

From Movement to Metaphor with Manner-of-Movement Verbs

¹SETH LINDSTROMBERG and ²FRANK BOERS

¹Hilderstone EFL College, Broadstairs, Kent, UK, ²Erasmus College of Brussels and University of Antwerp, Belgium

This paper concerns three two-stage experiments the aim of which was to find out whether enactment- and mime-based (E&M) instruction—a key element both of the method known as Total Physical Response and of some less codified instruction at primary level—can be employed in order to help learners: (1) better acquire English manner-of-movement verbs in their common literal senses; and (2) more accurately interpret previously unknown metaphorical expressions which include them. The results of the experiments, which involved Dutch-speaking, young-adult advanced learners, provide evidence that mnemonic benefits associated with dual coding (e.g. Paivio and Walsh 1993) may be obtained through formation of imagery that is likely to be *motoric* at least in part. Additionally, the results are compatible with a contention that learning manner-of-movement verbs in an E&M fashion can promote an interpretative capability subsumable under the term *metaphoric competence* in the sense of Pollio and Smith (1980) and Littlemore (2001).

INTRODUCTION

The research questions in the context of language teaching methodology

In a series of articles, some with collaborators, Asher reported that a movement- and enactment-based (E&M) foreign language teaching method which he developed, Total Physical Response (TPR), enables groups of beginning students of (various) foreign languages to outperform control groups who receive some more traditional form of instruction (e.g. Asher 1965; 1966, 1969; Asher *et al.* 1974). Similarly positive results have been reported by other researchers (e.g. Wolfe and Jones 1982; Thiele and Schneiber-Herzig 1983). As is well-known, a conspicuous instructional instrument of TPR (fully described in Asher 2000) is the more or less complete physical enactment by learners of commands (initially from the teacher) which gradually build in complexity. It was not an aim of our investigations to examine anything like the full range of claims that have been made about the effectiveness of the package of methods and

techniques branded as TPR. Rather, the broad aim has been, in the light of current theories (especially in cognitively oriented neuroscience, psychology, psychology of learning, and linguistics), to see—in an EFL context—what promise E&M instruction might offer with respect to learning English verbs of a particular kind. Specifically, our two research questions were whether, in the case of young adult learners, a simplified form of E&M instruction can: (1) promote understanding and relatively brief retention of some English manner-of-movement verbs: and (2) enhance learners' ability to accurately interpret previously unknown metaphorical expressions which include them. Both questions, then, relate to a single element of TPR: E&M instruction. Our second (prime) research question goes beyond any claim we have encountered in the literature regarding the effectiveness of E&M instruction.

Since this was our first investigation of E&M instruction of vocabulary, it seemed prudent that we should focus on unitary words of apparent high tractability. We therefore settled on manner-of-movement verbs which seemed enactable or mimable in a relatively straightforward fashion (e.g. *sway* and *hurl*). This kind of verb—to be characterized in more detail further below—we will henceforth refer to as 'e/m MM verbs'.

Why we believe in a role for motoric imagery in language-related cognition, including processing and retention of vocabulary

To claim that E&M instruction is a particularly effective means of promoting the learning and recall of an element of language seems to presuppose some kind of dual coding (i.e. symbolic plus analogic/image schematic coding) along the lines hypothesized by Paivio (e.g. 1986) and Paivio and Walsh (1993)—perhaps a kind in which motoric image schemas play a role.

Klatsky *et al.* (1989: 75), Johnson (2000), and Jackendoff (2003), although they do not investigate memory, offer evidence for motoric imagery in a sense consistent with the fairly venerable belief that schematic images are one component of our internal representations of many verbal concepts (e.g. Piaget 1962: 215–41). Kosslyn (1994), in the context of a survey of evidence for motoric imagery, observes: 'That the motor system is intimately involved in imagery is not new...however most of the findings in the literature are consistent with the view that the motor system is slaved to the visual system' (p. 347). Kosslyn's own view (1994: 351) that 'one actively anticipates what one will *see* when one makes a movement' (our emphasis) places him with the majority at his time of writing. Johnson (2000) directly addressed Kosslyn's hypothesis by inducing subjects to think about performing specific grasping tasks under various conditions, including grasping from an awkward position. The marked differences in the times taken to think through the straightforward and the awkward movements are, according to Johnson, so incompatible with the large body of evidence

that transformations of visual images follow the shortest path without regard to constraints implied by real-world practicalities of movement, that it seems highly likely that motoric imagery cannot always be dependent on visual imagery. Approaching the presumption of the primacy of visual imagery from a different angle, Lakoff (1987: 445–6) refers to four studies which report that subjects blind from birth performed approximately the same as sighted subjects in mental imagery experiments similar to ones carried out by Kosslyn and others mainly with the intention of learning about *visual* imagery (e.g. Kosslyn 1994). Closer to our own field, J. R. Levin, a well-known proponent of teaching methods designed to exploit and encourage *visual* imagery, reports findings, including some of his own, which can be interpreted as suggesting that motoric imagery is in some cases more basic than visual imagery in the cognition of children of kindergarten (early primary) age (Levin 1976: 116–17).

