Factive Investigations

Workshop on
Structure and Evidence in Linguistics
Cordura Hall, April 30 2013

1973 LSA Lauri meets Ivan

How should I pronounce your name?

/ s ɑ: g / ?

/ s æ: g / ?

/ s æ g / ?

/ ʃ ɑ: g / ?

1974 Cambridge
Annie meets Ivan

Ivan coauthors Annie's only term paper on phonology and tries to teach her how to play volleyball

No success with the volleyball.

1975 Berkeley
Ivan organizes, Annie cooks, Lauri and 50
other linguists eat and talk at the
Alternative LSA Institute.

Mid 80ties:
Ivan (Stanford-HP), Lauri (SRI), Annie
(PARC) at CSLI, arguing about HPSG,
PATR and LFG.

In the mid 80 Ivan, Annie and me met again at CSLI and were working on parallel implementations of HPSG, LFG, PATR. The prevailing view was that syntax was easy and that with the right tools we would be able to develop wide-coverage grammars for NLs, showcasing the importance of linguistics for NLP. Alltogether this has been a sobering experience.

The most important lesson being that there is a lot that we do not know about language(s) and that among the things that we think we know, a lot is wrong, or fatally incomplete. NLP has abandoned taking syntacticians seriously and now when it starts to look at semantics, it might very well end up not taking semanticists seriously either, if some of these shortcomings or gaps are not studied by linguists.

This is only possible by taking a more experimental direction as Ivan, among others, has championed. Here is one modest contribution. It is on a topic that Ivan has not worked on (difficult to find but we succeeded).

Investigations of factive (?) adjectives

Cleo Condoravdi, Lauri Karttunen, Stanley Peters, Annie Zaenen

Linguistics Department/CSLI

Stanford

Factivity

The complement of a factive predicate is presupposed, presented as factual even when the matrix is a question or a negation.

Is it not strange that desire should so many years outlive performance?

Presuppositions project up from embedded clauses.

I hope it is not annoying that I am updating my info.

The received wisdom is that factivity is determined by the lexical item and its syntactic frame.

There is 40+ years of literature on this topic.

But some discussion of non-factive uses of factive verbs, a summary and a lot of examples in Beaver 2011.

But factivity is not a settled issue

We are in the process of conducting a systematic study of factive adjectives using the web and crowd sourcing with Amazon's Mechanical Turk.

The results show there are many structural factors that come to play, including

      tense

      mood (declarative vs. interrogative)

      the specificity of the subject

      the form of the complement.

Some non-structural features also affect the judgements.

Tuesday, April 30, 13

The examples in this talk come from the web except for the made-up ones we are crowd-sourcing for judgments.

The Zoo of Factive Adjectives

- It be ADJ that S

- ***It be ADJ (of/for NP) to VP***

- NP be ADJ that S

- ***NP be ADJ to VP***

- NP be ADJ Prep -ing VP

- Emotive, evaluative, cognitive, ...

Structural factors in
It be ADJ to VP
'factives'

It is audacious to speak the truth out loud.

It was audacious of John to speak the truth out loud.

Only when there is a specific notional subject does one get a clear factive interpretation in the past.

In the present one doesn't see the difference between an adjective like *audacious* and one like *important*, which is considered non-factive.

Tuesday, April 30, 13

We did Mechanical Turk experiments with these but one doesn't need experimental evidence to
realize that the interpretation in the present is not factive but some kind of generic. What was surprising in the experimental results we found is that it in the past it is only with a specific subject like of John that we get a factive interpretation.

Lucky in the future

Pessimistic (idiomatic) interpretation

Exports will be lucky to eke out any gain at all.

You will be lucky to get this person to work for you.

Positive interpretation:

A few kids will be lucky to be cured, the rest wind up in residential centers.

Only one person will be lucky to get such an item.

Will they be lucky to see polar lights?

