PREDICTING TRANSFERABILITY FROM SEMANTIC SPACE:  
AN INVESTIGATION OF TRANSLATION PREFERENCES FOR A POLYSEMOUS WORD

ERIC KELLERMAN

Nijmegen University the Netherlands

Introduction

In Kellerman (1977) an attempt was made to characterize a ‘strategy of transfer’ in second language learning and performance, whereby a learner with a given native language (NL) could use that language to make predictions about the target language (TL), transferring NL forms and features whenever it was felt that they could be successfully employed in the TL (‘projection’), with suitable adjustment being made according to the supposed constraints imposed by TL surface structure (‘conversion’). The learner could ‘project’ a) so as to fill a perceived gap in his knowledge of the TL, or b) because he believes that NL and TL are to all intents and purposes identical either in very specific detail or in more general terms. Much will presumably depend on the learner’s notion of the ‘distance’ between NL and TL; the closer the TL is felt to be to the NL, the more useful a strategy of transfer is likely to be.

In the same paper, it was pointed out that if the learner did not believe that a particular NL form or feature could have a parallel existence in the TL, he would not, in the normal run of things, transfer. Thus for a given learner with a given TL, it would be theoretically possible at a given moment to list those items in his NL that he considered ‘language-specific’ and thus not transferable to the given TL, and those he considered ‘language-neutral’, i.e. transferable to the given TL. The TL itself is important here, since NL items should not necessarily be seen as inherently either transferable or non-

1 An earlier version of this paper appeared in Working Papers on Bilingualism 15, 1978, under the title ‘Giving learners a break’. The present version has been considerably revised.
The fact that idiom translations are not seen as feasible between two such close languages as Dutch and English indicates that learners are sensitive to the special nature of such lexical phenomena. If such intuitions about the specificity of these expressions were to be found exclusively amongst advanced learners, we might say that teaching methods, with their accent on language differences, were responsible. But it seems rather more generally true, irrespective of the level of proficiency of the Dutch learner of English at least: true for university students, and doctors, nurses and other professional people brushing up their English at evening classes, and, as we shall see, even true for quite young schoolchildren.

The reactions to what appear to be gross translations of Dutch idioms into English are interesting, in that they can provoke quite marked responses. Such apparent calques are stigmatised as ‘silly’, ‘ridiculous’, ‘too Dutch’, ‘impossible in English’, or are greeted with snigger. The strength of the reaction can perhaps be gauged from the following dialogue - which is based on an actual classroom incident:

Teacher: “out + verb” is very productive in English, not like Dutch, where you can only say ‘I ran him out of it’ which not everybody agrees is acceptable Dutch. You can outrun, outjump, outthink, outplay, outdrink, you know, outdrink someone - you can drink him under the table...”

Student at evening class (brushing up her school English for professional purposes): Excuse me, but what is the correct English for that expression?

Teacher: Sorry?

Student: The correct English for the Dutch expression....

Teacher: What Dutch expression?

Student: Ik dink onder de tafel drinken.

Teacher: Is that Dutch too?

The mutual mystification evident from the above seems to indicate that learners assign special status to idioms. An idiom is very often semantically intractable to non-natives and may reveal syntactic idiosyncrasies as well. It may have special neurological status too, like many of the types of items listed under the heading of ‘language-specific’ above (see Van Lancker 1979). It would be convenient to say that, psychologically speaking, idioms are ‘marked’2 structures in one’s native language. From here it is not difficult...

1 Note that contrary to normal practice, ‘markedness’ as used in this paper does not presuppose a purely binary opposition ‘marked/unmarked’. It is to be understood as a psycholinguistic concept, applicable to some defined linguistic system (i.e. syntactic structures or, as here, the sense of polysemous words) which is itself gradable in terms of ‘most marked—least marked’. Alternative terms have been used by the author in
to follow a line of reasoning that would assume that if idioms were already 'special' in one's own language, the likelihood of finding parallels in the language one is learning would be remote. Hence the more 'marked' an item, the less transferable it should be.

So far the discussion has limited itself to idiomatic expressions and such notions as language-distance, specificity, neutrality, transferability and 'markedness'. A more rigorous examination of the relationship between intuitions about 'markedness' and transferability would involve more extensive and perhaps more homogeneous material. With such material it might be possible to establish a 'markedness' gradient which would be of greater interest than the almost uniformly highly marked idioms. The 'markedness' gradient could then be used to predict the differential transferability of the items. If we may now formulate a working hypothesis, there should be a strong correlation between the degree of markedness and relative transferability.

