Alexander Grosu & Manfred Krifka

A note on *The gifted mathematician that you claim to be*

Abstract. The paper is a reply to Bassi & Rasin (2018) on the treatment of sentences like [*The gifted mathematician that you claim to be*] *should have solved this task without problems* by Grosu & Krifka (2007), which was published in L&P. G&K provide an analysis of the *de-dicto* interpretation in which the bracketed expression refers to an individual concept. B&R question this because equivalent expressions in Hebrew, in which the gap is rendered by a resumptive pronoun, do not exhibit the *de dicto* interpretation, but only the *de re* interpretation. We provide independent evidence that person-marked pronouns in post-copular position are incompatible with antecedents that denote individual concepts, thus explaining B&R's observation within G&K's framework. We furthermore point out two new problems for the analysis of B&R presented in the body of their article, which does not make use of individual concepts or of some alternative mechanism that can deal with substitutivity in opaque contexts. We also note that an alternative analysis they present in an appendix amounts to a notational variant of ours.

Grosu & Krifka (2007; henceforth: G&K) propose an analysis of data like (1). On its *de dicto* interpretation (presumably the most natural one), (1) implies that 'you', the addressee, claims to be a gifted mathematician, something that may or may not be true in reality and that the speaker may or may not believe. (1) also has a *de re* construal, which implies that 'you' claim to be someone else who is a gifted mathematician, e.g., David Hilbert. G&K proposed an analysis of the *de dicto* construal that does not appeal to syntactic reconstruction, and instead achieves the desired reading by assuming an input to semantics with the essential configurational properties of the observable surface structure, where the gap is interpreted as a variable over individual concepts, type ⟨s,e⟩. This comes with the assumption of a type-shifting operation that maps the CP-external NP *gifted mathematician* from the property type ⟨s,⟨e,t⟩⟩ to the type of a predicate of individual concepts, ⟨⟨s,e⟩,t⟩. As a result, the bracketed constituent in (1) denotes an individual concept.

(1) [*The gifted mathematician that you claim you are* __] *should be able to solve this problem*.

Bassi & Rassin (2018, henceforth B&R) offer an alternative analysis of the *de dicto* reading of such data that relies on syntactic reconstruction, for which they spell out an analysis following the syntactic reconstruction analysis of functional relative clauses in Heim (2019). For details of the two analyses, the reader is referred to the cited studies. In this brief note we address, and refute, a claim made by B&R concerning G&K, and point out two problems for the analysis of B&R.

B&R claim that G&K's analysis requires otherwise unmotivated stipulations in order to account for Hebrew data like (2). Following observations by Doron (1982) on the lack of resumptive pronouns for *de-dicto* interpretations of intensional predicates like *seek*, B&R point out that (2) excludes the *de dicto* reading when the trace t_i is replaced by a resumptive pronoun *hu*$_i$.

(2) *ha-matematikai* *ha-mexunan*$_i$ *še-ata toen* *še ata* {**t**$_i$ / ***hu***$_i$ } *amur lehacliax*
the-mathematician the-gifted$_i$ that-you claim that-you **him**$_i$ should be.able
liftor et ha-baaya be-kalut
to.solve ACC the-problem in-easiness
'The gifted mathematician you claim to be should be able to solve the problem easily.'
(t_i: *de re*, *de dicto*; *hu*$_i$: only *de re*)

(2) does not provide an optimal illustration of the point B&R wish to make, because *hu* can in principle be a form of the copula, and under this parse of (2), *hu* is followed by a trace[1]. Such ambiguity is avoided in the example in (3), where an unambiguous past form of the verb *hayo* 'be' is used instead of *hu*. Since (3) exhibits the same range of interpretive options as (2), we will base our evaluation of B&R's thesis on (3).

(3) *ha-matematikai ha-gadol*$_i$ *še miriam toenet še avia ha-manoax haya* {**t**$_i$ / ***hu***$_i$} *haya carix*
the-mathematician the-great that Miriam claims that father-her the-late was him was must
liftor et ha-ba'aya ha-pšuta ha-hi be-yoter kalut
to-solve acc the-problem the-simple the-that in-more ease
'The great mathematician that Miriam claims her late father was should have solved that easy problem with greater ease.' (t$_i$: *de re*, *de dicto*; *hu*$_i$: only *de re*)

On this basis, our response to B&R is that G&K's analysis can appeal to the independent fact that definite personal pronouns in post-copular position, such as the relative resumptive pronoun in (3), cannot refer to individual concepts in either Hebrew or English, even when they are used anaphorically, rather than resumptively, as illustrated in (4) with respect to both languages.

