Considerations in students' learning of anatomical terminology

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SUMMARY

Each subject discipline has its own language. Many anatomical terms are based on Latin or Greek, so students unfamiliar with either and learning anatomy for the first time often struggle with the terminology. A study was therefore conducted to investigate whether knowing the meaning of an anatomical term helped students recognise the anatomical structure, and whether identifying an associated English word assisted them to work out its meaning. Second-year biomedical science students doing a module on topographical anatomy were first presented with a list of largely unfamiliar anatomical terms and asked to give the meaning of each term and the anatomical structure it describes. On a second occasion, the students attempted to relate different terms to known English words and again tried to work out their meanings. Thirdly, they were asked whether they thought that knowing the meaning of the anatomical terms assisted their learning of anatomy. Not surprisingly, correct identification of anatomical structures that had already been introduced in the topographical module was good (65-91% of students), whereas for new terms, identification was poor (0-39%), even if their meaning was known. Giving correct meanings for the terms varied widely (0-83%), as did correctly providing a related English word (0-95%). All students thought that knowing the meaning of anatomical terms assisted their learning. The study demonstrated that these students were not adept at identifying unfamiliar anatomical terms, either directly or through association with known English words. Although student perception is that understanding is rewarded by better retention, more evidence needs to be provided before this can be confirmed.

Key words: Anatomy – Terminology – Vocabulary – Language – Learning

INTRODUCTION

Each subject discipline has its own language, which must be learnt in the process of becoming a member of that professional community. As many anatomical terms are based on Latin or Greek, languages no longer generally taught in the schools of English-speaking countries, students learning anatomy for the first time often struggle with the terminology. A study was therefore conducted to investigate whether knowing the meaning of anatomical terms helped students recognise

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the structure they describe, and whether relating them to English words assisted students to determine their meaning.

MATERIALS AND METHODS

The study consisted of three parts. Firstly, second-year biomedical science students doing a module on topographical anatomy were given a list of largely unfamiliar anatomical terms (profunda brachii, sartorius, cauda equina, serratus anterior, lateral malleolus, platysma, gastrocnemius, vagus nerve, porta hepatis, hypoglossal nerve) and asked to write down (or guess) both the meaning of the term and the anatomical structure it describes. To assist them with the task, they were given an example of an anatomical term (foramen ovale), its anatomical structure (hole in the heart) and the meaning of the words (oval (*ovale*); opening (*foramen*)). None of the students had previously studied Latin or Greek. Their approach to the task was then discussed.

A few weeks later, the same students were asked first to try and provide a common English word related to a different set of mostly unfamiliar anatomical terms, and then to write down or guess the meaning of the terms. Again, they were given an example of an anatomical term (*serratus*), a related English

word (serrated) and its meaning (serrated or jagged).

Thirdly, they were asked whether knowing the meaning of the terms assisted in their learning of anatomy and if so, to give reasons why.