A lexical item whose meaning varies according to linguistic context is ideal material for such an investigation. Such a 'word' may cover intuitively quite distinct meanings, or metaphorical extensions of a basic concrete sense, or senses with more subtle shades of meaning. A 'word' that fills the bill adequately is the verb BREAK and its Dutch counterpart, BREKEN. This is not the place to go into discussion about homonymy and polysemy, but the sorts of senses subsumed under BREAK in English are extensive, even excluding phrasal, prepositional or phrasal-prepositional forms, viz:

He broke the cup.
He broke his leg.
My radio's broken.
The waves broke on the shore,
His fall was broken by a tree.
He broke his journey in Delhi.
Jane broke his heart.
They are always breaking promises (appointments) the law.
At last they broke the enemy code.
'The man who broke the bank at Monte Carlo'.
He broke wind.

early papers, but have now been rejected as unsatisfactory for one reason or another. The term 'markedness' may not be the last word either.

This will also follow that the more 'marked' an item, the more likely it is to be judged 'specific'. It should again be noted that 'specificity' is an all-or-nothing statement about behaviour ('transferred or not transferred') while 'transferability' is a statement of probability.

This is a convenient overgeneralisation. Idiomatic expressions vary in their semantic transparency and there appears to be some moderate correlation between their transparency and their acceptability in translation.
University
Second-year students, tested at end of academic year (NU2), N=26
First-year students, 1976—1977, tested at end of academic year (NU1), N=50
First-year students, 1977—78, tested at beginning of academic year (NU0), N=35

Secondary school
Sixth-year pupils (A6), N=17
Fifth-year pupils (A5), N=23
Fourth-year pupils (A4), N=18
Third-year pupils (A3), N=20
Second-year pupils (A2), N=23

Subjects were given nine Dutch sentences containing a sense of BREKEN
The instructions were simple. If subjects thought the sense of BREKEN
illustrated by a particular sentence could be translated into English by BREAK,
they were to mark the sentence with a cross. Otherwise they were to do nothing.
The nine sentences (with the italicized word in English serving as mnemonic
for the Dutch sense) were as follows:

1. de golven braken op de rotsen (the waves broke on the rocks)
2. zijn stem brak toen hij 13 was (his voice broke when he was 13)
3. het kopje brak (the cup broke)
4. zijn val werd door een boom gebroken (his fall was broken by a tree)
5. hij brak zijn woord (he broke his word)
6. na het ongeluk is hij een gebroken man geworden
   (after the accident, he was a broken man)
7. hij brak zijn been (he broke his leg)
8. zijn brak het wereldrecord (she broke the world record)
9. zijn brak zijn hart (she broke his heart)

Every acceptance of BREKEN = BREAK was counted for each item,
yielding the group scores and rank orders:
The second phase is essentially the same, except that the number of BREKENs
is increased from 9 to 17. This brings with it obvious benefits for testing the
hypothesis, and will bear particularly on the collection and processing of
native speaker intuitions, as we shall see.

Subjects (N=81) were drawn randomly from Dutch first and third year
students of English at Utrecht University. The first-year group (UT1) con-
isted of 50 subjects, the third-year group (UT3) of 31. The following 17
sentences were used (with the original 9 being marked by an asterisk):

*a1. De golven braken op de rotsen (The waves broke on the rocks)
   2. De lichtstralen braken in het water (The light rays refract in water)
*6. Zij brak zijn hart (She broke his heart)
*7. Hij brak zijn woord (He broke his word)
8. De man brak zijn eed (The man broke his oath)
9. Welk land heeft de wapenstilstand gebroken! (Which country has broken the ceasefire?)
10. Sommige arbeiders hebben destaking gebroken (Some workers have broken the strike)
11. Nood breekt wet ('Necessity breaks law')
12. Da kwij een paar grapjes was het ijs eindelijk gebroken (Thanks to a few jokes the ice was finally broken)
13. Een spelletje zou de middag enigszins breken (A game would break up the afternoon a bit)
*14. Zij brak het wereldrecord (She broke the world record)
*15. Zijn stem brak toen hij 13 was (His voice broke when he was 13)
*16. Zijn val werd door een boom gebroken (His fall was broken by a tree)
17. Het ondergrondse verzet werd gebroken (The underground resistance was broken)

Of the additional sentences, nos. 2 and 11 have no direct English equivalents. The latter, a Dutch proverb, is odd in that the normal word used for breaking the law is not BREKEN but overtreden (infringe).