(4) **David Ben-Gurion haya* [*rosh ha-memšala šel* Israel]$_i$ *be-1948-53,*
D B-G was head the-government of Israel in-1948-53
ve Yitzhak Rabin haya ***hu***$_i$ *be 1974-77.*
and Y R was him in 1974-77
'*David Ben-Gurion was [the prime minister of Israel]$_i$ in 1948-53,
and Yitzhak Rabin was **him**$_i$ in 1974-77.'

We view it as incontrovertible that the expressions in brackets in (4) denote an individual concept. In G&K's analysis of examples like (1) and (3), the *de-dicto* interpretation crucially requires a construal of the post-copular element as an individual concept. (4) provides evidence that Hebrew (nominative, non-clitic) personal pronouns in post-copular position are not interpretable as individual concepts. We predict on this basis that the resumptive pronoun in (3) excludes this interpretation.

For the sake of completeness, it needs to be pointed out that resumptive pronouns are not always incompatible with a *de dicto* construal, as brought out by the Hebrew example in (5)[2].

(5) *Dani yimca et* [*ha-iSa*$_1$ *Se-hu xolem aleya*$_1$]
Dani will.find ACC the-woman that-he dreams of.her
'Dani will find the woman he is dreaming of.'

Note that the resumptive pronoun in (5) occurs in a position where traces are excluded, since Hebrew disallows preposition stranding (for detailed discussion of the different behavior of Hebrew resumptive pronouns in positions where they do/do not alternate with traces, see Sichel 2014). English does not allow resumptive pronouns in positions where traces are allowed; thus, the literal counterpart of (5), i.e., **Dani will find the woman (that) he is dreaming of her,* is

[1] We thank a reviewer for drawing our attention to this point.
[2] We thank the reviewer mentioned in footnote 1 for drawing our attention to this point as well and for providing the example in (5).

ungrammatical. At the same time, at least some speakers (marginally) allow them in positions where traces are excluded. For such speakers, we offer the English example in (6), which, to the extent that it is acceptable, makes the same point as (5).

(6) ?*The ideal woman*$_i$ *that Bill dreams of her*$_i$ *peerless virtues every night might well turn out not to exist in our world*.

The ability of a pronominal form to exhibit a *de dicto* construal depends on the syntactic context in which it occurs, and possibly also on morphological and semantic factors. This holds not only with respect to **resumptive** pronouns, but also with respect to **anaphoric** pronouns. Illustrations from English and Hebrew are provided in (7)-(8) respectively.

(7) [*The great mathematician Dan claims to be __*]$_i$ *should have solved this calculus problem with greater ease.*

a. ***He***$_i$ *should also have solved this linear algebra problem without difficulty.*
(*de re, ?*de dicto*).

b. ***His***$_i$ *handling of differential equations should also have been more professional.*
(*de re, de dicto*)

(8) [*ha-matematikai ha-gadol*$_i$ *še miriam toenet še avia ha-manoax haya* {**t**$_i$ */ **hu**$_i$*}] *haya carix*
the-mathematician the-great that Miriam claims that father-her the-late was him was must
liftor et ha-ba'aya ha-pšuta ha-hi be-yoter kalut
to-solve ACC the-problem he-simple the-that in-more ease
'The great mathematician that Miriam claims her late father was should have solved that easy problem with greater ease.'

a. ***hu***$_i$ *gam haya carix liftor mišvaot diferencialiot be-cura yoter mikcoit*
he also was must to-solve equations differential in-form more professional
'He also should have solved differential equations in a more professional manner.'
(*de re, ?*de dicto*).

b. *hityahasut-**o***$_i$ *le-mišvaot diferencialiot haya gam carix li-hiot yoter mikcoit*
approach-his to-equations differencial was also must to-be more professional
'His approach to differential equations should also have been more professional.'
(*de re, de dicto*)

In the last example, (8a) is a possible continuation of the first sentence only if the first sentence contains *hu* (and not if it contains a trace), which would result in a *de re* interpretation of the matrix subject. In contrast, (8b) is a possible continuation both when the first sentence contains *hu*, resulting in a *de re* reading, and when it contains a trace, resulting in ambiguity between a *de re* and a *de dicto* interpretation.

The (un)availability of *de dicto* readings for anaphoric and resumptive personal pronouns in various types of syntactic positions and/or exhibiting various types of morphological/semantic properties is certainly a topic of considerable interest, but its thorough examination lies well beyond the scope of this paper. What matters for present purposes is that this option is not available in Hebrew for anaphorically used nominative personal pronouns in post-copular position, as shown in (4), and that this makes possible a non-*ad-hoc* account of the fact that this option is also unavailable for resumptive pronouns, as in (3).