RESULTS

Twenty-three students carried out the first task. Figure 1 plots the percentage of students correctly giving the meaning of the word against the percentage of students correctly identifying the anatomical structure. Correct identification of anatomical structures already introduced to the students (marked with an asterisk) all fell into the upper half of the scatter plot (65-91% of students), whereas for structures that had not yet been encountered, identification was poor (0-39%). Correct meanings for the terms ranged from 0% (e.g., *sartorius*) to 83% (*hepatis*). The scatter plot falls naturally into four quadrants. The lower left quadrant indicates the terms whose anatomical structure and meaning were both poorly identified (the largest group). The lower right quadrant indicates terms whose meanings were reasonably successfully determined, but not their anatomical structure. The upper left quadrant, with only one occu-
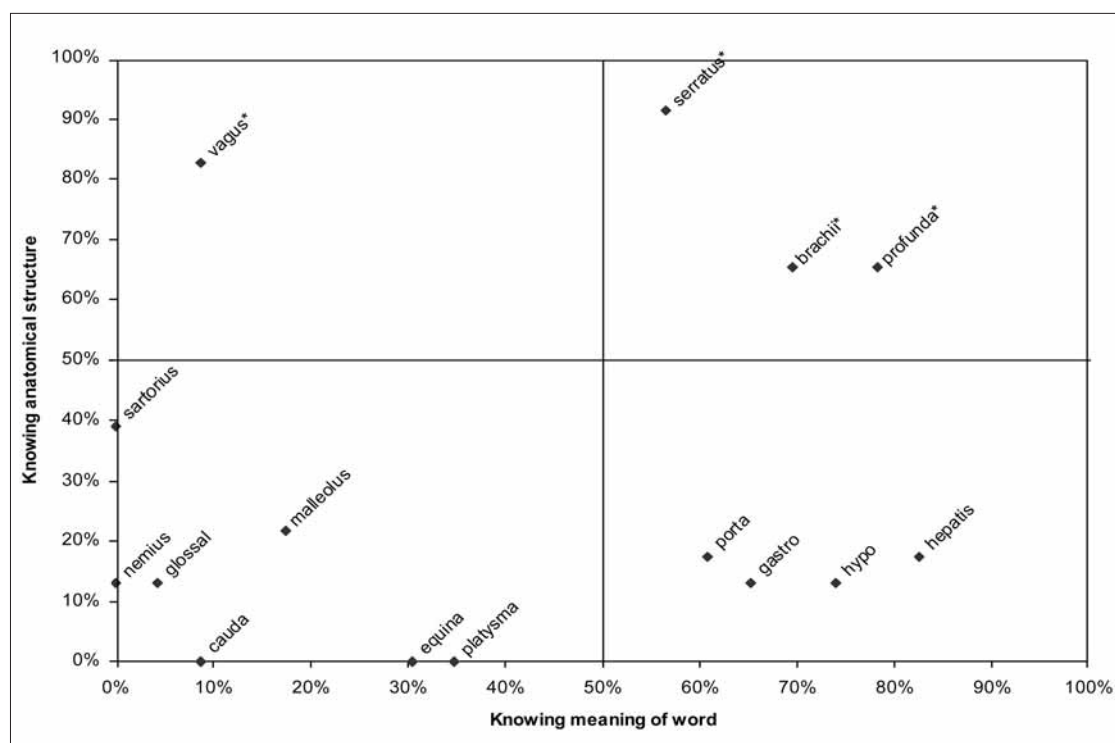

Fig. 1. Scatter plot of the percentage of students correctly giving the meaning of the component words of the anatomical term against the percentage of students correctly identifying the anatomical structure they describe.
* terms that the students had already encountered on the course.

pant, shows that the vagus nerve was well recognised as an anatomical structure, but that the students did not know the actual meaning of the word vagus. Finally, the upper right quadrant gives terms that were largely correctly identified in terms of both anatomical structure and the meaning of the component words.

The second task was performed by 19 students. Figure 2 plots the percentage of students correctly identifying an English word related to the anatomical term against the percentage of students correctly giving the meaning of the word. Providing an English word related to the anatomical term ranged from 0% (*genu*) to 95% (*dura*), while giving the correct meaning of the term ranged from 0% (e.g., *capitulum*, *genu*) to 68% (*brevis*). Although the data points are too few to draw a meaningful regression line, the general trend appears to indicate that being able to identify an associated English word makes it easier for a student to work out the meaning of the anatomical term. Also, having encountered a term previously did not necessarily improve the ability of students either to find an associated English word or define its meaning.

The students agreed without exception that knowing the meaning of anatomical terminology assisted their learning, but the reasons given varied. Some commented that it helped to distinguish between structures when there are many in one area (e.g., *brevis* and *longus*; *biceps brachii* in the arm, *biceps femoris* in the thigh). Others thought that it helped to make logical sense of anatomy. For example, knowing that *flexor digitorum profundus* is a deep flexor of the fingers was preferable to rote-learning the often long and difficult names. Knowing that there was a structure with *brevis* in the name helped them realise that there would be a related *longus*. Other comments were that knowing the meaning of the terms helped them learn what the structure is, does, or where it is located; that 'everything makes sense when you know what the words mean, especially since many are used repeatedly'; that it makes it easier to remember; and that understanding is the key to learning. One student admitted that s/he found it difficult to retain the word unless s/he came into contact with it regularly, however.

