

## **Exhaustivity as Cell Identification – Relevance for debates on the nature of Exhaustivity Inferences**

### **1. Background – two approaches to exhaustivity Inferences (a.k.a. Scalar Implicatures)**

- (1) Some of our former students have jobs in academia.  
Exhaustivity Inference (or Scalar Implicature): Not all of our former students do.
- (2) Who came to the party? (among Mary John and Sue)  
Mary did.  
Exhaustivity Inference: Only Mary did.

#### **(Neo-)Gricean Approach:**

Exhaustivity Inferences are not logical entailments but follow instead from shared assumptions pertaining to norms of communication (“the conditions governing conversation”)

#### **Grammatical Approach:**

Exhaustivity Inferences are logical entailments of a particular representation with which the sentences can be associated, one involving a covert focus sensitive operator *exh* (an overt counter-part of *only*).

### **2. Background – some evidence for a grammatical approach**

1. **Embedded/Intrusive Implicatures** (Cohen 1971, Chierchia 2004, Chierchia, Fox and Spector 2012, Crnič 2013, 2014, Levinson 2000, and much more)  
Evidence that the exhaustive meaning of a sentence  $\varphi$  is sometimes relevant for the computation of the meaning of constituents that dominate  $\varphi$
2. **Computational Order** (Bar-Lev and Margulis 2014, Fox 2007, Fowler 2014, Meyer 2016, Singh et. al., 2016...)  
Evidence that Ignorance Inferences are not computed “before” the introduction of exhaustive meaning (contrary to what is expected by neo-Gricean theory)
3. **Deactivating the Quantity Requirement** (Fox 2014)  
Evidence that Ignorance Inferences are deactivated while exhaustive inferences are not.
4. **Encapsulation** (Fox and Hackl 2006, Magri 2009, 2011, 2016)  
Evidence that the notion of informativity that enters into the computation exhaustivity is the formal notion of logical strength, rather than the pragmatic notion of contextual strength
5. **Grammatical Considerations**  
Reasons to believe that *exh* gives us good results when combined with other aspects of the theory of grammar (polarity licensing, Chierchia 2004, 2006, 2014, Crnič 2013; analogies between *only* and *exh*, Fox and Katzir 2011, Katzir 2013, 2014; considerations from other areas of grammar where Exhaustification seems to be relevant, Horvath 2000, Fox and Hackl 2006, Ivelieva 2013,...)

### 3. Background – Conceptual underpinning for a grammatical approach

#### 3.1. Grice's Predicament

(3) **Grice's Research Program:**

To develop a body of knowledge pertaining to communicative interactions (“the conditions governing conversation”, or Pragmatics, P) and to see how this could inform grammatical/logical analysis (G).

(4) **Grice's Hunch:**<sup>1</sup> Logicians (of his time) got things right about G.

“I wish...to maintain that the common assumption...that the divergences [between...some of what I shall call the formal devices  $\neg$ ,  $\wedge$ ,  $\vee$ ,  $\rightarrow$ ,  $(\forall x)$ ,  $(\exists x)$ ,  $(\iota)$  ...and...what are taken to be their analogs or counterparts in natural language] do exist is a common mistake **and that the mistake arises from inadequate attention to the conditions governing conversation.**”

(5) **Grice's Goal:** To show that pursuing (3) will corroborate (4). In particular to show that P can bridge the gap between what logicians had delivered (a while back) for G and what is empirically needed.

**My claim:** Not at all!

What are the “conditions governing conversation” and how can we study them? In particular, is there anything we know to be true in this domain?

(6) **Virtual Truism (VT):**<sup>2</sup> As speakers we are required (ethically obligated) to say  
(a) only things we believe to be true (nothing but the truth, *Quality*)  
(b) everything we believe to be true, if it is relevant (the whole truth, *Quantity*)

(7) **Grice's Predicament:** If his hunch about the lack of divergences is correct, VT needs to be denied<sup>3</sup>.

(8) **Exhaustivity Inferences aren't pragmatic if VT is correct:** Suppose s utters  $\phi$  and  $\exists\psi[\text{Rel}(\psi) \text{ and } \neg\text{Settle}_c(\phi,\psi)]$ <sup>4</sup>,

- (a) if  $B_s(\psi)$ , s would have communicated  $\psi$ . (by VT)  
(b) if  $B_s(\neg\psi)$ , s would have communicated  $\neg\psi$ . (by VT and truisms about Relevance)  
(c) Consequently, we derive that (a) and (b) are false, i.e. that s is ignorant about  $\psi$ .