Lucky is unique in that it in affirmative sentences with future tense there are two possible interpretations, a pessimistic interpretation that the complement clause will probably turn out to be false and an positive interpretation entailing the opposite. There are many structural factors that play a role: declarative vs. interrogative, NPIs, quantification of the subject,
adverbial modification, not yet clear how many different ones there are.

Insufficiency of curated corpora

No examples of the positive type are found in COCA or the BNC although they are easily attested on the Internet. Browsing the web turns up essential data that hasn't made it to the collections even as large as COCA.

Tuesday, April 30, 13

And you can even find them

Posted on the street

Tuesday, April 30, 13

on the street

Lucky in the present and past

My son is lucky to have a Japanese wife.

I remind myself that I was lucky to have any time with him at all.

A man was lucky to survive after plunging into the river in Bath.

entail that the complement clause is or was true.

Only generic sentences have the 'probably not' reading in all tenses.

Just a hundred years ago a man was lucky to live to be 45.

Tuesday, April 30, 13

In the present and past tense the idiomatic 'probably not' interpretation disappears except for generic sentences. Look at the second example with the NPIs any time and at all. It entails that I had
some (brief) time with him.

Conflicting judgments about grammaticality and meaning

Received wisdom (Larry Horn, Craige Roberts):

> be lucky to VP is factive   (if grammatical at all)

> be lucky enough to VP is implicative.

The web

> I was not lucky to get a table on this trip. Maybe next time.   implicative

Family and colleagues

> Both

Two-way implicative:
positive matrix entails complement clause,
negative matrix entails falsity of the complement clause.

> Yesterday she was lucky enough to run into Felicity.   She did.
> He was not lucky enough to fall into easy money.   He didn't.

Conflicting judgments about grammaticality and meaning

Received wisdom (Larry Horn, Craige Roberts):

be lucky to VP is factive   (if grammatical at all)

be lucky enough to VP is implicative.

The web:

I was not lucky to get a table on this trip. Maybe next time.   implicative

Family and colleagues

Both

Two-way implicative:
positive matrix entails complement clause,
negative matrix entails falsity of the complement clause.

Yesterday she was lucky to run into Felicity.   She did.
He was not lucky to fall into easy money.   Did he or did he not?

Was *lucky* an unlucky choice of example?

This was the first time I was in Italy and I was not <u>brave</u> to go out alone at night.

Luckily I was not <u>stupid</u> to send them my money.

It was raining and snowing like crazy in March here, so I was not <u>stupid</u> to risk the customer car, my license and my life.

Lucky is not alone!

Dialect variation in NP be ADJ to VP adjectives

350 AMT Workers

Robin was (not) outraged to see Mary with Bill.
Robin was (not) clever to choose the best piece.

Did Robin see Mary with Bill ?
Did Robin choose the best piece?

Matrix Polarity					
Affirmative			Negative		
Yes	No	undecided	Yes	No	undecided
99.5%	0.5%		76.3%	18.4	5.3%

"Yes" answer for a negative matrix is factive, "no" answer is implicative

Tuesday, April 30, 13

If outraged and clever are truly factive, the answer should be Yes regardless of the matrix polarity.

Emotive versus evaluative adjectives

Emotive: **Robin was (not) outraged to see Mary with Bill.**   Did Robin see Mary with Bill?
Evaluative: **Robin was (not) clever to choose the best piece.**   Did Robin choose the best piece?

adjective	matrix polarity					
	affirmative			negative		
	Yes	No	undecided	Yes	No	undecided
emotive	100	0	0	95.7	4.3	0
evaluative	98.9	0.9	0.3	25	64.2	10.7

"Yes" answer for a negative matrix is factive, "no" answer is implicative

Tuesday, April 30, 13

There is a clear difference between emotive adjectives such as outraged and evaluative adjectives
such as clever and stupid. So, maybe clever and stupid are not factives after all.