DISCUSSION

The first part of the study demonstrated that knowing the meaning of the component words of an anatomical term does not necessarily help students explain what the structure is, especially as terms may initially seem to bear little relation to the structure being
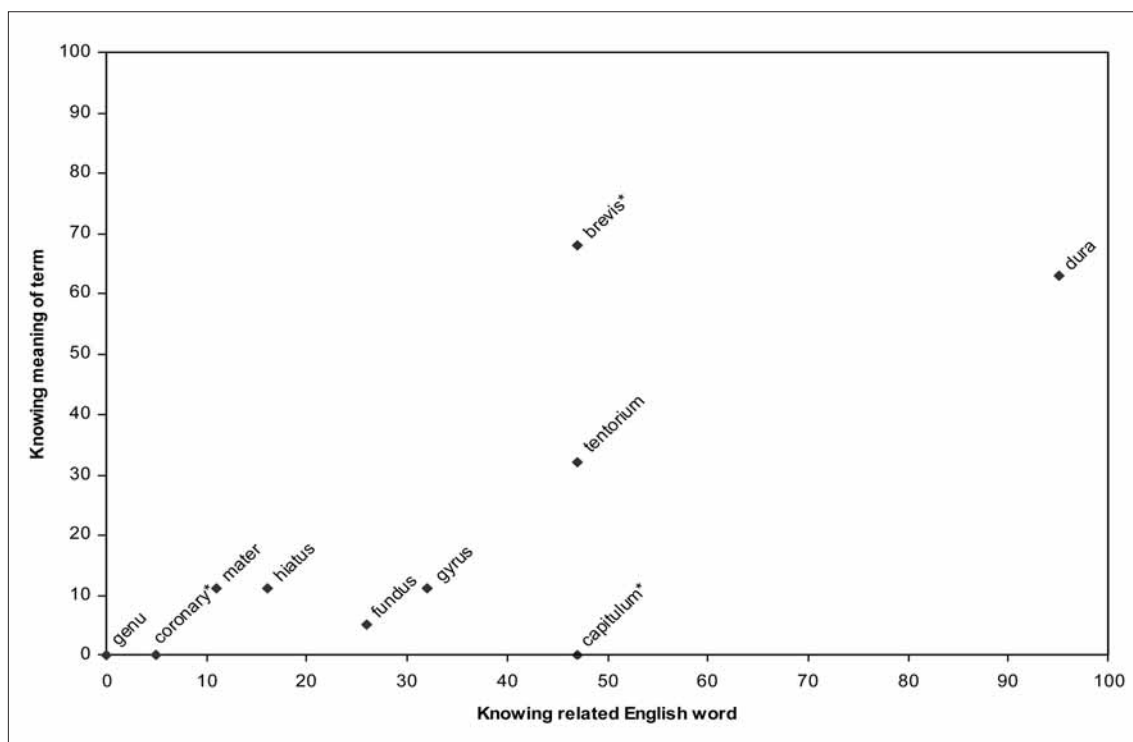

Fig. 2. Scatter plot of the percentage of students correctly identifying a common English word related to the anatomical term against the percentage of students correctly giving the meaning of the term.
* terms that the students had already encountered on the course.

described. For example, 35% of students correctly surmised that *platysma* meant flat, but not one student could name where the platysma muscle is found. It was not surprising to note that the three structures most successfully identified anatomically had all been encountered on the course already. However, knowledge of the meanings of their component words were only second (*profunda*), fourth (*brachii*), seventh (*serratus*), and twelfth (*vagus*) on the ranking of correctly identified meanings on the first list of fifteen terms. It therefore seems likely, at least in the case of the vagus nerve and serratus anterior muscle, that there was little understanding of the reason why they were so named, but the anatomical structure was still correctly identified by the majority of students. Unlike for *vagus*, the students had been told the meanings of *profunda* and *brachii*, and had encountered the terms in many different contexts (profunda brachii, biceps brachii, brachialis, flexor digitorum profundus, for example). As one of the students pointed out, terms were retained better if they were met frequently, which is probably one reason why they were better at identifying the meanings of these words. This is supported by second language vocabulary acquisition studies (Paribakht and Wesche, 1997; Stadthagen-Gonzalez et al., 2004). Other terms where the meaning was understood (*hepatis*, *hypo*, *gastro*) had probably been encountered in other courses, as they are common terms in science generally. This knowledge did not assist the students in identifying an anatomical structure containing these terms, however.