Of even nearer relevance to our investigation is the finding of Saltz and Dixon (1978; summarized in Saltz and Donnenwerth-Nolan 1981) that groups of young children and adults remember both nouns and verbs better after motoric enactment than after either verbal rehearsal or after they have followed instructions designed to stimulate visual imagery. Citing additional studies, Saltz and Donnenwerth-Nolan (1981: 322) state that many words and objects have ‘motoric implications’. They give *ball* as an example of a word which refers to something that may, for instance, be thrown or rolled. Further, they report the results of two experiments (with young adult native-speakers of English) which involved 16 e/m action verbs (e.g. *fold* and *peel* as well as several clear-cut e/m MM verbs such as *stomp* and *grab*) which were presented to the subjects in short sentences. Although Saltz and Donnenwerth-Nolan’s finding that processing which involves the generation of visual imagery can be mnemonically more effective than processing with motoric imagery (and also that both are more effective than the purely verbal mnemonic strategy which figured in their study), they find that the observed beneficial effects for sentence memory of generating motoric images seems to be due neither to visualization effects nor to verbal mediation. In their view this is evidence within a levels-of-processing theory for vocabulary-related imagery which is specifically and primarily motoric.

Other researchers have found that physical enactment of vocabulary with motoric implications can facilitate recollection by both children and adults in ways relevant to vocabulary learning. Duffelmeyer (1980), for instance, reports that acting out word meanings helps school-age children to increase their L1 vocabularies. This is consistent with the widely accepted belief that deep and elaborative processing, often ‘depth of processing’ for short, is a key factor in recall generally (e.g. Craik and Lockhart 1972; Squire and Kandel 1999: 71) and in recall of vocabulary in particular (e.g. Schmitt 2000: 121). For instance, with respect to processing that may be more elaborative than deep, McKeowan *et al.* (1985) and Stahl and

Fairbanks (1986) report that school-age learners are especially likely to remember an L1 lexical form if they learn new facets of its meaning on successive encounters with it.

To what extent might motoric imagery play a role in the enhancement of depth of processing? Despite findings such as those of Saltz and Donnenwerth-Nolan (1981) and Johnson (2000), the issue of the relationship between visual and metaphoric imagery has stood in the way of consensus. In particular, there are those who would ask: when learners watch someone else act out word meanings, how much of any mnemonic effect may be due to the formation of visual rather than motoric images? New light has been cast on this issue from the field of cognitive neurophysiology in the form of results which suggest that simply watching the performance of an action may trigger imagery that is purely motoric. During experiments with macaques, the chance discovery was made that certain neurons in the F5 region (the ventral pre-motor cortex) of the macaque brain become active not only when a macaque performs particular grasping actions but also when it merely watches these same actions being carried out by a human or by another macaque (Gallese *et al.* 1996; Rizzolatti *et al.* 1996a). Fadiga *et al.* (1995) report evidence of such 'mirror neurons' in humans. With respect to human *language*, it now seems clear that the human homologue of the F5 region of the macaque brain is Broca's region (e.g. Gallese *et al.* 1996; Heiser *et al.* 2003; Rizzolatti *et al.* 1996b), a profoundly intriguing state of affairs.¹

The enterprise of specifying the role of mirror neurons in linguistic cognition in general and in language learning in particular is only just under way. It seems probable, however, that this class of neuron plays a role in the generation of some motoric imagery, with so-called 'canonical neurons' being responsible for some motoric imagery as well (e.g. Iacobini, *in press*).

Why we believe stimulating motoric imagery might contribute to metaphorical competence

There is no unanimity about: (1) whether, for native-speakers, ordinary language is replete with conventional expressions routinely processed with recourse to conceptual metaphors (e.g. Lakoff 1987, 1993; Lakoff and Johnson 1980); (2) whether it is, rather, littered with familiar expressions which for most people most of the time are dead metaphors not unlike *arm of a chair* (e.g. Keysar *et al.* 2000); or (3) whether available evidence points to a role for metaphoric processing that is somewhere in between these two positions (e.g. Gibbs 1998). But even Keysar *et al.* (2000) find that latently metaphorical expressions are likely to be processed as metaphorical if they are novel. Further, the extra inferential work that must be done (Keysar *et al.* 2000: 591) seems likely to constitute depth of processing.²

We have hypothesized that unfamiliar, latently metaphorical expressions containing e/m MM verbs (e.g. *hurl insults*), which especially in on-line or near on-line processing might well be metaphorically dead or dormant for a native speaker, are likely to be processed by *non-native* speakers (but not necessarily on-line) as expressions of novel metaphors—provided, of course, that the key literal meanings of the verbs are known. In the second stage of the experiments, described below, it was our intention to test this hypothesis—in other words, to see whether dual coding (a *prima facie* type of depth of processing) is at play when a foreign language learner associates, for instance, the verb *hurl* in *hurl insults* with the physical act of hurling.

Paivio and Walsh (1993), in arguing for a dual coding view of metaphor comprehension, discuss or mention a number of studies which find that imagery enhances the comprehensibility of sentences, increases the efficiency of information storage and promotes processing flexibility. Kövecses and Szabó (1996) and Boers (2000a), which relate specifically to foreign language learning, report evidence that instruction about the literal grounding of L2 figurative expressions has potential to promote vocabulary learning. Boers (2001) and Boers *et al.* (2004) present evidence that guided but substantially independent image processing through what they call ‘etymological elaboration’ (i.e. resuscitation of the literal origins of metaphorical expressions) fosters recall of L2 figurative idioms. Boers (2000b) reports an experiment in which knowledge of the literal senses of expressions such as *weaning off* helped participants appreciate their evaluative import when used metaphorically in a text about economics. Findings such as these, which provide additional strong support for dual coding theory and for the view that depth of processing facilitates vocabulary learning, underlie our choice of prime research question.