The Consonant/dissonant complement hypothesis

If it is {clever,stupid,brave, ...} to do X and one is not {clever,stupid,brave}, then one doesn't do X.

To illustrate this reasoning:

It was (would have been) brave to venture out alone but I was not brave, so I did not venture out alone.

Tuesday, April 30, 13

How sentences with clever and stupid are interpreted is affected bhy non-structural considerations. Our hypothesis is this.

Consonant and dissonant results with evaluative adjectives

Matrix	complement	answers		R	CB	%
– R. was not clever	+ to choose the best piece	R. chose the best piece	+	F	– +	25
		R. did not choose the best piece	–	**I**	**– –**	**64.2**
		undecided				10.7
– R. was not clever	– to choose the worst piece	R. chose the worst piece	–	**F**	**– –**	**80**
		R. did not choose the worst piece	+	I	– +	10.0
		undecided				10.0
+ K. was not stupid	+ to save money	K. saved money	+	**F**	**+ +**	**78.6**
		K. did not save money	–	I	+ –	14.2
		undecided				7.1
+ K. was not stupid	– to waste money	K. wasted money	–	F	+ –	28.6
		K. did not waste money	+	**I**	**+ +**	**66.7**
		undecided				4.8

Tuesday, April 30, 13

Here we tried to make up complement clauses that in most situations would be seen either as a clever, non–stupid thing to do: choosing the best piece, saving money,
or as a non–clever, stupid thing to do: choosing the worst piece, wasting money.

But there is of course no situation–independent metric of stupid or clever actions.

The consonant factive readings have higher counts, 80% and 76.8% than the consonant implicative readings, 64.2% and 66.7%. How does that come about?

One hypothesis that we are considering is that there are two groups of people with different dialects that know about each other and adapt to each other's usage.
The majority group prefers uses and prefers clever and stupid as factives but is willing to accept them as implicatives when that interpretation appears to be what the speaker is intending to convey. There is a majority bias towards the factive but 10% for clever and 14.2% for stupid in the results above were implacable implicative users

Back to Lucky

- The result on the previous slide shows that there are non-structural factors involved with *clever* and *stupid*.

- There are non-structural effects with *lucky* as well.

  I <u>hope</u> that she will be lucky to die instantly.

  I <u>am afraid</u> that she will be lucky to die instantly.

Tuesday, April 30, 13

With verbs that express preference like hope and wish in the matrix clause, the regular interpretation of be lucky to VP seems to be the only one. With verbs that express an opinion such as be afraid and think, the pessimistic idiomatic reading wins.

Importance for linguistics

- How to characterize the non structural factors that play a role in the interpretation of these adjectives.

- Are there purely lexical factives? There are candidates left: mainly the that-factives

Tuesday, April 30, 13

Importance for NLP

Inference tasks are popular in NLP circles these days. Some of the features used are derived from the classification of lexical items. The results will most likely be better if the classification is correct.

Tuesday, April 30, 13

References

David I. Beaver. **Have you Noticed that your Belly Button Lint Colour is Related to the Colour of your Clothing?** In R. Bauerle, U. Reyle, and T. E. Zimmermann (eds.), *Presuppositions and Discourse: Essays offered to Hans Kamp,* Elsevier, pp. 65–99. Oxford. University Press, Oxford, UK. 2010.

Lauri Karttunen. **You Will Be Lucky To Break Even.** In *From Quirky Case to Representing Space: Papers in Honor of Annie Zaenen.* Tracy Holloway King and Valeria de Paiva, (eds.), pp. 167–180. CSLI Publications, Stanford, CA. 2013.

Lauri Karttunen and Annie Zaenen. **Veridicity annotation in the lexicon? A look at factive adjectives**. In Harry Bunt (ed.), *Proceedings of ISA-9 Workshop on Interoperable Semantic Annotation*, pp. 51–59. Potsdam, Germany. 2013.

CSLI   Language and Natural Reasoning