The second part of the study showed that these students were not adept at guessing the meanings of anatomical terms either directly or through association with known English words unless they had met the terms previously. Although several of them made a valiant effort to identify English words that were related to the Latin anatomical terms, many fell into the traps found commonly in second language learning such as deceptive transparency (cases of mistaken identification) (Laufer, 1997), where students, quite sensibly, but erroneously, decided that gastrocnemius was a muscle of the abdomen or stomach due to the meaning of *gastro*; or where a word was confused with a morphologically similar lexical form (genius or genus for *genu*, or matter for *mater*). Correctly identifying a related English word seemed to be a slight help in working out the meanings of anatomical terms, although this may have been because two of the terms where the students were most successful at identifying an associated English word was where the words were very similar (*dura*, *tentorium*). The terms *brevis* and *capitulum*, both of which had been introduced on the course previously, are worth consideration. 47% of the students were able to produce an English word related to *capitulum*, but none could work out its meaning. Conversely, 68% could give the correct meaning of the term *brevis*, but only 47% knew an associated English word. The reason is almost certainly that the students had previously been told its meaning, unlike *capitulum*. Interestingly, despite the term *hiatus* actually being an English word, only 2 of the 19 students knew its meaning.

Despite the results given above, the fact that all the students thought knowing the meaning of the terms assisted in their learning of anatomy may still be true. Knowing that *profunda* means deep should give them an insight into the relationship between adjacent structures. Realising that *hepatis* relates to the liver, and *brachii* to the arm should help students identify the region where structures containing these names can be found. Although knowing that *sartorius* means tailor might not help identification of this thigh muscle, understanding that the tailors of old used to sit with crossed legs where the lateral side of one ankle rests on the other thigh might help the student to remember that sartorius flexes, laterally rotates and abducts the hip joint and flexes the knee joint, the exact actions required to achieve this position. As the students explained themselves, more complicated terms such as *extensor carpi radialis brevis* become easier once translated. This should be facilitated by the fact that so many of the Latin terms are closely associated with English words, particularly if this is pointed out to the students (as with *brevis* vs. *capitulum* above). A deeper level of involvement with new vocabulary has been shown to improve retention (Laufer and Hulstijn, 2001), so perhaps learning and understanding the meanings of anatomical terms adds another strategy for remembering terminology. Hogben and Lawson (1994) have shown that multiple elaboration techniques are superior in vocabulary acquisition, at least in the short term. If this is followed by frequent repetition, the terms

should be retained more effectively (Stadtha-gen-Gonzalez et al., 2004).

The results of this study indicate that previous acquaintance with anatomical terms has a much greater effect on the students' ability to recognise both the meanings of component words and the anatomical structure they describe.

The question still to be answered is: Does knowing the meaning of anatomical terms improve retention of anatomy? There is no empirical evidence from this study to determine this, although the students' perception is that it is true. Future studies might compare retention of anatomical terms whose meaning is known with those whose meaning is not. This may provide evidence to establish whether knowing the meaning of an anatomical term really does improve a student's ability to remember its structure.

REFERENCES

HOGBEN D and LAWSON MJ (1994). Keyword and multiple elaboration strategies for vocabulary acquisition in foreign language learning. *Contemporary Educ Psychol*, 19: 367-376.

LAUFER B (1997). The lexical plight in second language reading: Words you don't know, words you think you know, and words you can't guess. In: Coady J, Huckin T (eds). *Second language vocabulary acquisition: a rationale for pedagogy*. Cambridge University Press, Cambridge.

LAUFER B and HULSTIJN J (2001). Incidental vocabulary acquisition in a second language: the construct of task-induced involvement. *Applied Linguistics*, 22: 1-26.

PARIBAKHT TS and WESCHE M (1997). Vocabulary enhancement activities and reading for meaning in second language vocabulary acquisition. In: Coady J, Huckin T (eds). *Second language vocabulary acquisition: a rationale for pedagogy*. Cambridge University Press, Cambridge.

STADTHAGEN-GONZALEZ H, BOWERS JS and DAMIAN MF (2004). Age-of-acquisition effects in visual word recognition: evidence from expert vocabularies. *Cognition*, 93: B11-B26.