The group acceptance figures, expressed in percentages of total possible acceptances, are as follows (raw scores in brackets):

<table>
<thead>
<tr>
<th></th>
<th>UT3</th>
<th>UT1</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>55</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>(17)</td>
<td>(18)</td>
<td>(35)</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>(9 )</td>
<td>(8 )</td>
<td>(17)</td>
</tr>
<tr>
<td>3</td>
<td>74</td>
<td>82</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>(23)</td>
<td>(41)</td>
<td>(64)</td>
</tr>
<tr>
<td>4</td>
<td>19</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>(6 )</td>
<td>(11)</td>
<td>(17)</td>
</tr>
<tr>
<td>5</td>
<td>88</td>
<td>78</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>(21)</td>
<td>(39)</td>
<td>(60)</td>
</tr>
<tr>
<td>6</td>
<td>77</td>
<td>74</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>(24)</td>
<td>(37)</td>
<td>(61)</td>
</tr>
<tr>
<td>7</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>(31)</td>
<td>(90)</td>
<td>(81)</td>
</tr>
<tr>
<td>8</td>
<td>71</td>
<td>58</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>(22)</td>
<td>(29)</td>
<td>(51)</td>
</tr>
</tbody>
</table>

Table 3. Acceptance scores, Utrecht, for BREKEN—BREAK

These figures give the following rank orders, ranging from 'most acceptable' to 'least acceptable':

<table>
<thead>
<tr>
<th>UT3</th>
<th>UT1</th>
<th>OVERALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>log*</td>
<td>log*</td>
</tr>
<tr>
<td>2</td>
<td>heart*</td>
<td>heart*</td>
</tr>
<tr>
<td>3</td>
<td>man*</td>
<td>cup*</td>
</tr>
<tr>
<td>4</td>
<td>cup*</td>
<td>word*</td>
</tr>
<tr>
<td>5</td>
<td>record*</td>
<td>man*</td>
</tr>
<tr>
<td>6</td>
<td>word*</td>
<td>oath*</td>
</tr>
<tr>
<td>7</td>
<td>oath*</td>
<td>record*</td>
</tr>
<tr>
<td>8</td>
<td>waves*</td>
<td>waves*</td>
</tr>
<tr>
<td>9</td>
<td>ice</td>
<td>law</td>
</tr>
<tr>
<td>10</td>
<td>law</td>
<td>ceasefire</td>
</tr>
<tr>
<td>11</td>
<td>ceasefire</td>
<td>resistance</td>
</tr>
<tr>
<td>12</td>
<td>light rays</td>
<td>ice</td>
</tr>
<tr>
<td>13</td>
<td>voice*</td>
<td>light rays</td>
</tr>
<tr>
<td>14</td>
<td>fall*</td>
<td>fall*</td>
</tr>
<tr>
<td>15</td>
<td>resistance</td>
<td>voice*</td>
</tr>
<tr>
<td>16</td>
<td>game</td>
<td>game</td>
</tr>
<tr>
<td>17</td>
<td>strike</td>
<td>strike</td>
</tr>
</tbody>
</table>

Table 4. Rank orders of acceptance scores, Utrecht (items also appearing in previous experiment marked with an *)

The rank-order correlation between the two groups is high (Spearman's rho = -0.919, significant <.01).
Comparison of results of the transferability experiments

If we compare the ranking of the nine original items across all ten groups in the experiments, it will be clear that the Utrecht sample is not substantially different in its behaviour from the earlier sample. Kendall's coefficient of concordance, W, based on the rank orders of the nine original items for the ten groups, is .9047, significant at < .01. Thus the rank orders are very closely related to each other.

What is therefore noteworthy is this consistency between groups, despite the range of ages and experience in the sample. The conclusion one must reach is that the ten groups are drawn from essentially the same population, qualitatively speaking, and that the effects of teaching, learning and growing older do not significantly alter learners' beliefs about the relative transferability of the BREKENs. Clearly we are dealing with an implicational series of items of considerable generality. The overall rank order for all 291 subjects is:

1. leg
2. heart
3. cut
4. man
5. word
6. record
7. waves
8. fall
9. voice

| Table 5 | Overall rank order of transferability for ten groups. |

One interesting feature in the results of the two samples deserves comment. It is evident that there is a certain discrepancy in the scores relating to 'leg' and 'cup' in groups NU1, NUO, UT3 and UT1, and to some extent in A6 and NU2. This discrepancy is not noted in the scores of the other groups. Thus the 'university group' (including A6) tends to find BREKEN - BREAK more acceptable for 'hij brak zijn been' than for 'het kopje brak', the difference in treatment of the two items being statistically significant (t = 7.142, p < .01). A possible explanation for this phenomenon resides in the difference between causative and non-causative BREKEN/BREAK, with the former being adjudged 'unmarked' relative to the latter. This point is discussed at some length in Kellerman (1979).a

b. Gathering native speaker intuitions

How native speakers perceive the inter-relatedness of the meanings of BREAK or BREAKEN will be crucial for assigning the appropriate degree of 'markedness' to each sense. From these native speaker intuitions, it will be possible to construct a semantic space (see, e.g., Clark and Clark 1977) from which the dimensions along which judgements of inter-relatedness are made, may be revealed.

To arrive at a representation of such a semantic space, a sample of native speakers is required to make judgements about the similarity of the senses to each other. These judgements can take various forms, but a point in common is that all such judgements should be convertible to numerical values. The goal is to arrive at a similarity matrix, where judgements of similarity are converted to distance scores. All this means is that subjects may be asked to rate similarity according to a given scale, say 1-5, where '1' could mean 'identical in meaning' and '5' totally unrelated in meaning'. Thus for any pair of meanings, similarity can be expressed as the sum of the ratings for that pair in a given sample.

In the experiments reported here, this method of paired comparisons was not used, as pre-testing had shown it to be difficult, unreliable and tiring where polysemy was concerned. Instead, use was made of Miller's card sorting method for gathering similarity data (Miller 1969). This method was developed by Miller to investigate the structure of the mental lexicon.

In his study, subjects were asked to sort 48 nouns, typed separately on cards, into piles according to 'similarity of meaning'. The subject could form as many or as few piles as he liked, with as few or as many cards as he chose in each pile. It is Miller's contention that people will sort cards together according to shared semantic features, thus overlooking the features that would normally distinguish one noun from another; thus by pooling data from a number of subjects the number of times a given pair of nouns appeared together in the same pile (with 50 subjects the theoretical maximum is 50) can be seen as a measure of similarity of the two items. The higher the number, the greater the subjects adjudged the similarity of meaning.

50 native speakers of Dutch (all either students or staff in the Faculty of Letters at the University of Nijmegen) took part in this investigation. The subjects were presented with 17 cards, on each of which was written a sentence illustrating a sense of BREKEN. The 17 sentences were those used in the second transferability experiment. Subjects sorted cards into piles according to their individual notions of similarity. The number of piles made by subjects varied from 2 to 15, with an average of 7.28 and a standard deviation of 2.95; some subjects finished in five minutes, others in twenty.

From the data produced by card sorting, a matrix of similarity scores was produced, based on the number of items subjects had put any two cards...
in the same pile. The matrix is as follows:

<table>
<thead>
<tr>
<th></th>
<th>1 waves</th>
<th>2 light rays</th>
<th>3 cup</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>13</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>17</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 6: Similarity matrix of meanings of BREAK

This matrix was submitted to computer analysis by the MINISSA program (July 1977 version, developed by E. Roskam, Nijmegen, J. Lingoes, Michigan, and M. Raeljmakers, Nijmegen), which scales the data so as to reveal their underlying structure in terms of an n-dimensional Euclidean representation of 'semantic space' (see for instance Caramazza and Grober 1976, or Hanley 1969). The smaller the number of dimensions the easier it is to interpret the dimensions, but the higher the risk of unacceptable stress (Kruskal 1964), a statistical measure of the 'violence' being done to the data by reduction in the number of dimensions. The stress can be expected to increase as the dimensionality decreases. In our case, two and three-dimensional solutions can be obtained without any intolerable degree of stress. In the case of the 3-D solution, the third dimension to be revealed (and therefore the least important in terms of underlying structure) could not be interpreted and is therefore not shown below. In the 2-D solution, this third dimension of course disappears altogether, with only a minimal increase in stress:

![Diagram](image)

Fig. 1. Multidimensional scaling of 17 BREAKS — 3-D solution (after orthogonal rotation of axes)

