Attributive *wrong* in underspecified semantics

Manfred Sailer
Goethe-University Frankfurt a.M.

Abstract

Attributive *wrong* as in *Alex opened the wrong bottle* shows a non-local reading, i.e., its meaning is not local to the noun phrase but interacts with the meaning of the rest of the sentence. I argue that previous accounts did not assume the correct semantics for attributive *wrong* and cannot account adequately for its restriction to the definite article. I present an analysis within a framework of underspecified semantics that (i) treats *wrong* as an ordinary adjective in how it combines with the head noun, (ii) captures its non-local readings, (iii) accounts for the definiteness restriction, and (iv) shows the parallels between non-local and local readings.

Haïk (1985), Larson (2000), and Schwarz (2006) argue that attributive *wrong* systematically shows non-local readings. Schwarz' running example is given in (1), together with his paraphrase for the intended reading.

(1)   I opened the wrong bottle of wine.
       "I opened a bottle that it was wrong for me to open."

I will show that this analysis does not capture the non-local meaning of *wrong* adequately. Instead, I will argue that the sentence is ambiguous between the two readings in (2).

(2)   a.   The bottle that I opened was not the one I was supposed to open.   (P)
       b.   The bottle that I opened was the one I was not supposed to open.   (B)

I call the reading in (2-a) the P(olice)-reading (*The police arrested the wrong person.*) and the one in (2-b) the B(luebeard)-reading (*Bluebeard's wife opened the wrong door.*). I will propose a new semantics of attributive *wrong* and show how it can handle known and new empirical observations and solve provlems of earlier analyses. I will sketch an analysis within a framework of underspecified semantics and relate non-local and local readings of attributive *wrong*.

1   The meaning of *wrong*

The P- and the B-readings come with distinct assertions and presuppositions, which are given in (3) and (4) respectively.

(3)   The police arrested the wrong person.
       a.   presupposes: There is a unique person x that the police arrested.
       b.   presupposes: There is a unique person x' that the police should arrest.
       c.   asserts: x is not x'.

(4)   Bluebeard's wife opened the wrong door.
       a.   presupposes: There is a unique door x that Bluebeard's wife opened.
       b.   presupposes: There is a unique door x' that Bluebeard's wife should not open.
       c.   asserts: x is x'.

In both readings, the uniqueness of an actually arrested person or opened door is presupposed. In addition, *the wrong N* presupposes a unique entity in the denotation of N which should be arrested (P) or should not be opened (B). This is also assumed in (Schwarz, 2006).

If we form a yes/no question from the sentences, the presuppositions are still valid, see (5) and (6). For example, in (5), the police arrested a unique person and the police should have arrested a unique person. We are only inquiring whether these two are non-identical.

(5)   Did the police arrest the wrong person?

(6)   Did Blueb.'s wife open the wrong door?

Similarly, in (6), there is a unique door that Blue-beard's wife opened and a unique door she is not supposed to open. The question is just about whether these doors are the same.

To capture this behavior, I propose the semantic representations in (7) and (8), in which the meaning of *wrong* is decomposed into an obligation operator, **SHOULD**, negation, and the presuppositions from (3) and (4). The decriptive content of the ι-terms are presupposed. The readings only differ with respect to the scope of negation. In the P-reading the negation part of the assertion, in the B-reading it is inside the second ι-term.

(7)   P: $\neg(\iota x : \mathbf{pers}(x) \wedge \mathbf{arr}(\mathbf{pol}, x))$
        $= (\iota x : \mathbf{pers}(x) \wedge \mathbf{SHOULD}(\mathbf{arr}(\mathbf{pol}, x)))$

(8)   B: $(\iota x : \mathbf{door}(x) \wedge \mathbf{op}(\mathbf{a}, x))$
        $= (\iota x : \mathbf{door}(x) \wedge \neg\mathbf{SHOULD}(\mathbf{op}(\mathbf{a}, x)))$

While my analysis uses two ι-terms, there is an asymmetry between them. In the P-reading, the noun phrase *the wrong bottle* in (1) can serve as antecedent for a pronoun referring to the bottle that was actually opened, but not to the one that should have been opened, see (9).

