

# 1 John Barnden's Comments and Responses

## Metaphor and related things (mainly section 6.1)

**JB-1:** Make it clear that in the current state of play the system only responds to pre-existing similarity, rather than being capable of doing things like adding new features to the target based on features of the source (where in many cases the new features can contravene existing knowledge of the target). As far as I understand it, with “surgeons are butchers”, the vector for surgeons is not affected by the metaphor, and also no meaning vector is constructed - cf. the meaning vector that Utsumi's vector based approach to metaphor computes on the basis of the source and target vectors.

*Yes, my approach involves the discovery of a subspace which is in some sense salient to both source and target, and so it would be wrong to claim that I'm identifying the properties transferred from target to source, or generating a conceptually revised version of the target vector. I've added a paragraph clarifying this.*

Optionally you could add something to the future work part of the thesis about prospects the system has for the above sort of thing or interpretation in other respects.

*I've added a couple sentences about the potential for using my methodology for both interpretation and generation of metaphor.*

**JB-2:** Make it clearer that as it stands the method is not sensitive to information provided by small local contexts that might affect what it does with something (e.g. a metaphor) placed within that context. Or, of course, if it is sensitive to it in some way, make the matter clear.

*I've included a sentence regarding the insensitivity to highly specific informational transfer along with the paragraph added to clarify the lack of interpretability of conceptual transfer added in response to the previous comment.*

## Coercion (section 6.2)

**JB-3** : p.137f: You seem to be just using the context words as subspace selectors, ignoring the targeted pair itself, and if I remember correctly you confirmed this in the viva. But why not compare performance between

- (a) original method, using the word pair but not the context words, with
- (b) that method plus context words?

This should surely reveal the effect of context in a better way? I may be wrong, but anyway add something about whether it would be a good approach or not.

### **Metaphor/Coercion Ramifications (section 6.3)**

**JB-4:** p.141 bottom: The claim that there is a strong correlation between figurativeness and the need to process context during interpretation needs additional justification (or weakening of the claim if you can't comply).

**JB-5:** p.143 last para: Do you mean you can compute new meaning by moving around within the spaces? If so, this could be something to mention in emendments responding to my comment (1) in the Metaphor segment above.

### **Analogy (Ch7)**

**JB-6:** Re an analogy experiment, around p.151: Add commentary on why seemingly irrelevant dimensions/terms such as "hearing" and "accidentally" come into play, and why relevant dimensions don't appear, such as perhaps "sit" in the analogy involving sofas. What \*is\* the intuitive significance of the most prominent dimensions that your analysis uncovers? I didn't understand your answer in the viva that it doesn't matter what the dimensions are. So considerable extra clarification is needed on these matters.

**JB-7:** The condition  $(a-b)-(c-d)=0$  is equivalent to  $(a-c)-(b-d)=0$ , making  $A:B::C:D$  equivalent to  $A:C::B:D$  from the point of view of a method of yours. Comment on the reasonableness or otherwise of this, and if possible on relevant evidence from psychological experiments.

**JB-8:** p.153 para 1: As mentioned in the viva, you seem to be saying that, for each analogy separately, you find the best "top ... projection". This apparently conflicts with the 90% claim in next para, which seems to say there's a good space that works for 90% of the analogies. Apply the clarification that you gave in the viva.

**JB-9:** Say whether you have looked at the vectors  $a-b$ ,  $a-c$  etc to see how similar they might be to vectors for the expected underlying relationships in the analogy, and/or mention something about this in future work. Of course, if you have an argument for not expecting those difference vectors to be interesting, add this.

### **Miscellaneous**

**JB-10:** For non-specialist readers, state somewhere what precision and recall are and how f-score and accuracy are defined. Your thesis may well be read by people who are not computational linguists or similar. The information could go in glossary at beginning, along with the other comparably basic concepts you include there.

**JB-11:** Make sure it's clear, for each experiment, what the definitions of precision and recall are exactly in the particular case. Sometimes it's not clear what you're counting.