After orthogonal rotation of the axes, two possible interpretations of the dimensions presented themselves. The first dimension to be revealed, thus the most significant in terms of underlying structure, runs West-East in both solutions. This has been labelled 'concreteness', though it could equally well be labelled 'high imagery — low imagery' as we move from left to right. The North-South dimension has been labelled 'markedness', since it appears to arrange the senses according to their relatedness to the 'primary' sense of BREAK. In this interpretation, 'to break someone's heart' is simply a metaphorical extension of the primary meaning — the heart, symbol of happiness of whatever, is broken in two. It will be clear that this is not the same as saying that senses like heart are adjudged very similar to the primary sense. On the contrary; the Euclidean distance between 'heart' (6) and, say, 'cup'...
Predicting transferability

Fig. 2. Multidimensional scaling of 17 BREKENs - 2-D solution (after orthogonal rotation of axes)

(4) is greater than between 'cup' and three other items (waves, light rays and ice), which are judged more similar to 'cup', yet are more 'marked' than 'heart'. We return to the question of rotation in the next section.

The predictive power of the putative 'markedness' dimension for the transferability of the BREKENs

We now have three sets of data:

a) transferability judgements for nine senses of BREKEN made by 291 subjects (NU2, NU1, NU0, UT3, UT1, A6-A2).
b) transferability judgements for seventeen senses of BREKEN (including the original nine) made by 81 subjects (UT3, UT1)
c) multidimensional scaling solutions for native speaker similarity judgements of seventeen BREKENs.

Clearly, to show that transferability is a function of 'markedness' it will be necessary to demonstrate some kind of relationship between the transferability scores and the semantic spaces revealed by multidimensional scaling. To do this it will prove necessary to rotate the axes orthogonally so that there is eventually an optimum correlation between the ordering of the senses along one dimension and in the transferability data, without destroying the plausibility of the hypothesized dimensions. An examination of Figs. 1 and 2, after optimal rotation, will show this to be the case. Here are the orderings of the senses along the concreteness/imagery dimension:

<table>
<thead>
<tr>
<th>2D meaning</th>
<th>rank order</th>
<th>2D meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>cup</td>
<td>1</td>
<td>cup</td>
</tr>
<tr>
<td>leg</td>
<td>2</td>
<td>leg</td>
</tr>
<tr>
<td>light rays</td>
<td>3</td>
<td>fall</td>
</tr>
<tr>
<td>waves</td>
<td>4</td>
<td>waves</td>
</tr>
<tr>
<td>fall</td>
<td>5</td>
<td>light rays</td>
</tr>
<tr>
<td>voice</td>
<td>6</td>
<td>voice</td>
</tr>
<tr>
<td>ice</td>
<td>7</td>
<td>game</td>
</tr>
<tr>
<td>man</td>
<td>8</td>
<td>ice</td>
</tr>
<tr>
<td>game</td>
<td>9</td>
<td>record</td>
</tr>
<tr>
<td>record</td>
<td>10</td>
<td>resistance</td>
</tr>
<tr>
<td>heart</td>
<td>11</td>
<td>heart</td>
</tr>
<tr>
<td>strike</td>
<td>12</td>
<td>man</td>
</tr>
<tr>
<td>ceasefire</td>
<td>13</td>
<td>ceasefire</td>
</tr>
<tr>
<td>oath</td>
<td>14</td>
<td>oath</td>
</tr>
<tr>
<td>word</td>
<td>15</td>
<td>word</td>
</tr>
<tr>
<td>law</td>
<td>16</td>
<td>law</td>
</tr>
<tr>
<td>law</td>
<td>17</td>
<td>strike</td>
</tr>
</tbody>
</table>

Table 7. Rank orders of meanings along a putative concreteness/imagery dimension, three- and two-dimensional solutions.

It will be seen that the first six senses in both solutions are clearly 'perceivable' senses which is consistent with an 'imagery' or 'concreteness' structure. The 'markedness' ordering is as follows:

<table>
<thead>
<tr>
<th>3D meaning</th>
<th>rank order</th>
<th>2D meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>leg</td>
<td>1</td>
<td>leg</td>
</tr>
<tr>
<td>cup</td>
<td>2</td>
<td>cup</td>
</tr>
<tr>
<td>strike</td>
<td>3</td>
<td>man</td>
</tr>
<tr>
<td>man</td>
<td>4</td>
<td>heart</td>
</tr>
<tr>
<td>heart</td>
<td>5</td>
<td>waves</td>
</tr>
<tr>
<td>word</td>
<td>6</td>
<td>light rays</td>
</tr>
<tr>
<td>waves</td>
<td>7</td>
<td>ice</td>
</tr>
<tr>
<td>oath</td>
<td>8</td>
<td>word</td>
</tr>
<tr>
<td>light rays</td>
<td>9</td>
<td>oath</td>
</tr>
<tr>
<td>ceasefire</td>
<td>10</td>
<td>law</td>
</tr>
<tr>
<td>law</td>
<td>11</td>
<td>record</td>
</tr>
<tr>
<td>oath</td>
<td>12</td>
<td>fall</td>
</tr>
<tr>
<td>resistance</td>
<td>13</td>
<td>voice</td>
</tr>
</tbody>
</table>
Here it is clear that the two-dimensional solution gives very much better results. However, "strike" seems unnaturally high on the 'markedness' dimension in the three-dimensional solution. That is more it is of low transferability. The effect of this item on the correlation is substantial, and if it is removed, the resultant rank orders of 16 items correlate extremely highly:

<table>
<thead>
<tr>
<th>p</th>
<th>sign level</th>
</tr>
</thead>
<tbody>
<tr>
<td>.920</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>.887</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>

Table 11. Significance level of rank order correlations between markedness dimension from 3-D solution and transferability data after the removal of strike.

If we now calculate the rank-order correlations between the concreteness/imagery dimensions and the transferability data for the seventeen items (totalled up from UT3+UT1 for convenience), there is virtually no correlation at all (3-D solution and transferability, \(p=0.057\), n.s., 2-D solution and transferability, \(p=0.129\), n.s.).

The effect of the target language on transferability

The preceding discussion will have indicated that transferability is theoretically independent of the TL, since it is a direct reflection of the 'markedness' of a NJ item. If the TL's role is to partially determine the cut-off point in a transferability scale below which transfer will tend not to occur but not to affect the ordering of that scale, then the scaling solutions used here should also correlate with the translation preferences of Dutch learners of German.

40 Dutch learners of German at Nijmegen (1st and 3rd year students) were given the nine-item transferability test; the instructions were modified to take German grammar into account so that subjects could accept either ZERBRECHEN or BRECHEN as a translation of BREKEN, or reject them both.

The resulting transferability rank order, based on acceptances, is:

1. cup 100
2. leg 100
3. heart 92.5
4. word 92.5
5. man 90
6. waves 87.5
7. voice 87.5
8. record 85
9. fall 82.5

Table 12. Transferability rank order for Dutch learners of German.
Correlation with the 'markedness' rank orders is as follows (Kendall’s S):

<table>
<thead>
<tr>
<th></th>
<th>II</th>
<th>sig</th>
<th>III</th>
<th>sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>24</td>
<td>&lt; .01</td>
<td>24</td>
<td>&lt; .01</td>
</tr>
</tbody>
</table>

Table 12. Significance level of correlations between rank orders of 'markedness' and rank orders from transferability data for nine senses, using Kendall’s measure of disarray (S)

Discussions and Conclusions

The results given above show that for BREKEN, the transferability of its senses can be predicted from analysis of similarity judgements, which can be used to construct a low-sentiment semantic space of two or three dimensions. Two of the dimensions can be interpreted as, on the one hand, high-low imagery or 'concrete-abstract', and as 'markedness' on the other. Whereas it is perhaps clear what the former dimension entails, a little space should now be devoted to discussion of the latter.

A number of speculations can be made to account for the above findings. The first is that all of these 'primary sense' of BREKEN/BREAK as represented in such a sentence as 'he broke the cup'. The closer a sense is to this primary sense, the more salient it should be. The problem lies with the definition of 'closeness' one is going to adopt, since similarity itself does not directly predict transferability. Since senses of BREKEN used in non-concrete environments ('hearts', 'man' etc.) can be more transferable than concrete BREKENS like 'voice' or 'fall', it is clear that the structure underlying the data from card sorting reveals a more complex arrangement of items. It is insufficient to say that the 'markedness' dimension is the other (weaker) component underlying the sorting data, without some explanation being offered as to what it is and why it should correlate so well with transferability data. One possibility would be that primary BREAK consists of a bundle of semantic features like 'of solid', 'brittle', 'needs force'. Whenever BREAK is collocated with an object which itself can match these features, then the primary meaning will be inferred. Metaphorical interpretations of senses will be postponed and subsidiary to feature matching. In this scheme, certain metaphorical senses would violate the feature matching condition to a lesser extent than some concrete senses. 'Waves', for instance, are neither solid nor brittle, though they can be metaphorically solidified ('a tidal wave like a solid wall of water'); 'fall would seem to share no obvious features with 'cup', apart from 'perceivable'. 'Word' would require that one 'solidify' it—a difficult conceptual task not to be found with 'heart' or 'man'. The question with this kind of approach is how far one can go positing 'metaphorical solids'. The greatest problems will occur with senses like 'he broke the news' or 'the storm broke'—unless it would be simpler to claim homonymy for the difficult cases—a tempting claim.