(9)   Unfortunately, its cork broke.
        #Unfortunately, I didn't find it in the cellar.

This shows that the first ι-operator is contributed by the overt definite determiner in English. The second ι-operator is only contributed by the adjective *wrong*, i.e., it is sublexical and, consequently, not accessible as an antecedent for discourse anaphora. This is parallel to other adjectives, see (10): *presidential envoy* means "the envoy of the president", but *him* cannot refer to the president.

(10)   The president$_i$-ial envoy informed him$_{*i}$
        about the state of the negotiations.

2   Challenges for previous approaches

Haïk (1985), Larson (2000), and Schwarz (2006) only discuss the P-reading They agree on the paraphrase in (1) and relate the non-local reading to propositional *wrong* as in *It was wrong for me to open this bottle*. Schwarz (2006) points out problems for the earlier, more syntactic approaches.

Schwarz (2006) discusses the uniqueness properties of *wrong*, but they are not part of his fi-nal analysis, as he assumes with (Abbott, 2001) that *the wrong N* is indefinite, based on the example *There was the wrong address on the envelope*. However, we find definite noun phrases in this construction, such as *There was my address written on the note* (www), and there is no occurrence of *the wrong N* in existential sentences in COCA (www.english-corpora.org/coca/). This weakens the claim that *the wrong N* is indefinite.

The restriction to the definite article is a major problem for all previous accounts. Schwarz stipulates that *the wrong* is a lexical unit, suggesting that *the* and *wrong* cannot be separated. This cannot be true as we find natural occurrences of *the very/completely/ ... wrong N* in corpora.

Morzycki (2014) argues for other adjectives with non-local readings that their occurrence restriction to a definite determiner (as *The average American has 2 children*) follows from a kind-reading of the noun. This is not applicable to *wrong*: all our examples involved a concrete bottle/door/person that is (not) supposed to be opened/arrested.

Larson (2000) stipulates that the definite article is a consequence of some superlative-like properties of *wrong*. Papiamentu (Portuguese-Spanish-Dutch-based creole of the ABC-Islands) provides evidence against this. Papiamentu has an indefinite and a definite article, but uses no article for (globally or situationally) unique nouns, such as *solo* "sun" (Kester and Schmitt, 2007). We find the definite article *e* in superlatives, but not with attributive *robes* "wrong":

(11)   El a tuma [*(e) mihó desishon]/
                [*(e) desishon mas importante]
        S/he has taken the best decision/
                the decision most important
        "S/he made the best/most important decision."

(12)   El a tuma (*e) desishon robes.   (P)
        S/he has taken the decision wrong
        "S/he made the wrong decision."

The Papiamentu data show what kind of definiteness we are dealing with: semantic definiteness, i.e., a presupposed, unique individual (Löbner, 2011). It is not an anaphoric definite nor a predicate with a unique value (as in the superlative above or in **(e) úniko N* "the only N"), all of which require the article *e*. This is exactly what the analysis above predicts.

3 Underspecified semantics of *wrong*

I will sketch an analysis within underspecified semantics – Pinkal (1999) and Egg (2011) for an overview. Using *Lexical Resourse Semantics*, LRS, (Penn and Richter, 2004), I can build on the analyses of *different* in (Lahm, 2016) and scope ambiguity of modal operators in (Park et al., 2018). Following Lahm (2016), I analyze *wrong* as an ordinary subsective modifier from the point of view of its noun-phrase-internal combinatorics, but with an additional non-local meaning component that is taken care of by the scope resolution mechanism of LRS.

In LRS, words contribute bits of semantic representation together with constraints on how these should be put together in the overall logical form. Ambiguity arises whenever these constraints do not fully specify the relative embedding of the components. Lexical specifications contain so-called *holes*, i.e. metavariables (α, β, ...), that allow for other semantic material to be inserted. Embedding constraints such as $\alpha[\beta_1, \ldots \beta_n]$ express that the value of α, it must contain the expressions $\beta_1, \ldots, \beta_n$ as subexpressions. LRS makes use of lexical decomposition and adds holes wherever scope ambiguity is possible.

