Sameness of Fregean sense

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Abstract   This paper develops a criterion for sameness of Fregean senses. I consider three criteria: logical equivalence, intensional isomorphism, and epistemic equipollence. I reject the first two and argue for a version of the third.

Keywords   Sense · Identity · Cognitive equivalence · Logical equivalence · Intensional isomorphism · Epistemic equipollence

The aim of this paper is to develop a criterion for sameness of Fregean senses. I will consider three criteria: logical equivalence, intensional isomorphism, and epistemic equipollence. After critically discussing these three criteria (Sects. 1–3), I will develop a version of epistemic equipollence (Sect. 4), show how the developed criterion applies to subsentential expressions (Sect. 5), and then show how it applies if one holds that senses are environment-dependent (Sect. 6).

Frege remarks on the question of sameness of sense in many passages giving examples for sentences or expressions that he considers to have the same or distinct senses. However, he only considers the issue in some detail on five occasions. In four of these passages, he addresses the sameness of sentential sense and in one the sameness of subsentential sense.[1] I will take a close look at each of these passages.

Frege's remarks about sameness of sense stand in conflict with one another. So in order to assess the passages and, more generally, to evaluate possible criteria for

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[1] The relevant passages are in his "Über die Begriffsschrift des Herrn Peano und meine eigene" in 1897/1984, p. 241; in a letter to Russell from 20 October 1902, in 1976/1980, p. 153; in a letter to Husserl from 9 December 1906 in 1976/1980, pp. 105–106/pp. 67–69; a passage from his 1906 manuscript *Kurze Übersicht meiner logischen Lehren* in 1969/1979, pp. 213–214/pp. 197–198; and in a letter to Jourdain from 28 January 1914, in 1976/1980, p. 80.

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sameness of sense, it will be helpful to articulate desiderata that a same-sense criterion should satisfy. There are two main desiderata: one is that expressions that have the same sense ought to be intersubstitutable *salva veritate* in contexts of belief ascription.[2] So if one holds a certain proposition to be true, then one ought to hold any proposition true that has the very same sense. It is important that this desideratum is formulated as being a matter of what one *ought* to be able to substitute, rather than what one can substitute. Someone may have inconsistent beliefs or may not be a competent speaker of her language. As a consequence, it may not be possible to substitute *A* with *B* in contexts of beliefs that she *endorses*, despite *A* and *B* having the same sense. This is compatible with it being the case that *A* and *B* *ought* to be intersubstitutable. A second desideratum for a same-sense criterion is that it should be as widely applicable as possible. The same principle should apply to both sentences and subsentential expressions; and it should apply to all sentences regardless of whether they are simple, complex, contingently true (or false), or necessarily true (or false). I will say more about each of these two desiderata in the course of this paper, but for now these short statements will do.

Before I address the criterion for sameness of sense, it will be helpful to make explicit one assumption. I am assuming that it is sentence- and expression-tokens that have senses. There may be a good use of the sense of sentence- and expression-types, however that is not the notion of sense that I am considering in this paper. Most of what I say can easily be applied to sentence- and expression-types in a given context.

1 Logical equivalence

In a letter to Husserl from 1906, Frege considers logical equivalence as the criterion for sameness of sense. He writes:

> It seems to me that the only possible means of deciding whether sentence *A* expresses the same thought as sentence *B* is the following, and here I assume that neither of the two sentences contain a logically self-evident component part in its sense. If both the assumption that the content of *A* is false and that of *B* true and the assumption that the content of *A* is true and that of *B* false lead to a logical contradiction, and if this can be established without knowing whether the content of *A* or *B* is true or false, and without requiring other than purely logical laws for this purpose, then nothing can belong to the content of *A*, as far as it is capable of being judged true or false, which does not also belong to the content of *B*; for there would be no basis at all in the content of *B* for any such surplus, and according to the presupposition above, such a surplus would not be logically self-evident either. In the same way, given our supposition, nothing can belong to the content of *B*, as far as it is capable of being judged true or false, except what also belongs to the content of *A*. Thus what is capable of being judged true or false in the contents of *A* and *B* is identical, and this alone is of

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[2] It is crucial that the focus is on belief ascriptions, rather than propositional attitudes more generally, since different propositional attitude ascriptions differ in how they draw boundaries around what is substitutable.

concern to logic, and this is what I call the thought expressed by both *A* and *B*. (1976/1980, pp. 105–106/pp. 67–69)

In this passage, Frege articulates a same-sense criterion via a *reductio ad absurdum*. In short, the idea is that two sentences have the same sense, if a contradiction can be derived from the assumption that one of the two sentences is true and the other false.