It should be stressed that people appear to vary in their propensity to produce and in their ability to comprehend novel metaphors (e.g. Pollio and Smith 1980; Pollio *et al.* 1977). Findings reported by Kogan (1983) could be interpreted as suggesting that the propensity of individuals to think, or not to think, metaphorically may be fairly stable over time. Against this we might set the belief of large numbers of educators and cognitive psychologists that instruction can help some people think better in various respects. For example, it seems to be widely accepted by researchers into second language acquisition that students can be trained to employ a range of ‘learning strategies’ whose purpose is to develop one kind of competence or another (e.g. Nation 2001: 261–316; Schmitt 1997). The second stage of each of the experiments reported below was designed to give indication of whether a session of E&M instruction might enable participants to outperform a control group in the interpretation of unfamiliar latently metaphorical expressions. Negative results would tend to disconfirm a contention that a broad ‘metaphoric competence’ (e.g. Littlemore 2001; Pollio and Smith 1980) can be enhanced by instruction.

English manner verbs, in particular, manner-of-movement (MM) verbs

Semantic structure and definability

A manner verb is a verb which can to some degree be paraphrased by means of a relatively generic verb and an adverbial of manner and/or means. *Tap*, for instance, can be glossed as:

hit [←a generic level verb] *lightly, especially with the tip of a finger or similarly shaped, fairly solid object* [← a manner/means adverbial]

Often it may be most practical to state the generic verb but demonstrate rather than describe the manner. For example, one might first say, 'Sway means move like this', and then actually sway.³ In fact, the difficulty of formulating accurate verbal definitions of many manner verbs has been a problem for lexical semanticists committed to the belief that word meanings are generally decomposable into a relatively small number of unitary non-image schematic semantic features interfacing with a purely symbolic/propositional representation of meaning (Jackendoff 2003: 338). This difficulty would be accounted for if it is true that the semantic representation of these verbs consists in part of (unique) kinaesthetic image schemas (Jackendoff 2003: 345–50). To the extent that this *is* true, explicit E&M instruction of manner verbs seems especially worth considering, especially since by our count there are well over 700 plain English MM which signify movements that are (1) more or less enactable (e.g. *sway*), (2) mimable (e.g. *slash*), or (3) gesturally suggestable to a potentially exploitable degree (e.g. *plummet*).⁴

Manner verbs and cross-lingual synonymy

English and German manner verbs are groupable in a rough and ready way under identical notional headings (Snell-Hornby 1983). For instance, each language has a number of specialized verbs for (change in) position/posture (e.g. *slump*; Snell-Hornby 1983: 161) and striking/colliding (e.g. *smack*; Snell-Hornby 1983: 163). More interesting is the evidence that at the level of individual verb, extremely close, let alone exact cross-linguistic synonymy of manner verbs is probably very rare, if not non-existent. For instance, even such superficially synonymous cognates as *glow* and *glühen* differ significantly in meaning with *glühen*, unlike *glow*, highlighting intensity of heat or light much more than a light's softness and fuzziness (cf., Snell-Hornby 1983: 194). Languages that are less closely related to English than German seem especially unlikely to have close counterparts of English manner verbs. Of course, it is true for certain other kinds of words (e.g. pre-/postpositions and abstract nouns) that extremely close cross-lingual synonymy is by no means the rule. What makes English manner

verbs particularly interesting in this respect is the frequency with which they are used metaphorically in ways that are different from how more or less corresponding verbs are used in German and (see Appendix 3) Dutch—two languages which have not only evolved in the same broad cultural realm as English but which have much the same ancient linguistic roots. Here is an additional reason to consider E&M instruction of these verbs.⁵

How frequent are e/m MM verbs, and where do they seem especially likely to occur?

The General Service List (West 1953), recast as a frequency list by John Bauman and Brent Culligan⁶, includes several possible e/m MM verbs (e.g. *dance*, 485th; *swing*, 1022nd), but it lacks the information about homonymy and polysemy necessary to judge frequency of use *as a verb of literal manner*. Leech *et al.* (2001), which is also far from being as informative about the frequency of particular senses of word forms as one might wish, nevertheless licenses the conclusion that almost all e/m MM verbs would probably have a rank well below 3,000 in any properly nuanced frequency list based on a large and varied corpus.

Of manner verbs of all sorts, it has been said that they are especially frequent in informal discourse (e.g. Snell-Hornby 1983: 72, 76). Since most modern narrative fiction written for children and teenagers is stylistically informal, we closely examined eight works in this category (three for very young children, two of clear appeal to teenagers and young adults, and three for in-betweens) with a view to determining the frequencies of *literally used* tokens of all kinds of e/m manner verbs (i.e. not just e/m MM verbs but also non-movement verbs such as *shout*). Stated as tokens per 100 words, the frequencies range from 1.0 to 5.8.⁷ Tokens of e/m MM verbs—our eventual focus of interest in the experiments—accounted for about 80 per cent of all e/m manner verb tokens with the remaining 20 per cent being tokens of verbs such as *shout* and *stare* which are enactable but which do not seem to us to be pre-eminently about movement. In total, 391 different e/m manner verbs were found with 282 of these (ca. 70 per cent) judged to be e/m MM verbs.