LRS flags some of the bits of the semantic representation contributed by a sign as they are important for embedding constraints at the syntax-semantics interface. These include the *external content* (Penn and Richter, 2004). Lahm (2016) states that for intersective adjectives, the external content of the adjective has the form $\alpha[x] \land \beta[x]$. It is, then, enforced in at the interface that x be the referential index of the head noun and that the content of the head noun be a subexpression of α.

In Lahm's analysis, *different* is like an intersective adjective from the point of view of noun-phrase-internal combinatorics, but contributes semantic material that scopes over its external content. This material takes care of the non-local effects. My analysis of attributive *wrong* will be along the same lines. The lexical constraints for attributive *wrong* are given in (13). For clarity, I underline the external content of the word *wrong*. Details will be explained in the following.

(13) Lexical constraints of attributive *wrong*:
$$\gamma[(\iota x : [\underline{\alpha[x] \land \beta[x]}])$$
$$= (\iota x : \alpha \land \epsilon[\textbf{SHOULD}(\beta)]),$$
$$\neg\delta[\textbf{SHOULD}(\beta)]$$

Attributive *wrong* is a subsective modifier, i.e., *the wrong bottle* must be a bottle. This is reflected in its external content, which is just as described above for intersective adjectives, i.e., it is of the form $\alpha[x] \land \beta[x]$. When combining with the noun *bottle*, the noun's contribution, $\textbf{bottle}(x)$, will be a subexpression of α.

As to the non-local semantics, the adjective makes four main contributions: (i) it turns the noun into a unique noun, i.e. into a semantically definite expression, (ii) it asserts an identity statement, $(\iota x : \alpha \land \beta) = (\iota x : \alpha \land \epsilon)$, (iii) it expresses a modal operator, $\textbf{SHOULD}$, and (iv) negation, $\neg\delta$.

Ad (i): The Papiamentu data showed that *wrong N* is a semantically definite expression like *sun* or *queen*. Consequently, languages like Papiamentu do not use a definite determiner with it. Languages that require a determiner, like English, use a semantically empty or redundant definite article, see (Ortmann, 2014) or, for an LRS analysis, (Sailer and Am-David, 2016). In (13), the ι-term containing the external content of the adjective, $\iota x : \alpha \land \beta$, is the relevant part for ensuring the semantic definiteness of the the overall noun phrase.

Ad (ii): The identity statement relates the semantically definite referent of the noun phase to another, presupposed, unique element: $(\iota x : \alpha \land \epsilon)$. In the P-reading, this is the bottle (α) that should be opened (ϵ).

Ad (iii): The adjective contributes a modal operator of obligation, indicated as $\textbf{SHOULD}$. This operator has scope over the VP of the clause. The operator occurs inside the second ι-term in the lexical entry, the one determining the implicit unique element to that should (or should not) have been opened or arrested in our examples.

Ad (iv): The meaning components (i)–(iii) would be the same also for attributive *right*. The semantics of *wrong*, in addition, contains a negation that takes scope over an obligation operator, $\textbf{SHOULD}$, indicated by the subexpression $\neg\delta[\textbf{SHOULD}(\beta)]$. The holes are used to allow to account for the two distinct readings. Given the constraints in (13), the negation could take wides scope, i.e., δ contains the identity statement), which leads to the P-reading. Alternatively, the negation could take narrow scope and be inside ϵ, which corresponds to the B-reading.

As mentioned above, when the adjective combines with the head noun, the head noun's semantics is constrained to be a component of α.

The semantic constraints collected for *wrong N* are compatible with a (weak) definite article. The weak definite article would be semantically empty (Ortmann, 2014) or contribute a ι-operator redundantly, i.e., an operator that is identical to the operator contributed by *wrong*. The latter is the standard analysis of semantic concord phenomena in LRS (Richter and Sailer, 2004) and the analysis of unique nouns in (Sailer and Am-David, 2016). For being consistent with the previous LRS literature, I will adopt the latter analysis.

