

Why we still don't need/want variables: Two SALTy Case Studies

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This talk is rooted in the program of variable free semantics (VFS), as implemented in particular in Jacobson 1999 (*L&P*), papers in SALT 2n for all $n \leq 7$, etc. The essential claim is that there are no variables or assignment functions as part of the semantic machinery, and no indices in the syntax. For example, there is a single pronoun *she* (denoting the identity function on individuals); its denotation is not assignment dependent. An immediate consequence of this view is that there can be no role for *variable names*. The grammar has no way to keep track of 'different pronouns (or gaps/traces))' by having them correspond to different variable names.

I focus here on two phenomena which have been argued (in SALT!) to necessitate the use of variable names to 'keep track' of different individuals. The first is Heim's classic analysis of 'Kennedy's puzzle' in SALT 7; also revised in Kennedy SALT 24 (published in the Heim festschrift). Heim crucially made use of a condition on No Meaningless Coindexation (NMC), and while Kennedy's revision avoids some of the problems for Heim, it still makes use of a variant of NMC. The second domain is the analysis of so-called 'MaxElide' phenomenon in Takahashi and Fox (T&F), SALT 15, also requiring NMC. For both phenomena, I show that solutions emerge effortlessly under VFS. Furthermore, I argue that the variable-free accounts have advantages over those making crucial use variable names, providing new evidence for VFS.

Background: **A.** Both domains involve what I have called 'TVP Ellipsis' (TVPE) in previous work. Cormack (1984) showed already that the phenomenon of ACD has a natural analysis in Categorical Grammar where what is missing in ACD cases is simply a 2-place relation (rather than a function of type $\langle e, t \rangle$ as in normal VPE). Evans (1988) showed that the same phenomenon can hold across sentences (much like VPE). Jacobson (1992) shows that this also extends to cases where the full paraphrase has a pronoun rather than a 'trace' (or, gap); such cases were rediscovered later in Merchant (2000) under the rubric of 'rebinding'. All of these are basically the same, and their existence follows immediately from the mechanics needed independently in VFS. **B.** I assume that VPE (and TVPE) do not involve any kind of deletion/silencing, but rather picking up a contextually salient property or 2-place relation from the discourse context. It is well known that VPE does not require overt linguistic antecedents (see, e.g., Miller and Pullum (2014) for many naturally occurring examples). TVPE is similar - including the sort of cases that have been called 'rebinding'. Consider a father with two kids Keela and Zack; Keela has been trying and trying to convince Dad that she no longer needs help tying her shoelaces. But out of habit, Dad reaches over to try to help, and she says "Please Dad. Stop! I don't want you to!" He then reaches out to help Zack- who always tries to emulate his sister, and who therefore says "And I don't want you to either". The intended interpretation of Zack's utterance is - unproblematically - λR [I don't z-want you to R either] where R is understood as the relation between x and y such y ties x's shoelaces. (Note that *either* forces this interpretation, rather than an interpretation in which Zach is saying 'don't tie my (Zack's) shoelaces). Why have so few antecedentless cases of TVPE been noticed previously (as compared to VPE)? I suggest that it is because it is more difficult to access from context a 2-place relation than a property. **C. Focus** in VFS. The focus value of something like *BILL saw her* is a function from individuals to a set of propositions (for each s, the set is {Mary saw x, Bill saw x, Sally saw x,.....}). **D.** With that, we restate Rooth's focus condition on 'ellipsis' (Rooth, 1992; see also Stockwell - SALT 28 for clear evidence that some contrast is needed for ellipsis interpretation). In my account, the 'missing' property/relation must be in a domain with

focus, but no overt material is needed to supply the contrast. Since (T)VPE does not require a linguistically overt 'antecedent', neither can the focus condition.

This gives us what we need to recast Heim's analysis of Kennedy's puzzle (I build here on my analysis in SALT 14.) Consider the contrast in (1a) and (1b), a variant of the 'puzzle' originally put forth in Kennedy (1994)

- (1) a. Mary read every book that SAM did.
b. *Mary read every book that reviewed an article that SAM did.

Note, the (1b) is fine in the right context; the relevant contrast is that (1a) is good with no prior context while (1b) is not. Heim (SALT 7) - correctly, I believe - attributed this to the fact that in (1a) we are 'talking about the same things' in the Mary clause and the Sam clause; this is not the case in (1b). But her implementation of this insight involved (a) NMC, (b) making sure that relative clauses and arguments to generalized quantifiers denoted open sentences, not properties (the *formulas hypothesis*), and (c) a version of Rooth's condition requiring overt linguistic antecedents to supply the contrast. Kennedy (SALT 24) preserves (c), and an analogue to (a). My revision makes use of the fact that the focus value of (*that*) *SAM did* is a function from 2-place relations R and individuals x to a set of propositions about different individuals R'ing x. The revised focus condition on where 'missing' properties and 2-place relations are allowed captures Heim's insight without variable names. For R = [[read]], (1a) necessarily evokes (with no additional context) for each x a contextually salient alternative individual who read x, (1b) does not (out of context). The reformulated condition requires no linguistic antecedent to satisfy contrast, and further circumvents Heim's problem that led to the 'formulas' hypothesis. That no analogous problem arises here is a consequence of the treatment of focus.

I then turn to Takahashi and Fox's (SALT 15) explanation of the 'rebinding' contrasts in (2) (from Jacobson SALT 2) vs. (3) (from Sag, 1976):

- (2) John asked Bill to water his plants, and SUE asked MARY to.
(3) *Harris, thinks that S. Carolina will vote for her, and Warren also thinks that it will.
(bad on sloppy reading).T&F - following Merchant 2000 - argue that this is due to a constraint on the size of ellipsis; (3) competes with a variant in which the second clause is just *Warren does too*; (2) has no such competitor. But this competition arises only when - in standard terms - the smaller 'ellipsis' contains within it an unbound variable: (4b) may be slightly degraded compared to (4a) but certainly not significantly so:
(4) a. I think the Dems will nominate Harris, and Mayor Pete does too.
b. ?I think the Dems will nominate Harris; Mayor Pete also thinks they will.

T&F account for this by a version of the focus condition on ellipsis, which crucially uses NMC to make sure that the understood *her* in the Warren clause in (3) is differently indexed from the Harris-*her*. (If they had the same index then the understanding of the second clause has the same meaning as that of the antecedent, and T&F's focus condition would allow ellipsis here just as in (4b).) In addition to having to invoke the stipulative NMC (and not allowing for ellipsis effects with no antecedent) this has an additional problem. Why *should* there be a grammatical MaxElide condition on ellipsis? One might argue that all competition effects should be a matter of speaker or hearer - not grammar-based principles. One could, then, imagine a version of MaxElide that basically assumed speakers to be as lazy as possible, but then ellipsis versions should always be obligatory, and (4b) should be as bad as (3). Under VFS, however, there is a natural explanation for the fact that (3) competes with a VPE variant. Recall that it was pointed out that 2-place relations are harder to access from context than functions of type $\langle e, t \rangle$; we speculate that the more complex the type, the more difficult it is to conjure up without having been explicitly named (so as to make it salient). Thus I agree with T&F's insight that the oddness of (3) stems from a competition effect - but it is *type* and not *size* competition. The better VPE variant involves a missing $\langle e, t \rangle$ whereas (3) involves a missing $\langle e, \langle e, t \rangle \rangle$. (So does (2), but here - as T&F note - there is no competitor.) This allows the phenomenon to be located in principles of speakers and hearers. I will also present new data arguing for type over size competition.