We now turn to the experiments by means of which we addressed our research questions—whether, in the case of young adult learners of English as an additional language, a rudimentary version of E&M instruction, compared with a rudimentary version of more traditional instruction, can: (1) promote understanding and retention of literally used MM verbs judged *prima facie* to be enactable or mimable; and (2) make it more likely that learners—when confronted with previously unknown, latently metaphorical expressions which include these verbs—actually will interpret them metaphorically in line with currently accepted meanings.

EXPERIMENT ONE

Method

The participants in the first experiment were 62 Dutch-speaking modern languages students (aged 21 to 22) majoring in English at a higher education college for translation and interpreting. Two parallel groups with a shared history of English courses at the college were used as experimental ($N=27$) and control ($N=35$) groups.

A selection was made of 24 readily enactable or mimable English MM verbs that all have attested figurative and literal senses: *cower*, *flit*, *hobble*, *hurl*, *lash*, *leap*, *nudge*, *pounce*, *prod*, *saunter*, *scrape*, *shrug*, *slash*, *slump*, *snap*, *sprinkle*, *stumble*, *stagger*, *sway*, *swoop*, *teeter*, *tickle*, *trudge*, and *veer*.

The students in both groups were told they were going to be participating in a vocabulary acquisition experiment. The 24 MM verbs were displayed by OHP. Each participant received a slip of paper showing one of the verbs and its dictionary definition—from the *Collins Cobuild English Dictionary* (1995)—of the primary literal sense, for example ‘If you **hurl** something, you throw it violently and with a lot of force’ (see Appendix 1 for more examples). Under the experimental condition, the participants were asked to convey to the others in the group the meaning of each of the verbs they were given, without showing their slip of paper and without using verbal descriptors. Instead, they were asked to convey the meaning of the verb by enacting or miming it. The other participants in the group were then supposed to attempt to say which of the verbs on the OHP screen was being acted out. Participants took turns enacting their verbs until each of the 24 verbs had been acted out and identified twice. The procedure for the control group was the same except that these participants were asked to convey the meaning of the words on their slips of paper *verbally* in English and without any enactment.

After the above instruction stage, the OHP was switched off and both groups of students were asked to do a gap-fill test (of brief term retention) targeting the literal usage of the 24 manner verbs, e.g. *The protesters _____ stones at the police* (see Appendix 2 for more examples). The participants were given 15 minutes for this task. They were also asked to indicate the test items they recognized as those where they should fill in one of the verbs they themselves had demonstrated (in the experimental condition) or explained (in the control condition).

One week after the instruction stage and the gap-fill test for retention of the literal senses of the manner verbs, the participants were given an exercise where they were asked to assess the quality of Dutch translations of English sentences in which the 24 MM verbs were used metaphorically. For example, *His girlfriend hurled several reproaches at him* was translated into Dutch as *Zijn vriendin maakte hem allerlei verwijten*, where the intensifying MM verb *hurl* is replaced by the more neutral verb *make* (see Appendix 3 for

more examples). Students were asked to rate the translations as: (a) 'exactly the same'; (b) 'lacking detail'; or (c) 'completely different from the original'. For options (b) and (c), the respondents were also asked to succinctly explain in what ways they felt the translation to be imperfect. This task was meant to estimate the students' in-depth comprehension of the metaphorical usage of the verbs. In 20 cases the translation of the MM verb used a more general Dutch verb, and was meant to trigger response (b), that is 'lacking detail'. In two cases (for *cower* and *saunter*) the translation was wrong, and in two further cases (for *scrape* and *veer*) the translation was very much like the original. These last four cases were intended as distracters. The participants were given 20 minutes to complete the test.

Results and discussion

The mean score (out of 24) on the vocabulary retention test under the experimental (E&M) condition was 14.19 ($SD=4.54$), compared with a mean of 10.29 ($SD=4.23$) under the control condition. Application of the Mann-Whitney U test shows the difference between the higher score of the experimental group and the lower score of the control group to be significant at $p<.002$ (two-tailed). In short, experimental participants were much more likely than the control participants to remember the verbs over the fairly brief period of time between instruction and the first gap-fill retention test. Any poor formulation of definitions by members of the control group will have been to some undetermined extent off-set by less than optimal demonstrations within the experimental group.