Caramza and Grober (1971) have argued for an underlying 'core' meaning for all the senses of line they studied. They claim that surface meaning would be built up from a 'core' meaning by a number of instruction rules. The greater the number of rules the more complex the processing involved with that sense, and the less likely it is to be cited as 'typical' or 'representative'. Miller’s approach is similar, using line as his example, he writes:

the problem is to characterize the relations between this core sense and all
the particular sense of line listed in the dictionary. Those relations should not be
specific to line, but should apply to other semantic extensions elsewhere in the lexicon,
in which case they might be formulated as rules that people learn when they
master their English vocabulary (1978:101).

Miller’s discussion, which closely resembles Kelly and Stone’s (1976) in many respects, revolves round the question of how one goes about selecting
the appropriate rule or rules for correct interpretation. Having a limited number
of core concepts which can be summoned up by a particular context
would, he claims, be far more plausible than having to store endless separate
meanings for each occurrence of the word in a different context. The context,
linguistic and pragmatic, will effectively select the right sense for us—and
Miller says, it would be distinctly odd to have to execute a disambiguation
decision to discover whether the context is the nautical kind in which line
might be understood as 'rope' (1978:102) when one is discussing the rescue of
a drowning woman. Miller goes on to say that the apparent polysemacy of
line may be due to lexicographers including 'a lot of contextual information
that is really not part of its meaning' (1978:102). He notes that

the inferential process seems more plausible than an ad hoc list of... objects... In
some cases the set of admissible subjects or objects of a verb seem to form a coherent
class that can simply be remembered. But in other cases—and probably in most cases
for young children—instances based on conceptual knowledge and prevailing circumstances
are the ultimate court of appeal (1978:499–510; see also Kelly and Stone 1975:65f).

One could invoke here the concept of syncretism, which is discussed
in e.g. Kelly and Stone (1975), and Miller (1977), where the precise meaning
of a word like good is determined by the nouns it qualifies, e.g. a good knife
cuts well, a good chair is comfortable etc. Miller writes:

"good can select a salient feature of the meaning of its noun and assign a positive
value to that feature" (1978:405).

Presumably one might try to argue on similar lines for BREAK, though
it would be difficult to account for every sense of the word in this way (consider
for instance a principle like 'BREAK puts an end to the continued existence
of some given entity'—how would this apply to 'she broke the news' or
"the storm broke")?

Perhaps there is a compromise position which tends to favour Miller’s...
'static' position rather than Caramazza and Grober's 'dynamic' one. This would be as follows: senses are learned as part of conventional collocations in some cases, and as generalisable concepts in others. Thus the child can learn to generalise from 'breaking cups' to all manner of 'breakable' objects. But other senses are only evoked in collocations where the meaning is ritualised, as in 'to break one's word', or 'to break somebody's heart'. It will not normally be necessary for there to be a cognitive link between these 'breaks' and generalisable ones. However, when the child, or learner of a foreign language, or reader of some idiosyncratic dialect, comes across what is for him a novel environment for a word, and an attempt is made to interpret it, then rapid scanning of 'core' concepts will take place, with the help of pragmatic knowledge - the 'ultimate court of appeal'. I would argue against the generalisability of all 'core' concepts to new cases, on the basis of differences between typologically close languages. Take the sense of BREAK as typified in 'to break one's word, an agreement, the rules, the law, an appointment, a contract, a code of behaviour, cease-fire etc., e.g. to violate some sort of agreement, or set of rules binding parties. In Dutch, the generalisability of BREAKEN is limited to 'agreement', 'contract' and 'word'. The generalisability of a sense to new cases will be ad hoc - first we learn its meaning, then we have it available for building up interpretation rules. But unlike objects like 'cup', the generalisation may only be receptive, that is, we do not use it produce new forms before we have heard them and they have impinged on our consciousness.

To illustrate the point, let us look at what would be a novel use of BREAK in English, but one which is interpretable nonetheless:

his life broke

By itself, a number of interpretations might be possible for this use of BREAK. Put in the following context, however, the interpretations seem, on the basis of informal elicitation, to reduce to one or two:

Finally, at the age of 21, his life broke.

