K. Felka. *Talking about Numbers: Easy Arguments for Mathematical Realism*. Frankfurt: Vittorio Klostermann, 2016. 188 pp. €49,00. ISBN 978-3-465-03879-5.

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Author's note: the published version of this review contains a significant copyediting error. In example (7), the strikethrough text representing syntactic ellipsis was misrepresented. This is the final version as it was sent to the publisher, before the error was introduced.

In §57 of the *Foundations of Arithmetic*, Frege famously turns to natural language to support his claim that numbers are 'self-subsistent objects':

> I have already drawn attention above to the fact that we speak of 'the number 1', where the definite article serves to class it as an object. In arithmetic this self-subsistence comes out at every turn, as for example in the identity $1 + 1 = 2$. Now our concern here is to arrive at a concept of number usable for the purposes of science; we should not, therefore, be deterred by the fact that in the language of everyday life number appears also in attributive constructions. That can always be got round. For example, the proposition 'Jupiter has four moons' can be converted into 'the number of Jupiter's moons is four'. ...what we have is an identity, stating that the expression 'the number of Jupiter's moons' signifies the same object as the word 'four'. And identities are, of all forms of proposition, the most typical of arithmetic. (*Frege 1884*, §57)

Whatever the status of this argument is in Frege's overall project, it is clear from this passage that he thinks a sentence like 'Jupiter has four moons' is equivalent to, or at least implies, the related sentence 'the number of Jupiter's moons is four'. He also thinks that the second sentence should be analyzed as an identity statement containing two singular terms, and that this analysis reveals that numbers really do play the role of objects in our language and thought.

Some recent literature, however, has called Frege's analysis into question on the basis of more careful attention to the linguistic facts.[1] Katharina Felka's book *Talking About Numbers: Easy Arguments for Mathematical Realism* is a new contribution to this literature. The book, which is based on Felka's 2014 dissertation, proposes an analysis on which sentences like 'the number of Jupiter's

[1]This literature largely stems from Hofweber (*2005*) and Hofweber (*2007*). See especially Brogaard (*2007*), Moltmann (*2013*), Balcerak Jackson (*2013*), Felka (*2014*), Knowles (*2015*), and Lawrence (*2017*). Much of this literature can be seen as developing the 'adjectival strategy' of analysis for number terms in natural language discussed by Dummett (*1991*).

moons is four' are not identity statements, but question-answer pairs.

The book centers on an 'easy argument' for the existence of numbers which is reminiscent of Frege's remarks in §57 of the *Foundations*. The argument turns on the relationship in pairs of sentences like the following, which is the example running throughout the text:

(1) Mars has two moons.

(2) The number of moons of Mars is two.

The argument exploits two assumptions about these sentences which seem natural, though they lead to a surprising result. First, the two sentences are equivalent: it is hard to see how either sentence could be true while the other was false. Second, sentence (2) is 'ontologically loaded': its truth requires that there is an object which is the reference of the singular terms 'two' and 'the number of moons of Mars', so it implies that numbers exist. (In sentence (1), by contrast, the word 'two' can be analyzed as a quantifier rather than a singular term, so the sentence is ontologically 'innocent'.) The argument then proceeds as follows. Sentence (1) states an uncontroversial astronomical truth. Because the sentences are equivalent, (2) must also be true. But the truth of the second sentence implies the existence of numbers. So numbers must exist.

What is surprising, given the long history of debate about whether numbers and other abstract objects exist, is that this conclusion seems so easy to establish. Where does the argument go wrong? The central chapters of the book explore four different answers to this question, based on positions in the contemporary literature. The chapters on 'Fictionalism' (Chapter 4) and 'Indifferentialism' (Chapter 5) discuss views which accept the Fregean analysis of (2), but reject the inference from (1) to (2) as unsound. After criticizing these views, Felka discusses two non-Fregean analyses of (2) in the chapters on 'Focus Constructions' (Chapter 8) and 'Question-Answer Pairs' (Chapter 9). She argues that (2) is indeed equivalent to (1), but it is neither an identity statement nor ontologically loaded, so the easy argument fails.

The book itself is easy to navigate. The chapters are well organized and the writing is thoroughly sign-posted. The bibliography is quite complete, and Felka is careful to cite relevant literature throughout the text. The book's index, however, leaves something to be desired. For example, there is no entry for 'focus', despite the important role this concept plays in both chapters 8 and 9.

I will limit my comments to Felka's positive view (developed in Chapter 9), which is what will most interest this journal's readers. Felka's alternative analysis starts from the observation that (2) is a *specificational sentence*. Specificational sentences are copular sentences in which the post-copular phrase 'specif[ies] who (or what) someone (or something) is' (p. 152). They contrast with *predicational* copular sentences, in which the post-copular phrase is predicated of the pre-copular phrase. For example:

(3) The second planet from the Sun is very bright. (predicational)

(4) The second planet from the Sun is Venus. (specificational)

Whereas the predicational sentence gives one of the *properties* of the second planet from the Sun, the specificational sentence says *which* thing the second planet from the Sun is. In a parallel manner, (2) says which thing the number of moons of Mars is, namely, two.