Participants in both groups had also been asked to indicate on their forms which test items (i.e. sentences) they recognized as targeting a verb that they had demonstrated or explained themselves. One would expect participants who invested effort into demonstrating or explaining a verb to be more likely to remember it than participants who merely attended to its demonstration or explanation. The scores bore this out; a Chi Square test yields $\chi^2=39.44$; $p<.001$. Furthermore, enacting or miming a verb resulted in better retention than explaining it. The test items marked by the respondents as having been demonstrated by themselves triggered correct responses in 89.47 per cent of such cases under the E&M condition, compared with 72.34 per cent under the control condition. Chi-square ($\chi^2=3.98$) shows the difference between the two scores in this subsection of the data to be significant at $p<.05$. This finding accords with the contention of dual coding theorists that storage of lexical meaning at least in part as a schematic mental image creates an additional kind of pathway for recall. More specifically, this result is consistent with claims in support of a form of dual coding which includes *motoric* imagery (since enactors were not watching themselves in a mirror). It is possible too that thinking out how to enact or mime a verb required more cognitive effort (and thus

deeper processing) than merely repeating a dictionary definition. Better recall of the verbs by the respondents who had enacted or mimed them may therefore be interpretable largely as evidence in support of levels-of-processing theory in general rather than dual coding theory in particular. However, the very marked difference between the overall experimental and control group scores ($p < .002$) cannot mathematically be accounted for solely by the especially high recall rates associated with auto-demonstration; the higher recall rate of E&M observers also comes into play. It seems that merely watching someone else enact or mime the meaning of an MM verb can have mnemonic benefits via a form of dual coding the obvious source of which, in this case, is what is seen, with possible additional *motoric* dual coding taking place through 'neurological mirroring' of the observed actions.

Due to circumstances beyond our control, fewer participants turned up for the second test in the experiment: 17 in the experimental group and 19 in the control group. A blind judge (an experienced EFL teacher whose mother tongue is Dutch) assessed the students' justifications for judging whether the 20 translations that lacked detail were imperfect. Only those responses accompanied by a justification which she judged correct were counted to the respondent's credit. The blind judge observed that respondents had clearly found it hard to draw the line between the negative categories ('lacking detail' versus 'completely different'). Therefore, the two negative categories were conflated, and the students' responses to the translations that lacked detail were processed in a binary fashion: (1) not criticized (or criticized for the wrong reasons) versus (2) criticized for the right reasons.

The students who (one week previously) had participated in the experimental condition proved more likely than those who had participated in the control condition to correctly identify those Dutch translations which were too general in meaning. Typical criticisms were 'lacking intensity', 'not violent enough', 'not sudden enough', and 'too slow'. The participants who had been in the E&M group correctly criticized on average 7.76 out of 20 of the Dutch translations ($SD = 3.27$), compared with a mean of 4.47 for the control group ($SD = 4.47$). Application of the Mann-Whitney U test shows the difference between the better performance of the experimental group and the weaker performance of the control group to be significant at $p < .002$ (two-tailed). In other words, the students who had processed the literal senses of the manner verbs via physical demonstration appeared more likely than the control students to appreciate the rich imagery of the verbs when these were used metaphorically.

Although the results of the first experiment seem to lend support to our hypothesis that E&M instruction may enhance not only learners' short-term retention of the literal senses of MM verbs but also their in-depth comprehension of metaphorical usages, three methodological problems

weaken our results:

- 1 It seemed very likely that the experimental and the control groups were on an even footing with respect to the target vocabulary, but our assumption was not backed up by an appropriate pre-test.
- 2 Because the experimental group was smaller than the control group, a comparatively larger proportion of the former were actively involved in the instruction stage owing to the fact that, in each group, students took turns until all 24 of the target verbs had been demonstrated (or explained) twice. As mentioned above, respondents' active involvement in either enacting or explaining the verbs also led to better retention. The fact that the experimental group was smaller may thus have contributed to some extent to the difference in overall recall rates between the two groups.
- 3 The weaker performance by the control group in the second test (i.e. the evaluation of Dutch translations) may have partly resulted from the weaker retention that was observed in the first stage of the experiment. If control students remembered fewer verbs in the first place, then they would automatically have been at a disadvantage when it came to interpreting the metaphorical sentences in the final stage of the experiment. The four distracters in the translation exercise reveal, for example, that students in the control group were more likely ($\chi^2 = 12.33$; $p < .001$) than those in the experimental group to rate correct translations as wrong, and vice versa. In order to address these three weaknesses in design, we repeated the experiment with modifications.

EXPERIMENT TWO

Method

The participants in the second trial were 62 Dutch-speaking students (aged 19–20) of modern languages (majoring in English) at the same college for translation and interpreting as in the first experiment. Two parallel groups sharing the same English courses were used as experimental ($N=39$) and control ($N=23$) groups. We chose the largest group for the experimental condition in order to eliminate one of the methodological questions that had arisen in the first experiment (i.e. the potentially greater active participation in the experimental group). Under the new procedure, all individuals in the control group would be actively involved in the instruction stage at least twice (as they would be taking turns until each of the 24 verbs was explained twice).

The procedure was the same as in the pilot experiment, with two important exceptions. First, a pre-test was administered to both groups in order to verify that they were on a par with regard to prior knowledge of the targeted vocabulary. Students were given a list of the 24 English MM verbs and they were asked to translate into Dutch the ones they thought

they understood. Secondly, the 'evaluate-the-translations test' was administered immediately after the gap-fill test instead of one week later. This had two advantages: (1) all the participants took both tests; and (2) the likelihood was reduced of students' not remembering (during the second test) the literal meaning of the verbs they encountered earlier—which would automatically short-circuit their ability to evaluate the translations. After all, the purpose of the 'evaluate-the-translations test' was to measure not the students' recollection of the verbs but rather their appreciation of the rich imagery behind the metaphorical usages.

Results and discussion

The pre-test of prior knowledge of the 24 MM verbs revealed no significant difference between the experimental group and the control group; mean scores were 4.89 (SD = 2.63) and 4.17 (SD = 2.19), respectively.