**Conceptual Underpinnings for a grammatical theory of SIs:** Consistent with VT.

---

<sup>1</sup> This is often taken to be the conclusion of Grice's inquiry but, for reasons that will be clear shortly, I don't think it is warranted.

<sup>2</sup> They explain why the oath we take in a court of law seems unnecessary – a mere reminder of what we know a priori to be true.

<sup>3</sup> or at the very least doesn't play a role in bridging the gap between what is literally said and what is conveyed.

<sup>4</sup> By  $\text{Settle}_c(\phi,\psi)$  I mean that either that  $\phi$  together with what is common ground entails  $\psi$  or the negation of  $\psi$ . ( $\phi \Rightarrow_c \psi$ ) or ( $\phi \Rightarrow_c \neg\psi$ ).

### 3. 2. The Neo-Gricean Alternative to VT (NG theory of Exhaustivity Inferences)

VT is False. Instead:

- (9) **NG Maxims (alternative to VT):** speakers are required to say
- (a) only things they believe to be true (nothing but the truth, *Quality*)
  - (b) everything they believe to be true, if it is relevant **and can be uttered with a formal alternative of what they actually decide to say** (perhaps, the whole truth if it's not too complex, c.f. Katzir 2007, *NGMQ*)

### 3.3. The Grammatical Alternative to L

If VT is right, we derive ignorance inferences and nothing beyond ignorance inferences.

Any communicative system governed by VT would have to make use of a “formal device” that would allow speakers to convey all of the relevant information they possess.

**Design Specification for a “Super-Engineer” (Fox 2007):** design a device that would allow speakers to (efficiently) engage in conversation governed by VT.

More specifically,

- (10) **Design Specification for a “Super-Engineer”:** design a device that would allow speakers to (efficiently) convey all of their beliefs about any Topic of Conversation.<sup>5</sup>

#### Proposed Device:

- (11) **Covert *exh*:** Natural language contains a covert focus sensitive operator, similar to *only* in its syntax and its semantic-interpretation.

- (12)a.  $\llbracket \text{only} \rrbracket^w = \lambda Q_{st,t}. \lambda p_{st}. p(w)=1. \forall q \in \text{IE}(Q,p)[q(w)=0]$   
b.  $\llbracket \text{exh} \rrbracket^w = \lambda Q_{st,t}. \lambda p_{st}. p(w)=1 \ \& \ \forall q \in \text{IE}(Q,p)[q(w)=0]$

- (13) Let  $p$  be a proposition and  $A$  a set of propositions:

The set of propositions in  $A$  that is *innocently excludable* given  $\phi$ ,  $\text{IE}(A, \phi)$ , is the intersection of all maximal sub-sets of  $A$ ,  $A'$ , such that  $\{\phi\} \cup \{\neg\varphi: \varphi \in A'\}$  is a set of consistent propositions.

**Conceptual Objection:** the device does not meet the design specification. Specifically, there is nothing that guarantees that a speaker will be able to convey all of their beliefs about a Topic of Conversation.

---

<sup>5</sup> What we mean by efficiently will become clearer when we talk about question answer matching (efficiently, means using a prejacent that is a member of the question denotation).

(14) **Modified Design Specification:** design a device that would allow *opinionated* speakers to (efficiently) convey all of their beliefs about any Topic of Conversation.

The definition of *exh* given in Bar-Lev and Fox (2017) meets these specifications:

(15) **Bar-Lev and Fox (2017), simplified:**

- a.  $[[\text{only}]]^w = \lambda Q_{st,t}. \lambda p_{st}. \forall q \in Q [q \notin \text{IE}(Q,p) \rightarrow q(w)=1].$   
 $\forall q \in \text{IE}(Q,p) [q(w)=0]$
- b.  $[[\text{exh}]]^w = \lambda Q_{st,t}. \lambda p_{st}. \forall q \in Q [q \in \text{IE}(Q,p) \rightarrow q(w)=0] \& \forall q \in Q [q \notin \text{IE}(Q,p) \rightarrow q(w)=1].$

→ **Exhaustivity as Cell Identification**

#### 4. Conclusion

**Exhaustivity as Cell Identification:**

- a. Provides further empirical support for grammatical approaches:  
we've seen an additional domain (other than SI's) where *exh* plays a role.
- b. Fits better within the conceptual grounding of the grammatical theory outlined above, (14).