One important reason for treating (2) as a specificational sentence is that specificational sentences exhibit *intonation-independent focus* (pp. 152–154). Intuitively, a focused sentence stresses or emphasizes some part of the information it communicates. This emphasis affects the sentence's role in discourse: a focused sentence is generally only appropriate as an answer to questions that ask for the focused information. Most copular sentences do not exhibit focus without special intonation, but in specificational sentences, the post-copular phrase is always focused. Thus, for example, (4) is an appropriate answer to 'What is the second planet from the Sun?' but not to 'What is Venus?' or 'Which planet is Venus?'. Similarly, (2) exhibits focus on 'two': it can answer 'What is the number of moons of Mars?', but not 'What is two?' or 'Which planet has two moons?'. This is evidence that it it is a specificational sentence, rather than some other kind of copular sentence.

There is ongoing debate in the linguistics literature about how best to analyze specificational sentences, at both the syntactic and semantic levels.[2] Examples like (4) are easily construed as identity statements; but other examples point to differences between specificational sentences and identities. Felka cites two considerations for keeping the two categories apart (pp. 155–158). For one thing, there are specificational sentences in which the post-copular phrase is not a singular term, such as:

(5) How Valium soothes is by blocking that neurotransmitter.

Here, 'by blocking that neurotransmitter' specifies how Valium soothes. But it is an adverbial phrase, not an expression that stands for a particular object, so it is unattractive to analyze (5) as containing two singular terms flanking a sign of identity. The second, more significant consideration is that specificational sentences exhibit so-called *connectivity effects*. Briefly, the idea is that if specificational sentences are simply identities, then we cannot explain examples like

(6) The person John likes is himself.

An identity analysis predicts that certain post-copular expressions in such examples occur in the wrong syntactic configuration to be licensed by their pre-copular antecedents. In this case, for example, the identity analysis cannot account for the fact that 'himself' is bound by 'John'.

Drawing inspiration from examples like (5), Felka instead adopts the view that specificational sentences are question-answer pairs. According to this view, the pre-copular phrase of a specificational sentence is an indirect question, and the post-copular phrase answers that question. Both phrases are full

[2]See Mikkelsen (*2011*) for an overview.

clauses that may be elided, according to accepted principles of syntactic ellipsis. There is good, though not decisive, empirical support for this view in the linguistics literature. For the purposes of this review, it is sufficient to note that the question-answer analysis gives plausible explanations of the unique features of specificational sentences, including both their connectivity effects and the fact that they exhibit a fixed focus on the post-copular phrase.

Felka thus proposes that (2) should be analyzed as follows:

(7) [~~What~~ the number of moons of Mars ~~is~~] is [~~Mars has~~ two ~~moons~~].

The pre-copular phrase is the elided indirect question 'What the number of moons of Mars is', and the post-copular phrase is the elided answer 'Mars has two moons' – the same sentence, before ellipsis, as (1). If this is correct, then the occurrence of 'two' in the post-copular phrase is playing the same semantic role in (2) as it plays in (1): it is a quantifier, not a singular term, *contra* Frege's analysis. The analysis also explains why (1) and (2) seem to be obviously equivalent, a fact which remains puzzling on Frege's analysis. According to Felka's question-answer approach, a specificational sentence is true just in case the post-copular answer is true and it completely answers the pre-copular question. Assuming that 'Mars has two moons' does indeed completely answer 'What is the number of moons of Mars?', (2) will then be true just in case (1) is true.

The final analysis, then, is a serious alternative to Frege's own, and worthy of further discussion. I would like to suggest one point from which such discussion might begin. On Felka's analysis, the pre-copular question in (2) still contains the definite description 'the number of moons of Mars'. This is because Felka assumes that the pronounced pre-copular phrase must be generated from the question by syntactic ellipsis, which is not obviously the right approach.[3] On the one hand, 'Mars has two moons', with focus on 'two', seems more naturally taken as answering 'How many moons does Mars have?' than 'What is the number of moons of Mars?'. On the other hand, a Fregean might wonder why the latter question does not introduce commitment to numbers as abstract objects, even if Felka is right to deny that its *answer* does.

Felka in fact allows that the question 'pragmatically presupposes' that numbers exist as abstract objects, but denies that this presupposition is entailed, because the question has true and complete answers (namely (1)) that do not entail it (pp. 166–168). This merely puts off the real issue, though, which is that (2) seems to invoke a *substantive* concept of number – a sortal concept, true or false of individual objects, expressed by the noun 'number'. That is why the sentence seems ontologically loaded in comparison to (1), and that is what an anti-Fregean needs to explain away. An anti-Fregean needs to show that *all* uses of 'number' commit us to no more than our innocent uses of number words as quantifiers do, including outside of questions, in such seemingly obvious truths as 'Two is a prime number'. Felka recognizes that her analy-

[3]Felka discusses this issue, but without decisively arguing for the ellipsis approach, in her (*2014*).

sis only lends the anti-Fregean limited support for this project; but the issue deserves more attention in future work.

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