In English, the definite article determines the external content of the noun phrase, i.e., the ι-term contributed by the article is the external content of the overall noun phrase. This expression is the one containing the external content of the adjective. The external content of a noun phrase is what is used to determine the discourse referent it makes available. In (14), the accumulated constraints are given for *the wrong bottle*. In this representation, the noun phrase refers to the unique bottle that had been opened ($\iota x : \alpha \wedge \beta$).

(14) Accumulated constraints for *the wrong bottle*:
$$\gamma[(\iota x : \mathbf{bottle}(x) \wedge \beta[x]])$$
$$= (\iota x : \mathbf{bottle}(x) \wedge \epsilon[\mathbf{SHOULD}(\beta)]),$$
$$\neg \delta[\mathbf{SHOULD}(\beta)]$$

Next, we can include the semantic contributions of the rest of the sentence. We can only integrate them as part of β. This captures the fact that sentences with attributive *wrong* assert (non-)identitiy statements rather than propositions related to the semantics of the verb in the sentence, an opening or arresting in our examples. In (15), the constraint is given for sentence (1).

(15) Accumulated constraints for (1):
$$\gamma[(\iota x : \mathbf{bottle}(x) \wedge \mathbf{open}(\mathbf{I}, x])$$
$$= (\iota x : \mathbf{bottle}(x) \wedge$$
$$\epsilon[\mathbf{SHOULD}(\mathbf{open}(\mathbf{I}, x)]),$$
$$\neg \delta[\mathbf{SHOULD}(\mathbf{open}(\mathbf{I}, x))]$$

There are only two possibilities to resolve the remaining meta-variables: For the P-reading, the negation has wide scope, i.e.:
$$\gamma \equiv \neg \delta, \qquad \delta \equiv (\iota x : \ldots) = (\iota x : \ldots), \text{ and}$$
$$\epsilon \equiv \mathbf{SHOULD}(\ldots).$$
In the B-reading, the negation has narrow scope:
$$\gamma \equiv (\iota x : \ldots) = (\iota x : \ldots),$$
$$\epsilon \equiv \neg \delta, \text{ and} \qquad \delta \equiv \mathbf{SHOULD}(\ldots).$$

4 *The wrong* vs. *a wrong*

As *wrong N* is a semantically definite expression, it combines naturally with a definite article in English. In COCA, there are 16,917 hits of *the wrong N* and 952 hits of *a wrong N*, i.e. 5% of indefinite occurrences. For established unique nouns, we find a similar low percentage of indefinite uses (1% for *sun*, 5% for *pope*).

Larson (2000) and Schwarz (2006) observe that *a wrong N* does not allow for non-local readings. A corpus survey of confirms this observation. Even cases like (16) express a local reading of *wrong*: The speaker will answer only if a number has been dialed that does not exist, i.e., if there is an "incorrect" number, not whenever you have dialed a number that you did not intend to dial.

(16) I also do other intercept messages, when you dial a wrong telephone number, [...] That's me. (COCA)

The present analysis predicts exactly this. There is no way to combine the semantics of an existential determiner with that of *wrong N*.

5 Local readings of attributive *wrong*

Previous studies of attributive *wrong* are restricted to non-local readings and have discarded local readings as uninteresting. However, I would like to stress the connection between local and non-local readings of attributive *wrong*. To see this, consider example (17). There, *a wrong note* refers to a note that is incorrect in the sense that it is not part of the intended chord.

(17) Students see a four-part chord and hear it played with a wrong note. (COCA)

The basic idea pursued here is that in the local reading what should have been done to the referent of the noun phrase, the note in (17), is inferred from the context. This is sketched in the semantic representation in (18), where I use $\mathbf{SH}$ to abbreviate $\mathbf{SHOULD}$.

(18) $\exists x (\mathbf{note}(x) \wedge$
$\neg (x \in \{x | \mathbf{note}(x) \wedge \mathbf{SH}(P(x))\}$
$\wedge \mathbf{play}(x)),$
where P can be inferred.