The problem with this criterion is that it does not individuate senses finely enough. Logically equivalent sentences are not intersubstitutable *salva veritate* in contexts of belief ascriptions. Moreover, the criterion of logical equivalence would make expressions have the same sense that Frege in other passages thinks to have different senses. In a letter to Bertrand Russell from 28 December 1902 he writes:

> wherever the coincidence of *Bedeutung* is not self-evident, we have a difference in sense. Thus the sense of '$2^3 + 1$' is also different from the sense of '3^2' even though we have the *Bedeutung* is the same, because a special act of recognition is required in order to see this. (1976/1980, pp. 152–153)[3]

As Frege articulates in this passage, '$2^3 + 1$' and '3^2' have different sense, despite being logically equivalent. They have different senses since a special act of recognition is necessary to understand that they have the same reference.

This brings us to the main problem with the criterion of logical equivalence, which is that it cuts sense off from its connection with the notions knowledge and what one can recognize to be true—notions that are central to the basic idea of Fregean sense. As Frege writes in "Über Sinn und Bedeutung" of the sentences "The Morning Star is a body illuminated by the sun" and "The Evening Star is a body illuminated by the sun":

> Anybody who did not know that the Evening Star is the Morning Star might hold the one thought to be true, the other false. (1892/1984, p. 162)

As this passage brings out, whether two expressions have different senses is at least in part a matter of whether one can recognize a thought containing one expression to be true without recognizing a thought containing the other to be true—assuming one does not know that the two expressions have the same reference. The intrinsic connection between sense and what one can recognize to be true cannot be accommodated, if the criterion of sameness of sense is logical equivalence. Consider the case of two tautologies: one tautology is easily recognizable as a tautology; the other is highly complex and it takes considerable work to see that it is a tautology. Despite being logically equivalent, the tautologies arguably have different senses: one can recognize one to be true, without recognizing the other to be true. In short, the problem is that logical equivalence is not an epistemic criterion, whereas Frege's notion of sense calls for an epistemic criterion of sameness of sense.

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[3] Similarly he writes in "Über die Begriffsschrift des Herrn Peano und meine eigene", p. 241: "I say of the designations '$3 + 1$', '$1 + 3$', '$2 + 2$', '2×2', that they have the same Bedeutung but different senses." Finally in he writes in Logic in Mathematics, "The sign '$(16 − 2)$' is a proper name of a number. '$(17 − 3)$' designates the same number, but '(17-3)' does not have the same sense as '$(16 − 2)$' ". (1969/1979, p. 232)

2 Intensional isomorphism

The second criterion for sameness of sense builds on Carnap's idea of intensional isomorphism. In short the idea is that

> if two expressions are built in the same way out of corresponding designators with the same intensions, then we shall say that they have the same intensional structure. (1956/1988, p. 56)

He argues that two expressions are intensionally isomorphic iff the following two conditions are met:

 (i)   The components of the two expressions have the same intension.
(ii)   The expressions have the same intensional structure, that is, each expression is constructed from its components in the same way.

So in order to be intensionally isomorphic, the components of an expression must not only have the same intension, the connections relating the components and the order of application of the components must be the same as well.

The problem with this criterion is that it is too rigid and it individuates senses too finely. Sentences that arguably have the same cognitive significance can turn out to have different senses according to the criterion of intensional isomorphism. Consider the sentences

(A)   There is a vixen in the garden.
(B)   There is a female fox in the garden.

The two sentences do not have the same intensional structure since they are constructed in different ways. This difference is enough for the two sentences to differ in sense given the criterion of intensional isomorphism. Now it may be that there is a deeper level of semantic structure on which "vixen" and "female fox" are intensionally isomorphic. But if this is the case, then an additional criterion is needed to determine at what semantic level the criterion of intensional isomorphism ought to be applied.

It should be noted that intensional isomorphism does not individuate sentences as finely as the syntactic structure of two sentences would. While the sequence of single signs is crucial for the syntactic structure of a sentence, it is the sequence of the construction-steps of the expression that is crucial for the intensional structure. As Carnap (1956/1988, p. 59, emphasis added) puts it "[f]or the intensional structure, in contrast to the merely syntactical structure, only the order of *application* is essential, not the order and manner of spelling". In principle, this allows for sentences in different languages to have the same intensional structure. However, if the construction steps of the expressions differ in the relevant languages then sentences that we would intuitively consider to have the same sense will turn out to have different senses.