**JB-12:** Glossary would also be good place to say that e.g. by a 2x2 co-occurrence window you mean one that goes two before and two after the target word.

**JB-13:** And after p.50: you actually talk about window size in terms of "k", so on first use of "NxN" for some N, point out you mean k=N.

**JB-14:** p.41 and Fig 3.2: clarify that "co-occurrence terms" are selected words to which other words are being related. It only becomes gradually clear up to p.46 that you're talking about co-occurrence with "soprano" etc.

**JB-15:** p.49: I don't understand the point about parentheticals - add extra explanation.

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**JB-16:** p.51 para 1: The meaning given for the ratio (without the "a" correction) is wrong. The ratio can be bigger than 1 (right?) so cannot be any sort of probability! I think you mean: the denominator is proportional to the joint probability. The formula given on p.69 and p.149 in terms of probabilities makes the matter much clearer, and shows that the explanation on p.51 is askew. \*\*\*\*\*

**JB-17:** Around here say something about how the chosen value of 10,000 for "a" comes about. What was this choice influenced by? Would it change if the corpus-size changed?? Etc.

**JB-18:** Explain at some early point that the "dimensions" are just the words along the top of the matrix M.

**JB-19:** p.53 (and as necessary elsewhere): You say "component" of T, but "member" and "element" would be clearer and standard. It's just a set, right?

**JB-20:** In INDY: what about different components of  $T$  selecting some of the SAME dimensions, so you can't just concatenate the lists of dimensions found? You seem to assume there'll be no such duplication. Clarify this matter.

**JB-21:** What does "top" amount to here?

**JB-22:** What if  $d/|T|$  isn't an integer?

**JB-23:** In explanation of JOINT: what does "merged" mean here? Multiplied or minimized point-wise? Becomes clear later, but it should be made clear here (in ordinary English, probably, rather than mathematically).

**JB-24:** Surely you discard the dimensions with \*zero\* elements, not non-zero elements!

**JB-25:** For definiteness, explain that by normalised you mean in the standard vector-space sense of converting to length 1. "Normalise" means lots of different things in different areas.

**JB-26:** p.54, para before formula 4.2: being "central" sounds contradictory with being "peripheral" - explain.

**JB-27:** p.54: Formula 4.2 needs amendment. For one thing you seem to be using the curly brackets normally used for \*set\* notation to define a vector instead.

**JB-28:** And anyway the "i" has no reference, but needs somehow to be tied to "t". Minimally "t" should be replaced by " $t_{h,i}$ " (where my underscore means subscripting).

I think that what you want to is actually quite tricky to write in a clear formula, and it may be best to stick with saying that  $n_h$  is formed successively from those successive components  $t_{h,i}$  of  $t_h$  where  $((\dots \text{your } \Pi \nless 0 \text{ condition as written in 4.2}))$

**JB-29:** Formula 4.4: I don't understand the " $d/k$ " subscript of "max".

**JB-30:** Somewhere up to here: I felt the need for some idea of typical values of  $d$  and  $|T|$ .

**JB-31:** p.56, Table 5A and text: give more systematic information about statistical significance of the results.

**JB-32:** p.77: WordNet experiment re "body part" etc.: you mention "accuracy" but your explanations sound as though you're only looking at number of correct items found, i.e. measuring \*recall\*. (This contrasts with use of f-scores at other places, e.g. on p.114 bottom.) Make the text clearer.

**JB-33:** Somewhere up to p.93: Optional amendment: I suggest that you make more of the superiority of your method over static methods on the lower dimensionalities.

**JB-34:** p.118: what agreement or whatever is the kappa measure measuring in this analysis?

**JB-35:** p.122: end of middle para, relating to Fig 6.2: "remain fairly far": doesn't seem to be borne out by the Figure.

**JB-36:** p.155: "the analysis" – but that used for the prior results involved knowing the fourth term, no?

### **Important Typos etc.**

NB there are quite a few minor typos spread over the thesis - it needs a further round of complete proofreading.