For the sake of completeness, we wish to note that languages sometimes allow a *de dicto* construal of certain anaphoric forms in post-copular position. Thus, anaphoric reference to the nominal property (in the term denoting the individual concept), while impossible in English with an animate pronoun like *him*, is possible with non-animate expressions like *that* or *it,* as shown in (9a). The version with *it* is somewhat degraded, because *it* does not easily allow stress, and in (9a), it needs to be stressed. In a context where stress is not required, as in (9b), *it* is fully acceptable for some speakers (e.g., Christopher Tancredi; p.c.), and marginally possible for others[3].

(9) a. *David Ben-Gurion was* (*the*) [*prime minister of Israel*]$_i$ *in 1948-53, and Yitzhak Rabin was* {*that*$_i$ */?it*$_i$} *in 1974-1977*.
b. *David Ben-Gurion was the* [*prime minister of Israel*]$_i$ *at a time when Yitzhak Rabin wasn't even THINKING of being* { *it*$_i$ */that*$_i$}.

To round off the general picture, we note that data like (9) seem not to exist in Hebrew. We modified (4) by replacing *hu* with *ze* 'this.M.Sg' and *zot* 'this.F.Sg', and submitted both variants to a number of native consultants. Both forms were rejected by all the consultants.

We now wish to point out two problems for the analysis of B&R, one of them particularly serious, which do not arise for G&K.

The first problem concerns again anaphoric reference. With the generalization that anaphoric pronouns in the relevant position cannot refer to individual concepts, G&K rightly predict that the *de dicto* interpretation is absent in (7a) and (8a). But B&R's analysis predicts that no such problem should exist, since in their analysis, the *de dicto* interpretation amounts to *Dan, who claims to be a gifted mathematician* (cf. B&R's example (23), which allows for anaphoric uptake by a personal pronoun just as the *de re* reading). Note also that if an anaphoric expression that **can** denote an individual concept is substituted for *he* in (7a), e.g., *that gifted mathematician,* or for *hu* in (8a), e.g., *ha-matematikai ha-gadol ha-hu* 'that great mathematician', the *de dicto* reading becomes possible.

The second problem, which constitutes – in our view (and in that of a third reviewer) – an insurmountable problem for B&R's analysis, is an observation made by G&K, to the effect that in order to obtain the *de dicto* reading, the main clause needs to be **modalized**, as brought out by the infelicity of (10), which does not comply with this requirement.

(10) #*The gifted mathematician that you claim to be solved the problem effortlessly*.

G&K motivate this by pointing out that the individual concept denoted by the subject has no presupposed extension in the actual world, but a non-modalized predication would require an extension in the actual world[4]. The necessary modalization of the main clause in data like (1) and (10) under a *de dicto* reading of its complex DP subject in fact constituted G&K's principal reason

[3] A second reviewer indicates that (s)he is a native speaker of the latter type.

[4] This requirement does not apply in cases where the existence of the individual concept is asserted, as in *The gifted mathematician that you claim to be is, in my view, an unquestionable reality*.

for basing their analysis on individual concepts, rather than on individuals. In contrast, B&R's approach, which relies on individuals, fails to predict the infelicity of (10) on the *de dicto* interpretation. We submit on these grounds that their analysis, and more generally, any analysis that relies on individuals without also appealing to some mechanism that can deal with the (im)possibility of substitution in opaque contexts (e.g., structured meanings, as in Cresswell and von Stechow 1982), is on the wrong track.

B&R actually offer two analyses, one that does not rely on individual concepts and seeks to account for the *de-dicto* interpretation of (1) by syntactic movement of the NP *gifted mathematician*, and one that constructs an individual concept by syntactic movement (cf. their appendix). As far as we can see, the latter analysis, unlike the former, can deal with (7a) and (8a), as well as with (3), by taking into account the generalization that emerges from (4). But this second analysis constitutes little more than a notational variant of G&K's analysis, whose main point was that the additional complexities of syntactic reconstruction are, while possible, not necessary, once individual concepts are assumed.

We close this brief note by addressing a remark of B&R, who argue that the type shift assumed by G&K should not be available because it is not used independently (their footnote 5). We would like to stress that G&K motivate this type shift with reference to the structurally similar analysis of functional constituent questions in Engdahl (1986), and functional relative clauses in Jacobson (1994). The functional relative clause *the relative (of his) that every boy likes* is analyzed as involving a type shift of *the relative* from a relation-in-intension ⟨e,⟨e,t⟩⟩ to a property of functions ⟨⟨e,e⟩,t⟩, whereas the de-dicto interpretation of *the gifted mathematician that you claim to be* is analyzed as involving a type shift from the property denoted by *gifted mathematician*, type ⟨s,⟨e,t⟩⟩, to a predicate of individual concepts, type ⟨⟨s,e⟩,t⟩ (see G&K for details). The treatment of indices, type s, as a sort of entities that can be quantified over was introduced in Gallin (1975) and defended in Zimmermann (1989), and is widely accepted as a framework of intensional logic for natural-language semantics.

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