

La temperatura es de 30 grados y subiendo: a case in concept-formation

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The example in (1) is a case of an ill-formed inference due to the referential opacity effect induced by the verb *subir*.

In the analysis by Montague (1970) of the temperature paradox, it was suggested that the definite description *la temperatura* is assigned an intension and an extensión. The intension consists of a function that assigns a number in the scale of degrees for each world-time index. The extension at a given index will be a number, e. g., 30. The verb *subir* selects for intensions as arguments so that it creates an opaque context in its argument position. The sentence (1a) asserts that the function denoted by *la temperatura* returns rising values as the value of the function. On the contrary, 30 denotes a number or a constant function that does not change at indices. The sentence (1b) asserts that the value of the function *la temperatura* at the index of evaluation is 30. Therefore, (1c) is necessary false or lacks a truth value.

This analysis has been criticized on different grounds (Jackendoff 1979, Thomason 1979, Löbner 1981), especially by Lasersohn (2005). For Lasersohn, the analysis of *la temperatura* as a function whose value changes temporally is not necessary, (2).

With the help of the presuppositional analysis of definite descriptions as in (3a), Lasersohn explains the temperature paradox as a case of non-identity of intensions in the argument position of the intensional-argument taking verb *subir* as shown in (3c).

However, it is possible to conjoin a predicate of identity of individuals as *ser* with a predicate that selects for individual concepts, type $\langle s, e \rangle$, such as *subir*. The sentence in (4a) could suggest that the presuppositional analysis of the definite description *la temperatura* may not be correct, since we will have a type mismatch between the type of the argument of *ser*, $\langle e \rangle$, and the type of the argument of *subir*, type $\langle s, e \rangle$. The fact that the sentence is semantically coherent may suggest that the definite description *la temperatura* is being interpreted as a function denoting expression as originally suggested by Montague (1970).

Moreover, note that the definite description *la temperatura* does not necessarily take individuals, i. e., numbers, as its denotation. The value of the function *la temperatura* may be some element of a qualitative scale such as $\langle \text{baja, templada, calurosa, asfixiante} \rangle$ as in (5) for which a presuppositional analysis does not seem to be feasible (Kayser 1988, 2003). Note that the inference in (6) is a piece of valid reasoning, albeit not everyday Spanish, suggesting that when the value of the function denoting expression *la temperatura* is a value capable of change over indices the temperature paradox dissolves (compare with (2)).

- (1) a. La temperatura está subiendo.
The temperature is rising
'The temperature rises.'
- b. La temperatura es de 30 grados.
The temperature is of thirty degrees
'The temperature is thirty degrees.'
- c. \neq 30 está subiendo.
Thirty is rising
'Thirty rises.'

- (2) To know that a particular value is the temperature at a given moment, a single snapshot suffices, and snapshots taken at other times are essentially irrelevant.
(Lasersohn 2005, pp. 131-132)

- (3) a. $\llbracket \text{temperature}'(u) \rrbracket^{\mathcal{M},i,j,g} = \begin{cases} a \leftrightarrow a \text{ is the unique object} \\ \text{such that } \llbracket \text{temperature}'(a) \rrbracket^{\mathcal{M},i,j,g(a/u)} = 1, \\ \text{undefined otherwise.} \end{cases}$
- b. $\text{temperature}'(u) \neq 30$
- c. $\text{subir}'(\text{temperature}'(u)) \neq \text{subir}'(30)$
- (4) a. La temperatura es de 30 grados y subiendo.
- b. $\llbracket \text{temperature}'(u) \rrbracket^{\mathcal{M},i,j,g} (\llbracket (\lambda x_{\langle e \rangle} [\forall x = 30] \wedge \text{subir}'(x_{\langle s, e \rangle})) \rrbracket^{\mathcal{M},i,j,g})$
- (5) La temperatura es baja.
The temperature is low
'The temperature is cold.'
- (6) a. La temperatura está subiendo.
The temperature is rising
'The temperature rises.'
- b. La temperatura es baja.
The temperature is low
'The temperature is cold.'
- c. \models Lo bajo (de la temperatura) está subiendo.
the cold of the temperature is rising
'The cold value of the temperature rises.'

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