The results of the gap-fill task measuring students' recall of the verbs in literal contexts confirm the trends observed in the first experiment. Despite the fact that the experimental group was larger, with the result that several individuals demonstrated only one verb, the E&M instruction was still found to yield better recall rates for the experimental group as a whole. Experimental students reproduced on average 10.64 of the targeted verbs (SD = 5.07), compared with a mean score of 8.13 under the control condition (SD = 3.56). Application of the Mann-Whitney *U* test shows this difference to be significant at $p < .05$ (two-tailed). Students who had themselves either physically demonstrated or verbally explained particular verbs were more likely to remember these verbs than other verbs ($\chi^2 = 35.12$; $p < .001$), which is in accordance with depth-of-processing expectations. Actively demonstrating the meaning of verbs produced higher recall rates than actively explaining them: 88.64 per cent and 55.88 per cent, respectively ($\chi^2 = 9.14$; $p < .01$). This seems to provide further evidence of a form of dual coding involving *motoric* imagery, but it cannot mathematically account for the superior recall rates for the experimental group collectively. Again it seems that simply observing a fellow student demonstrate the meaning of a manner verb, and inferring on that basis what verb is being enacted, can be a useful mnemonic technique—more so than hearing a verbal explanation.

The results of the 'evaluate-the-translations test' confirm the tendency observed in the first experiment. According to feedback from our blind judge, the experimental students correctly rated, on average, 6.52 of the Dutch translations as wrong or lacking detail (SD = 2.59), compared with a mean score of 4.00 under the control condition (SD = 2.75). Application of the Mann-Whitney *U* test shows this difference to be significant at $p < .002$ (two-tailed). Experimental students correctly criticized 52.5 per cent of the translations of verbs they had recollected in the gap-fill test compared with 40.0 per cent for the control students, a difference significant at $p < .02$.⁸ Again, E&M instruction seems to have helped the experimental

participants appreciate the rich imagery behind the metaphorical usage of the manner verbs under study.

Although the second experimental set-up appears to eliminate some of the doubt surrounding the results of the pilot experiment, some caution is still in order. We found no significant difference between the experimental and the control groups' prior knowledge of the 24 MM verbs, but the mean score of the experimental group on the pre-test was 0.82 higher. Considering the small selection of verbs for this study, even a relatively small head start could possibly skew some of the later findings.

EXPERIMENT THREE

Method

Participants in the third trial were 29 Dutch-speaking modern languages students (aged 20–21) majoring in English at the same college as before. Two parallel groups that had shared the same English courses served as experimental ($N=17$) and control ($N=12$) subjects. The largest group was again chosen to participate under the experimental condition.

The procedure was the same as in the second experimental set-up, but in order to be able to remove as much doubt as possible about both groups being comparable at the start, we administered, as an additional pre-test, the Nation and Laufer 3000 word level test, adapted by Tom Cobb for his on-line *Lexical Tutor* at <http://www.lextutor.ca>.

Results and discussion

As the number of participants in the third trial was quite small, any conclusions drawn from this third set of data alone must be very tentative. However, in the case of clear tendencies, the results of this third experiment could still be interpreted as either corroborative or the contrary.

The two pre-tests confirmed that the experimental group and the control group had very similar knowledge of both general vocabulary and the targeted MM verbs. Mean scores on the on-line vocabulary levels test were 39.06 per cent ($SD=16.95$) and 39.25 per cent ($SD=15.23$), respectively. Mean scores on the MM verbs test were 4.65 ($SD=2.45$) and 4.55 ($SD=2.02$), respectively.

The results of the gap-fill test, which aimed to measure students' recall of the literal usage of the 24 manner verbs, were like those observed in the previous two experiments. The average score under the experimental condition was 14.65 ($SD=4.92$), compared with a mean of 10.18 ($SD=3.52$) under the control condition. Application of the Mann-Whitney U test shows this difference in performance to be significant at $p<.05$ (two-tailed). As before, participants showed superior recall of exactly those verbs whose meaning they themselves had either acted out or explained as opposed to

the verbs for which this was not the case ($\chi^2 = 30.94$; $p < .001$). Under the experimental condition 90.7 per cent of the items indicated as having been 'taught' by the respondent were correct, compared with 85.2 per cent under the control condition. Since the latter difference is far too small to account for the higher (brief term) recall rates for the experimental group as a whole, it seems again that watching a fellow student enact an MM verb can be more beneficial for retention than hearing a verbal explanation.

The results of the evaluate-the-translations test also confirmed the trends observed before. Experimental students were found (by our blind judge) to correctly criticize on average 8.06 of the Dutch translations ($SD = 2.82$), compared with a mean of 4.82 ($SD = 2.40$) under the control condition. Application of the Mann-Whitney U test yields $p < .002$ (two-tailed). Experimental students correctly criticized 56.8 per cent of the translations of verbs they had previously recalled in the gap-fill test compared with 41.5 per cent for the control students. The difference is again significant at $p < .02$.

SUMMARY AND CONCLUSION

The results of the experiments suggest that implementation of a form of E&M instruction of e/m MM verbs may bring benefits to advanced learners with respect to both literal and latently metaphorical expressions.

