the suitability of the construction *Schreibtisch* in the former scenario but not in the latter. By contrast, the scientific categories and relations of the relevant metalinguistic description require the formulation of a set of independent rules that specify different usage situations by adding further conditions to the production, such as 'IF you want to say English *desk* in German, THEN use *Schreibtisch*', 'IF you want to say English *desk* in

German and IF the expression is used in the context of an airport or a bank, THEN use *Schalter*', and so forth.

At the level of more schematic categories, the implicit linguistic knowledge of a proficient user of English and German would include not only the schema [CO-ORDINATING CONJUNCTION] but likewise instantiations of this schema, all of which are associated with a wealth of linguistic and conceptual context information. Accordingly, the fact that the German constructions *aber, jedoch, allein* and *sondern* may all be translated as English *but* would be complemented not only by information about the high frequency of *aber*, but also by knowledge of the specific syntactic properties of *jedoch*, the literary or archaic connotations of *allein*, the tendency of *sondern* to be used in contradicting a preceding negative, etc. However, the metalinguistic descriptions formulated in the previous sentence clearly show that, when made explicit, this information needs to be stated in terms of independent propositions, or sets of IF-THEN production rules based on stable and discrete categories.

Thus, it can be argued that the scientific rules and categories characterizing metalinguistic knowledge may plausibly account for (some of) the limitations of such knowledge in L2 performance and learning. As outlined above, empirical evidence suggests that use of appropriate metalinguistic knowledge can co-occur with unsuccessful performance, while no use, or indeed inappropriate use of metalinguistic knowledge can be associated with successful performance. If the scientific rules and categories of metalinguistic descriptions and explanations only ever partially reflect the prototype structure of implicit linguistic knowledge, these findings may arguably be accounted for.

In cases of successful performance despite inappropriate use of metalinguistic knowledge, the learner may simply have relied on their implicit L2 knowledge, so that the inappropriate application of metalinguistic knowledge failed to do any harm. Conversely, in cases of unsuccessful performance despite appropriate use of metalinguistic knowledge, the apparently appropriate path through the problem space may have led to the wrong response because the metalinguistic productions the learner used failed to capture the intricacies of the problem space at hand. Put differently, the closest match between metalinguistic rule and linguistic construction that could be found by means of deliberate hypothesis-testing was not suitable in the given context, so that the linguistic construction which, to all intents and purposes, was inferred correctly in terms of the metalinguistic knowledge employed, was nonetheless an inappropriate instance of language use in the given context.

6. Conclusion

To summarize the argument: Empirical research concerned with the nature and role of metalinguistic knowledge in SLA indicates that explicit and implicit L2 knowledge are distinguishable but interacting constructs, that metalinguistic knowledge and L2 proficiency are positively correlated, and that metalinguistic knowledge varies in terms of specificity and complexity. Drawing on the assumptions of the usage-based model of language, it was argued that the variation of linguistic and metalinguistic knowledge along the same parameters – specificity and complexity – is fully consistent with the empirically supported claim that the two types of knowledge correlate positively and are engaged in interplay. To the extent that they differ qualitatively – in terms of prototype versus scientific categories – linguistic and metalinguistic knowledge are distinguishable.

The discussion of metalinguistic representation was concluded with a revised definition of the construct of metalinguistic knowledge: Metalinguistic knowledge is explicit or declarative knowledge about the syntactic, morphological, lexical, phonological, and pragmatic features of the L2. It includes knowledge about categories as well as knowledge about relations between categories. Metalinguistic knowledge can vary in terms of specificity and complexity, but it minimally involves either a schematic category or a relation between two categories, specific or schematic. Metalinguistic knowledge relies on scientific categories, i.e. categories that are stable and discrete.

Empirical evidence further suggests that use of metalinguistic knowledge can be understood in terms of hypothesis-testing and monitoring operations, that use of metalinguistic knowledge is associated with consistent L2 performance and learner decisions characterized by certainty, and that use of metalinguistic knowledge can be associated with successful L2 performance while, at the same time, it does not guarantee successful L2 performance. Put differently, metalinguistic knowledge appears to be both potentially facilitative and limited in its usefulness. It was argued that this apparent paradox may be explained if mental processes are considered in terms of the contrast between explicit metalinguistic knowledge representations and implicit linguistic knowledge representations.

The algebraic production systems posited in the ACT model seem to provide a clear account of use of metalinguistic knowledge as problem-solving in the linguistic domain, observable as deliberate analysis of L2 input, creative construction of L2 output, and post-hoc monitoring of spontaneous speech. It was proposed that since conscious thought is subject to working memory constraints, controlled problem-solving operations rely on the sequential processing

of a limited number of units, with abstract and complex thought being achieved through the binding of information into schematic and complex multimodal units. However, as the units of conscious mental operations and, likewise, the units constituting metalinguistic production rules are characterized by scientific category structure, the prototypical nature of context-dependent categories which define our implicit linguistic knowledge cannot be captured fully. Hence, metalinguistic knowledge can only ever be of limited use.

The present argument is intended to offer a thought-provoking account of how the essentially pedagogical notion of metalinguistic knowledge may be understood in terms of an established linguistic theory, i.e. the usage-based model of language, and an established theory from the field of cognitive psychology, i.e. the ACT model. At the same time, it is acknowledged that, ultimately, a full theoretical explanation will additionally need to consider the potential impact of a range of variables whose relevance has been identified in SLA research. In particular, it is likely that the relative usefulness of metalinguistic knowledge in L2 performance and learning is at least partially dependent on a learner's current L2 proficiency level.