The representation in (18) states that there is a note such that it is not among the notes that should occur ($P(x)$) and it was played.

This reading can be derived by using the lexical semantic contribution of local attributive *wrong* in (19). As indicated by the underlining, the entire expression is the external content. This makes it a *local* adjective in the sense that there is no contribution of the adjective that contains its own external content.[1]

(19) Lexical constraints of local *wrong*:
$$\underline{(\alpha[x] \wedge}$$
$$\underline{\beta[x \in \{x | \alpha \wedge \epsilon[\textbf{SHOULD}(P(x))]\}},$$
$$\underline{\neg\delta[\textbf{SHOULD}(P(x))]]),}$$
where P can be inferred.

With this lexical specification, local attributive *wrong* is compatible with all determiners, including both the definite and the indefinite article, while non-local *wrong* only allowed for a redundant definite article.

Nonetheless, the presented representation of the local readings shares major parts with that of the non-local reading. An important difference is the inferred predicate P, which is not necessarily identical with the main predicate of the clause. In the non-local readings, the predicate in the scope of the modal operator **SHOULD** needs to be the same as the predicate in the clause. This latter identity is what gave rise to the impression that *wrong N* takes scope over a VP, as encoded syntactically in the analysis in (Haïk, 1985).

Let me briefly illustrate some options for inferring the predicate P. In (16), P would be something like "do a valid dialing", i.e., whenever a person dials a number that is not among the valid numbers, they end up talking to the speaker of (16). This choice of P is a contextual restriction of the expressed predicate of the clause.

A further clear example of a deviance of the predicate expressed in the sentence and the one that occurs in the scope of the modal operator is given in (20). Here, *a wrong decision* refers to a decision that should not have been made, not to a decision that should (not) be overturned.

(20) "Institutional integrity" turns out to mean the Court must not overturn a wrong decision if there has been angry opposition to it. (COCA)

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[1] I assume that there could be local analogues of P- and B-readings, depending on whether the negation takes scope over $x \in \{\ldots\}$ (P-reading) or just scope over **SHOULD** (B-reading).

The example with the noun *decision* shows that with deverbal nouns, the inferred predicate is often the verb contained in the noun, as in *a wrong answer/assumption/perception/. . . .* In other cases, it is the predicate that is part of a highly common expression with the head noun, such as *a wrong way [to do s.th.]*.

6 Conclusion

I presented new data and a new analysis of attributive *wrong*. My approach captures the basic dilemma that non-local *wrong N*-combinations are definite, but that there are typically more than one N that would could count as "wrong". It makes the correct predictions as to what is presupposed, what discourse referent is established for anaphoric reference, and as to the type of definiteness.

The use of LRS makes it possible to combine the attributive adjective with the head noun just like ordinary subsective modifiers. In addition, non-local semantic material can be contributed by the adjective. In the case of *wrong*, the non-local semantic contribution is rather complex, but necessary to account for its observed empirical properties. This type of analysis is parallel to the analysis of *different* in (Lahm, 2016), showing that LRS is a suitable framework for puzzles at the syntax-semantics interface.

My analysis accounts for the unavailability of non-local readings with *a wrong N*. At the same time, it is the first approach to discuss the local readings as well and to point out the systematic similarities and differences between local and non-local readings of attributive *wrong*.

There are two natural ways to broaden the presented research. First, focussing on English, it seems that all uses of *wrong* – the two attributive and the predicative, propositional use mentioned in (Schwarz, 2006) – have the basic meaning component $\neg\delta[\textbf{SHOULD}(\ldots)]$. Are these three uses related by a productive process of English or is it a mere coincidence that we have three possible ways of introducing these basic meaning components of *wrong* into a sentence? Second, it would be insightful to include the expression of *wrong* in other languages in the picture. French, for instance, seems to use the same adjective, *mauvais* "bad", for both attributive readings of *wrong*, but a different one, *faux* "false", for propositional *wrong*.

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