Some of the more important things to fix:

p.25 near top: do you really mean "asseveration"? Just mean "assertion"? Your word sounds a bit judgmental.

p.32 first full para: criteria -> criterion

p.61, Table 4C: "angel" !

p.66, l.-5: distances -> distances between {I presume}

p.126, p.137 l.5, p.170 l.-6, p.171 l.2: discreet -> discrete {discreet has a completely different meaning!}

p.138 top: content -> context

## **2 Anna Korhonen's Comments and Responses**

### **General corrections:**

**AK-1:** Explain, for all the experiments, whether you calculated statistical significance and whether the improvements or differences reported are significant.

**AK-2:** Explain, for all the experiments to which this applies, how you did qualitative analysis: did you analyse all of the output data or only a subset? Did you do the analysis in some systematic manner?

**AK-3:** Explain how you came up with the thresholds, the number of dimensions (20, 50, 200 etc) and sizes of windows used in your experiments. Did you just invent them or are they based on some preliminary experiment and then adopted for the rest of the thesis?

**AK-4:** This is an optional correction, but I would recommend highlighting the best results in the tables for easier readability.

#### **Specific corrections:**

**AK-5:** p. iv Glossary: Because the terminology is quite cross-disciplinary in this thesis, I would expand this glossary a bit, give a more comprehensive definition for each concept and even mention, for concepts that are used in a non-conventional (from NLP perspective) sense, which field the definition comes from. I would also add meaning and situation(al) in this glossary.

#### **Chapter 1**

**AK-6:** Explain more clearly that this thesis belongs to / advances primarily the field of computational linguistics.

**AK-7:** Define more clearly what the thesis does and doesn't do: it develops computational linguistic methodology and evaluates it in the context of NLP tasks. Although based on theoretical insights from other fields (and although potentially useful for several fields), cross-disciplinary investigations are not included but are left for future work.

**AK-8:** P. 10 typo: there are two the words in the 3rd line of the 3rd paragraph

#### **Chapter 2**

**AK-9:** Section 2.2. When you start talking about concepts here, please define the intended properly and/or refer to the places in the thesis where they are defined properly (and mention the existence of that Glossary).

**AK-10:** Section 2.3 I found all this background on metaphor was a little out of place in this section. Consider moving the background elsewhere if possible?

**AK-11:** p. 24 This is the place where I would mention that no attempt is made in this thesis to discuss the conceptual structure (of the human brain).

**AK-12:** Section 2.4. Show some awareness of the long history of semantics research in NLP by including a paragraph or two that mention the main lines of research prior to / alongside VSMs. Then say explicitly that you will focus your literature review literature on the distributional semantics and neural approaches only.

**AK-13:** On p. 28 define generalizability better (its a term with many meanings).

### **Chapter 3**

**AK-14:** Section 3.2. p. 37 The concept situation should be defined better. In particular, what does a situation of words in a large corpus mean?

**AK-15:** p. 38 Context is defined here, too late in the write-up.

### **Chapter 4**

**AK-16:** Section 4.1 The second paragraph talks about the cleaning process. Mention who performed this process.

**AK-17:** Section 4.2 There's a typo in the caption of table 4-7: delete one the

### **Chapter 5**

**AK-18:** Here or earlier: Explain how you chose the specific tasks in chapters 5, 6, and 7 for your evaluation?

**AK-19:** p. 98 Here or elsewhere in the chapter (or in the future work section at the end of the thesis) discuss how factors such as part-of-speech (nouns, verbs, adjectives), polysemy and abstract vs. concrete, among others, many also influence your results alongside the obvious issue of frequency.

**AK-20:** P. 130 The end of the first paragraph on this page is difficult to understand explain what you mean by too conventional

## **Chapter 6**

**AK-21:** p. 139 BNC is a balanced corpus so shouldnt be colloquial in nature. Explain, if you can, how the 2000 sentences were selected.

## **Chapter 8**

**AK-22:** Section 8.2. If possible, I would try and discuss the potential usefulness of the methodology introduced in this thesis for NLP at large, and for real-life applications (search, QA, etc). I would also discuss what it would take to make your methods useful for research in cognitive science.