In the context of a small-scale study involving learners of L2 Italian at a British university, Sorace (1985) reported a stronger association between metalinguistic knowledge and L2 linguistic knowledge in intermediate-level learners than in beginning learners. Similarly, Butler's (2002) investigation of article use in L1 Japanese learners of L2 English led to the conclusion that, with increasing levels of L2 proficiency, learners' use of metalinguistic knowledge generally increased in sophistication. Camps (2003) discovered that noticing of the targeted L2 feature was associated with higher test scores in case of his second-semester participants, but not in case of his first-semester participants. As the former group could be

expected to exhibit a higher level of L2 proficiency, Camps proposed that learners in the latter group may have been unable to make use of the information they explicitly attended to because of their low L2 proficiency levels.

By the same token, in the context of a case study analysis involving two highly proficient university learners of L2 German and one learner showing very low L2 proficiency, Roehr (2005) tentatively suggested that metalinguistic knowledge may be of limited use in conjunction with both very high and very low levels of L2 proficiency. While very low levels of L2 linguistic knowledge may result in an overly constrained hypothesis space, very highly proficient L2 learners may have outgrown the potential usefulness of metalinguistic knowledge.

A further avenue for future research is suggested by the cumulative finding that learners' use of metalinguistic knowledge appears to vary depending on both the targeted L2 features and the task requirements at hand. For instance, in a study of adult L1 English-speaking learners of L2 French, Renou (2000) found that in oral grammaticality judgements, participants performed best on tasks involving pronouns, while tasks involving verbs proved most difficult. Tasks involving adjectives proved to be of medium difficulty. In written grammaticality judgments, tasks involving verbs remained the most challenging, while, conversely, performance on tasks involving adjectives was most successful, with tasks involving pronouns moving to medium position. Along similar lines, in a longitudinal study of British university-level learners of L2 German, Klapper and Rees (2003) identified eight L2 features from a pool of 13 topics of pedagogical grammar which might be particularly amenable to explicit instruction drawing on metalinguistic knowledge, namely adjectives, modals, passives, prepositions, relatives, strong verbs, the use of tenses, and word order.

These findings indicate that factors such as a learner's level of L2 proficiency at a certain point in time, the type of targeted L2 feature, and task conditions all have a role to play in determining the usefulness or otherwise of metalinguistic knowledge in L2 learning and performance in a given situation. It would certainly be worthwhile to investigate these variables further within the broad framework of a usage-based model of language that was employed here.

Notes

[1] The main points addressed in this article were presented at the international symposium *Current Trends in Cognitive Linguistics*, University of Hamburg, Germany (10-11 December 2004) and the BAAL seminar *Instructed Second Language Learning: State of the Art*, University of York, UK (11-12 April 2005). In each case, I am grateful to the audience for their queries and comments. I would also like to thank Sonja Eisenbeiss, Roger Hawkins, and Maxwell Roberts for providing helpful feedback on earlier versions of this paper.

[2] The following notation is used: Schematic categories are shown in small capitals with square brackets, e.g. [TREE]. Members of conceptual categories are shown in small capitals, e.g. BONSAI. Specific linguistic constructions are shown in italics, e.g. *send*, *woman*, *Gelächter*. Metalinguistic descriptions and explanations are shown in single inverted commas, e.g. '*da* sends the finite verb to the end of the clause'.

[3] While some research paradigms make a clear distinction between language use and language learning, a strict separation of the two processes is not possible in the usage-based model. As

the term 'usage-based' implies, acquisition crucially depends on contextualized input, so that there can be no language learning without language use. This applies to both L1 and L2.

[4] I employ Langacker's (1991) terminology throughout this article. Croft (2001) uses the terms 'atomic' and 'substantive' instead of 'minimal' and 'specific', respectively.

[5] ACT stands for Adaptive Control of Thought. 'Thought' refers to higher-level cognition, with 'control' giving thought its direction. It is assumed that, in evolutionary terms, the control of thought has an 'adaptive' function, since the organism selectively develops abilities that allow for advantageous interaction with its environment (Anderson, 1996). As the current argument is concerned with skill acquisition theory in general, improvements of, and changes to the details of the ACT model as exemplified by the development of ACT* and ACT-R are not discussed. Instead, I only refer to the main premises of skill acquisition theory which have remained constant over the years and are thus common to all versions of ACT.

[6] Given the definition of explicit knowledge applied in this article, explicitness of knowledge is a concomitant of consciousness. At a conceptual level, phenomenal consciousness can be distinguished from access consciousness. A mental state is considered to be access-conscious "if by virtue of having that state, the content of the state is available for verbal report, for rational inference, and for the deliberate control of behavior. When I look at a red book, I can report the presence of the book ('there's a red book'), I can reason about it (e.g., concluding that I must have put it there when reading yesterday), and I can use its presence in deliberately directing my behavior (e.g., picking up the book and putting it back on the shelf)". Conversely, a mental state is considered to be phenomenally conscious "when there is something it is like to be in that state", i.e. being in that state involves some sort of subjective

experience (Bayne & Chalmers, 2003: 28). Thus, access consciousness is defined in terms of the causal role a state plays, while phenomenal consciousness is defined in terms of the way the state feels.

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