1 As Kelly and Stone (1975) point out, we do perhaps suffer by an obsession with analysis of meaning at the morpheme level. They say 'dictionaries often exaggerate the polysemy of a word by attributing to it the meaning of phrases in which it appears -- both idiom and common locutions'.

2 Dollinger (1976), in a highly entertaining and instructive article, makes the general point very convincingly: "The question is: why do we not generate *an extended time ago if we generate a lifetime ago, and why do we not generate *sometime else if we generate somewhere else? It is not because the generative mechanism is lacking. I suggest that as least in part we do not do it because we have not heard it done. We have no memory of it."

Also: "... learning goes on constantly - but especially with young children - in segments of collocation size as much as it does in segments of word size, and that much if not most of our labor manipulative grasp of words is by way of analysis of collocations" (Bolinger 1976:8). See also the ensuing discussion of to 'bear' on p. 9 of this same article.

This sentence has been interpreted for me either as meaning 'changed for the better' or 'changed for the worse'. Yet if we simply change '21' to '86':

Finally, at the age of 96, his life broke.

The interpretation shifts from 'changed' to 'ended' - in other words 'he died'. Only pragmatic considerations can lead to this shift in interpretation, which also highlights the potential ambiguity of 'life' - 'period of biological activity' or 'history of personal events in that life'. The main point is still that some sort of drumming up of available concepts must take place (combined with practical knowledge) to reach an appropriate interpretation. However, the generalisability of such concepts to potential collocations is restricted by convention. For this reason, lexicographers should not be put off by psycho-economists from preparing their involved dictionary entries for words like 'line' or 'break'. (It would be interesting to see what kinds of overgeneralisation occur in children 'neo-collocations').

A further point to consider is that there may be no single underlying organisational system for handling the diverse 'core' meanings of a polysemous word. For BREAK one could argue for a 'primary' sense to which all the others are variously related - a number of 'core' senses; this primary sense is a surface, not an underlying one. For 'line', an underlying 'core' concept is perhaps more likely, since it is difficult to agree upon a 'primary' sense. And for 'eye' (Kellerman, 1980), it would only make sense to have a 'primary' sense, features of which are variously shared with extensions of meaning to concrete objects (eye of needle, electronic eye, etc.). Perhaps in the case of BREAK we should even be thinking in terms of actual homonymy, with 'cups', 'hearts', and 'legs' representing one discrete meaning. There is certainly a degree of discomfort about the entry for the verb BREAK in Kelly and Stone's (1975) 'disambiguation dictionary', viz.:

Sense 1: To fracture, split, stop or cause to stop functioning, cause a division or change, enter forcibly, escape, begin sudenly, interrupt, etc.

Sense 2: (Idiom) break the news
Sense 3: (Idiom) break a law

Since Kelly and Stone argue for a small member of 'core' senses being appropriately interpreted in situ it is a pity that their own entries for this verb are woefully inadequate. If there is a unifying sense in Sense 1, it escapes the present author. A more interesting proposal of theirs is to develop evidence of parallel sense-development in separate languages... as this would suggest the operation of "cognitive universals" (1975:77).

A quick survey of 9 dictionaries reveals that 7 give as their first definition of line 'piece of string, thread, cord' etc. Only two list 'mark or storks' first.
This last proposal really brings us back to the experiments described above. Historical comparisons of meaning extensions are complex, and ways must be found, as Kelly and Stone acknowledge, of eliminating the effects of interlanguage borrowing. However, we can make use of the uninformed translations by learners of languages from NL to TL to establish the transferability of senses. These translations, though often at variance with the facts of diachrony, nevertheless may be revealing of the structure and limits of polysemy, and may also help to settle the question of whether a small number of 'core' concepts and interpretation rules versus a fully (or over-) specified description of environments of occurrence in the mental lexicon is the right one. In this respect, the results above show that the generalised intuitions of learners do not allow the same degree of sense generalisation for English as for Dutch, despite the fact that all but a few senses in the experiment could be successfully translated between both languages, and also despite the fact that English also has extra senses not shared by Dutch. That this is so must be due to precisely the kind of cognitive mechanism that potentially generalises senses to new environments receptively or productively. Since cross-language comparisons only incidentally provide insight into the language facilities of individuals, it is surely essential to tap the intuitions of native speakers who also happen to be learners of foreign languages as well.

REFERENCES


