

LING 106: Homework 3

Due: Wednesday, October 3, 2007

1. THE DISTRIBUTIONAL METHOD

In class, we saw evidence that, e.g., *fairer* and *purser* are the same category, as are *from* and *in*, and so forth. But of course, for English speakers, it's easy to pick out a couple of adjectives or prepositions. What if instead you had to face an unfamiliar language—e.g., Welsh or Finnish?¹

1.1. Welsh

The following lines are from *Y Gododin*, an epic Welsh poem with translations by John Williams (1811-1862). They are presented here in no particular order.

- (1) a charnedawr tra gogyhwc gwyr trin
“And there was raising large cairns over the heroes of toil.”
- (2) deichyr eryr gwyr govaran
“Unflinching eagle of the forward heroes”
- (3) en ol gwyr pebyr temyr tudwet
“After the strenuous warriors have extended their country's bounds”
- (4) gwyr a aeth gatraeth veduaeth uedwn
“The heroes marched to Cattraeth, filled with mead and drunk,”
- (5) gwyr en reit moleit eneit dichwant
“Men renowned in difficulty, prodigal of their lives”
- (6) gwyr nyt oedyn drych draet fo
“The warriors did not cut their way to flee,”

Based on the above data, you should be able to give the meaning of at least one word of Welsh. What word? What does it mean? How do you know? (Note: the place name *gatraeth* “Cattraeth” doesn't count.)

¹ Foreign texts borrowed gratefully from Project Gutenberg. Also, please note: I speak no Welsh at all, and only one word of Finnish, namely *jäätelöä*, “ice cream (partitive)”, which didn't appear in the corpus. Consequently: (a) not knowing Welsh or Finnish won't keep you from solving these; (b) in cases where I excerpted part of a sentence, I can't promise that what I've used is even a complete grammatical phrase.

1.2. *Finnish*

1.2.1. *Distributional information*

The following sentences are assembled from a variety of Finnish texts. They've been conveniently placed in pairs, saving you the trouble of scouring thousands of lines of Finnish prose, looking for evidence. For each numbered example (whether it's a pair of sentences, or a single, longer sentence), provide a pair of words that belong to a single category, and explain how you know.

- (7) a. ...istumaan ja halaili äitiä iloissaan, vaikka ei tiennyt syytä minkä tähden hän halaili.
- b. Vaan sen puheen johdosta se kuitenkin tuntui olevan, vaikka ei tiennyt oikein minkä tähden se oli.
- (8) a. Ja jos niihen nyt muutaman tai parin satamarkkasta panee, niin se ei ole mitään, kun niissä on ijäksi ja vielä pojan pojallekin kalua, kun ne hyvät laittaa.
- b. Menköön se vaikka Matin pellon ojaan, niin se ei merkitse mitään, kun se kerran on näiksi lähtenyt.
- (9) Samoin on laita, jos toisen paha sana vastataan rakkauden sanalla, niin sen viha muuttuu rakkaudeksi, jos toisen paha teko vastataan rakkauden työllä, niin se vaikuttaa rakkauden ja viha sammuu.
- (10) ...että lähetän hänelle rakkaan tervehdyksen ja että kiitän häntä kaikesta siitä hyvästä, mitä hän minulle on tehnyt, ja kaikesta siitä kunniaista, mitä hän minulle on osoittanut lapsuudesta pitäin...

1.2.2. Using Harris's Conditions

Consider one more pair of Finnish sentences:

- (11) a. ...ajatteli alottaa jotakin puhetta sen kirjeen johdosta, mutta ei tiennyt mitä oikein sanoisi.
- b. Hannan mielessä tuntui, että pitäisi siihen jotakin sanoa, mutta ei selvinnyt, mitä oikein sanoisi.

Once again, identify a pair of words that are likely to be the same syntactic category.

Now answer the following: suppose that you've hypothesized that each of these words consists of more than one morpheme. Which two sentences of the six below, presented in no particular order, would be most helpful in proving the hypothesis? Explain why, with specific reference to Harris's conditions.

- (12) a. ...ja samassa näytti koko tuo säikähtynyt kyyhkysparvi tuokioksi hämmentyneen selviämättömään sekasotkuun.
- b. Jukella siinä selkensä tiessä hengen heikkona sairastaminen kävi polttavan ikäväksi.
- c. "Jumala olkoon kanssanne, jalo sire; mitä tietä tulee lohikäärme?"
- d. ...paholaisen niin lähelle itseään selvissä verenvuodatuksen aikeissa.
- e. ...sitten, taitavasti selvittäen kirjoitetut sanat, ilmoitti hänelle, mitä Tristan pyysi.
- f. Tristan käänsi hevosensa, Kaherdin ohjasi omansa samalle tielle.