The test results for retention of the literal senses of e/m MM verbs suggest quite clearly that: (1) recall (after a relatively short interval) is better promoted by watching someone physically demonstrate the meaning of an MM verb than by listening to a verbal definition; and (2) physically demonstrating the meaning of an MM verb oneself promotes one's own retention especially well. These learning benefits may largely stem from an increase in depth of processing, that is, from at least partial coding of meaning in the form of image schemas, with coding in motoric image schemas being especially likely in the case of auto-demonstration. Since the E&M instruction which figured in our experiments was (deliberately) spare, it seems likely that even greater learning benefits would result if more elaborate procedures were followed (see, e.g., Asher 2000 and Lindstromberg 2004: 156–9). Our finding that merely watching someone enact or mime an MM verb can have a positive effect on learning is of particular interest and seems highly consistent with speculation that mirror neurons play an important role in linguistic cognition (e.g. Gallese 1999), a role as yet unspecified.

The test results for construal of metaphorical expressions containing e/m MM verbs are compatible with the possibility that physically enacting or miming the literal sense of a MM verb, or watching someone else do so, promotes recognition of the rich imagery behind its use in a substantially unfamiliar, latently metaphorical context. In other words, adult learners whose understanding of such a verb is grounded in enactment or mime

may show an enhanced tendency to retain its rich imagery when interpreting its metaphorical usage, resulting in appropriate understanding of that metaphorical usage.

The results of the two tests are highly consistent with the view that dual coding facilitates both retention and in-depth learning. These effects seemed strong after instruction which, given the nature of the experimental set-up and in light of the findings of Saltz and Donnenwerth-Nolan (1981), seems likely to promote imagery that is motoric. It must be acknowledged, however, that the greater efficacy of the experimental mode of instruction may have been to some degree due to its novelty.

The study reported here raises rather than answers at least five questions of relevance to pedagogy and/or lexicography:

- 1 Could a form of E&M instruction be effective with other types of word than e/m MM verbs? Liberman and Mattingly's (1985) motor theory of speech perception suggests, if somewhat indirectly, that non-MM e/m verbs such as *shout* and *screech* might be particularly learnable in this way while findings described or mentioned in Saltz and Donnenwerth-Nolan (1981) and Iacoboni (in press) imply that E&M instruction could usefully be extended beyond verbs and even as far as the level of clause.
- 2 Could E&M instruction be effective even in language classes so large that it is not possible for all students to carry out all target actions themselves? Our finding that observers can significantly profit from watching E&M presentations of new MM verbs raises this as a strong possibility.
- 3 Could filmed or animated depictions of lexical meanings be even more valuable than has hitherto been suspected (see, e.g., Dubois and Vial 2000)? This too is a possibility raised by our results on the beneficial effect of simply watching demonstrations of one kind of verbal meaning.
- 4 Do the marked differences among the test scores of participants in the experimental groups suggest that not all language learners might reap the same rewards from such E&M instruction? Perhaps degrees of ease and efficacy of dual coding vary with cognitive style (e.g. Littlemore 2001).
- 5 Can the instructional method we have outlined not merely enhance learners' ability to accurately interpret metaphoric expressions containing earlier-taught e/m verbs but also promote development of a broad metaphorical competence in the sense of Pollio and Smith (1977) and Littlemore (2001)? That is, can it help learners to interpret metaphorical expressions containing untaught motoric lexis? Our results are compatible with this possibility, but firmer evidence is certainly required.⁹

In sum, E&M instruction seems a promising vehicle for: (1) the acquisition of lexis with motoric implications; and (2) enhanced accuracy in interpreting metaphoric expressions that contain such lexis. However, its precise

scope of applicability, particularly in the latter respect, remains to be determined.

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APPENDIX 1

Examples of dictionary definitions used in the experiments

- If you **nudge** someone, you push them gently, usually with your elbow.
- When an animal **pounces** on something, it jumps on it and grabs it.
- If you **slash** something, you make a long, deep cut in it.
- If you **stumble**, you put your foot down awkwardly while you are walking or running and nearly fall over.
- When people or things **sway**, they lean or swing slowly from one side to the other.

APPENDIX 2

Examples of gapped sentences used in the experiments:

- The cat _____ on the mouse before I could do anything.
- My neighbour was dozing off, and I _____ him before the teacher noticed.
- As he got up to answer the phone, he _____ over his dog.
- He almost bled to death after _____ his wrists.
- As the band was singing a ballad, the audience _____ back and forth.

APPENDIX 3

Examples of 'evaluate-the-translation' items used in the experiments:

- At parties she pounces on every opportunity to ridicule me.
Op feestjes maakt ze van elke gelegenheid gebruik (= 'she uses every opportunity') om mij belachelijk te maken.
 - (a) exactly the same
 - (b) lacking detail because:
 - (c) quite different because:

- Most economists say that subsidies need to be slashed.
De meeste economen zeggen dat subsidies moeten worden beperkt (= 'reduced').
 (a) exactly the same
 (b) lacking detail because:
 (c) quite different because:
- After months of investigation I stumbled on a crucial piece of evidence.
Na maanden onderzoek vond ik (= 'I found') *een cruciaal bewijsstuk*.
 (a) exactly the same
 (b) lacking detail because:
 (c) quite different because:
- It is difficult for teenagers not to be swayed by fashion.
Het is moeilijk voor tieners om zich niet te laten leiden (= 'be led by') *door de mode*.
 (a) exactly the same
 (b) lacking detail because:
 (c) quite different because:
- She had nudged her husband into accepting me as their daughter's partner.
Ze had haar echtgenoot overtuigd (= 'she persuaded') *mij te aanvaarden als de partner van hun dochter*.
 (a) exactly the same
 (b) lacking detail because:
 (c) quite different because:

NOTES

- 1 Gallese *et al.* (1996) and Gallese (1999) are of the opinion that the budding theory of mirror neurons dovetails with the motor theory of speech perception as outlined in the work of Alvin Liberman (e.g. Liberman and Mattingly 1985).
- 2 Keysar *et al.* (2000) observe that their results can be interpreted as supporting the view that metaphorical processing of novel expressions instantiates conceptual source-to-target-domain mapping in the sense of Lakoff and Johnson (1980). But they also state that a similarity-based

analogical reasoning model such as that outlined in Gentner (1983) can account for the data either better or more parsimoniously. (See Murphy 1996 for an introduction to this issue.) The kind of depth of processing effects we have investigated could also occur if metaphorical processing proceeded as proposed by Gentner.

- 3 Among the compensatory strategies employed by speakers who do not know or who cannot quickly enough recall a word that they need is gesturing to indicate the meaning of an MM verb (e.g. Gulberg 1998).

- 4 A list is available from the first named author.
- 5 A third reason is that ignorance of a word in a passage is almost always equivalent to missing out on meaning. Further, Liu and Nation (1985) find that it is probably necessary to know at least 95 per cent of the word tokens in a text in order to understand it well enough to have a reasonable chance of guessing the meaning of the remaining unknown words. Nation (2001: 233) suggests that 98 per cent coverage is a more realistic prerequisite. But knowing 95 per cent, let alone 98 per cent, of the words in text after text entails learning a great many markedly uncommon words such as MM verbs—if, that is, the texts are authentic, or nearly so.

A fourth reason emerges from a recent cross-lingual comparative study of MM verbs. Behrens *et al.* (1997) find that the English-speaking two- and three-year olds they studied had 'a large vocabulary of manner verbs such as *run*, *hop*, *jump*, *skip*, *slide*, and *crawl* whereas the Romance-speaking children [had] almost no verbs of this type'. Slobin (2000) argues that the languages of the world may fall into one of two classes with respect to specification of manner of motion (i.e. movement resulting in change of location). That is, some are like Germanic and Slavic languages in that manner of motion strongly tends to be expressed by the verb itself (along with, possibly, a bound morpheme) whereas in other languages—such as Japanese, Turkish, the Romance languages—manner of motion tends to be expressed outside the main verb, if it is expressed at all—e.g. French *entrer en volant* ('enter flying' as opposed to English *fly in*). Thus, for learners whose mother tongue is not of the 'manner-of-motion verb' type, systematic teaching of at least this type of

e/m MM verb could have a much broader effect than the mere learning of this or that number of additional verbs especially if it is also true, as Slobin (2000) also maintains, that fluent speakers of languages in which these verbs play a prominent role have a strong tendency to form mental representations of common classes of events and scenes which are significantly different from those formed by speakers of languages in which these verbs have a less important role. However, our experiments could not address this issue since English and Dutch are in the same family.

- 6 On the internet at <http://jbauman.com/gsl.html>; accessed 12 August 2004.
- 7 (a) Milne (1928/71) showed the lowest frequency while Oram (1984), for pre-primary children, showed the highest, with Rowling (1997) showing a frequency of 2.0 by calculation based on an every *n*th page hand count amounting to 29 per cent of the book. Rough estimates of tokens of literal e/m manner verb frequencies in six randomly chosen novels for adults are on the order of 0.5 and in one case markedly less.

The ratio of figurative to literal uses of e/m manner verbs in all the works judged to be mainly for younger readers was estimated to be 1:10 or less, with no figurative uses being noticed in any of the works for very young children. Counts through national newspapers—from first to last page exclusive of advertisements and sports news—suggest that there the ratio of literal to figurative usage is about 1:1, with figurative uses most likely to predominate in articles on politics, society, and the economy.

There is a great deal yet to learn about such matters. For one thing, our counts raise the question of whether literal e/m MM verbs may be an especially important constituent of

texts that appeal to children and teenagers. In any case, authors such as J. K. Rowling, their publishers, and the organizations that award them prizes must assume that the manner verbs used will not cause young readers to be continually reaching for their dictionaries.

(b) Details of all the counts may be obtained from the first named author.

8 Similar figures could not be obtained for the corresponding test in experiment 1 because the students had not been asked to write their names on the test sheets.

9 One anonymous reviewer has correctly pointed out that our evidence does not itself license the conclusion that e/m instruction contributes to

metaphorical competence for the reason that under the experimental condition the observed superior description of the metaphoric usage of some of the manner-of-motion verbs (*hurl*, *slash*, and *sway* at least) could, as well, be interpreted as 'an epiphenomenon of improved understanding of the literal meanings'. For instance, a subject who has understood that slashing is a violent kind of cutting could decide that the Dutch for *reduce subsidies* is an inadequate translation of *slash subsidies* on the grounds that there is a straightforward semantic mismatch between a bland expression and a vivid one. We agree there is an issue here which merits further investigation.

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