2. CRYPTOGRAPHY

2.1. Deciphering Texts

The three texts in (a)-(c), presented in alphabetical order and with their letter frequencies in boxes to their right, represent three different encoding methods. Each one is a 203-letter paragraph from the same novel from which spaces and punctuation were removed, an encryption performed, and the resulting string broken into 29 seven-letter chunks. The three encryption methods, in no particular order, were:

- (i) A rearrangement encryption
- (ii) A monoalphabetic substitution cipher
- (iii) A polyalphabetic cipher

For this assignment, *you do not need to decipher the texts*. Instead, answer the following question: which encryption method produced each of the three ciphertexts? How can you tell?

a. FRCDYCL EVFZWDN EEGJAPK IQQLRDY
CBWIUXM WJJRRVH SQKJPTE MTKFLXY
MGEFJAT TFGJSCW IEERJPF MGAKFYG
OBHNFPM INTKFFN EXGJYCW JYQFBHP
EEURLSO SYERLDX WUCMCSH RRDVDDK
IGQDCCW MQAFSIA MAMXMSA EQGOCBI
XRFNCNU VVFXCW X MFPFRPG MAULPPG
GRCXCCM

16: F	8: ADW
15: C	7: IQS
13: M	6: KLNY
12: ER	5: TUV
11: G	4: BH
10: X	3: O
9: JP	1: Z

b. IUHSEND EFNNLOR BOOETRY FTOFGRD
ATCESMS ETITEEP EEUUIHO HFOUIHD
LVSHIIA HUHREDO ESIGTRR UONRFT
AIYAFMO RAPASRL ROCNHBO OGMRTTT
ISKGYOP NTDOTTT INFAGTY VWHATTH
HHOEUSR RTIMNAI ATOOPBA TETANBE
ONEUHNM TEHAAMT EITHUER BHRHNEU
FRIANES

23: T	9: S
20: E	8: F
18: HO	6: M
16: R	5: BDG
15: A	4: PY
14: I	3: L
13: N	2: CV
11: U	1: KW

c. QABOHSO QNYQAYN YTBIIBI TJPQAYY
IRAYOEB RBIQYMM SKQBITH YQAYYIR
QAYTMYE QEIRQYM MBNGYRE XJPQAYG
JMRVAYI HYIOAEG GCEGGSK JIQAYHJ
SIQEBIO EIRQAYM JCFOQJP EGGSKJI
QAYHEIR ABRYQAY HABRYQA YHPMJHQ
AYPECYJ PABHQAE QOBQQYQ ASKJIQA
YQAMJIY

29: Y	8: G
26: Q	7: O
22: A	6: PS
18: I	4: KT
12: BEJ	3: CN
10: R	1: FVX
9: HM	

2.2. Enciphering Texts

Two people—call them LN and CL—are sending each other encrypted messages. You’ve figured out how to intercept the first message of the week, from LN to CL, and you would like to send an encrypted message back to convince LN that you, in fact, are CL.

Unfortunately, their encryption method changes weekly, and always leaves out punctuation. Fortunately, the method is never complicated, and always includes spaces. Even more fortunately, your sources have informed you that the first two messages sent each week are the same. (You’d think LN and CL would know better.) They are:

- (13) the quiz is ready in the secret mailbox. we need to make copies before wednesday.
- (14) give me the key and i’ll do the job.

Below are the first messages posted on Monday morning of five consecutive weeks. Your task for each message is:

- (i) Give the enciphering function, or otherwise describe the enciphering procedure;
- (ii) Give the appropriate reply, i.e. the result of enciphering (13) via the method in (i).

Week 1

eht iquz is adery in eht ceerst abilmox ew deen ot aekm ceiops beefor addeenswy

Week 2

htq eiui zr saeyd ni hts eceerm tiablxo ew ende ot amek ocipse ebofer ewndseady

Week 3

qeb nr fw fp obxav fk qeb pbzobq jxfiylyu tb kbba ql jxhb zlmfbp ybclob tbakbpaxv

Week 4

ht4 l13b 3j k45xc 3n ht4 j4yk4h p53qz2d f4 n44x h2 p5r4 y2m34j z4w2k4 f4xn4jx5c

Week 5

ord jsea cs inkob xs ord dobmoc hylvskw og noox yd oukw coszym obypol ikncoxnog