3 Epistemic equipollence

I will now consider a third criterion for sameness of Fregean senses: the criterion of epistemic equipollence. I will argue for a particular version of this criterion. Fre-

ge articulates the criterion in the following passage of his 1906 manuscript *Kurze Übersicht meiner logischen Lehren*:

> two sentences *A* and *B* can stand in such a relation that anyone who recognizes the content of *A* as true must thereby also recognize the content of *B* as true and, conversely, that anyone who accepts the content of *B* must straight away [ohne weiteres] accept that of *A*. (Equipollence). It is here being assumed that there is no difficulty in grasping the content of *A* and *B*. (…)There is nothing in the content of either of the two equipollent sentences *A* and *B* that would have to be at once immediately recognized as true by anyone who had grasped it properly. (1969/1979, pp. 197–198)

He expresses the same epistemic criterion in a number of passages. In a letter to P. E. B. Jourdain, he says of two sentences containing the two expressions with different senses:

> Someone who takes the latter to be true need not therefore take the former to be true. An object can be determined in different ways, and every one of these ways of determining it can give rise to a special name, and these different names then have different senses; for it is not self-evident that it is the same object which is being determined in different ways. (28 Jan. 1914, in 1976/1980, p. 80)

In a letter to Russell from 20 October 1902, Frege writes:

> The thought that all thoughts belonging to Class *M* are true is different from the thought that all thoughts belonging to Class *N* are true; for someone who did not know that *M* coincided with *N* could hold one of these thoughts to be true and the other to be false. (1976/1980, p. 153)

The central idea is that possible differences in what can be taken to be true (or false) account for differences in sense. Reformulated as a thesis about sameness of sense rather than differences in senses, the idea is:

> **(CogEquiv)** Two sentences *A* and *B* are cognitively equivalent iff anyone who understands both *A* and *B* and takes *A* to have a certain truth-value must recognize that *B* has the same truth-value and vice versa.

There are at least three problems with the criterion (CogEquiv) as a criterion for sameness of sense. One problem is that if sentences are sufficiently complex, they may be understood, but not be recognized to be true: someone might understand both *A* and *B* but due to the complexity of *A* and *B* fail to recognize that *A* expresses a truth despite recognizing that *B* expresses a truth. Presumably two complex sentences can have the same sense. If that is right, then (CogEquiv) cannot be necessary for sameness of sense.

A second problem is that (CogEquiv) cannot be sufficient for sameness of sense, since anyone who understands two simple tautologies *C* and *D* will recognize both *C* and *D* to express a truth. To give an example, consider:

(C) An apple is an apple.

(D) $p \supset p$

We do not want to say that (C) and (D) have the same sense. So (CogEquiv) can at best be a necessary condition for sameness of sense. As the first problem brought ought, it is not even a necessary condition.

A third problem is that someone might understand both *A* and *B* but be deeply confused and as a consequence not recognize that *B* expresses a truth (or falsehood) despite recognizing that *A* expresses a truth (or falsehood). In order to deal with these problems, the criterion of epistemic equipollence needs to be qualified and adjusted in various ways. I will do this in the next section.

4 Epistemic equipollence refined

Frege qualifies the core criterion of equipollence, "two sentences *A* and *B* can stand in such a relation that anyone who recognizes the content of *A* as true must thereby also recognize the content of *B* as true and, conversely, that anyone who accepts the content of *B* must straight away [ohne weiteres] accept that of A", with both:

(i) It is here being assumed that there is no difficulty in grasping the content of *A* and B.
(ii) There is nothing in the content of either of the two equipollent sentences *A* and *B* that would have to be at once immediately recognized as true by anyone who had grasped it properly.

So the criterion of equipollence, as he understands it, is restricted to sentences that are easily graspable but not immediately recognized to be true. I will first show how these restrictions can deal with at least some of the problems articulated above. I will then present a way of dealing with the problems that does not require restricting the criterion of sameness of sense in the way Frege suggests. So I will present a way of dealing with the problems that does not require restricting the same-sense criterion to sentences that are easily graspable but not immediately recognized to be true.

The first qualification opens a path to circumventing the first problem: if *A* and *B* are very complicated, then one does not easily grasp their content. So they could have the same sense even if one does not recognize this. In order to acknowledge this, the criterion for cognitive equivalence needs to be qualified in the following way:

> **(CogEquiv*)** Two sentences *A* and *B* are cognitively equivalent iff anyone who understands both *A* and *B* and takes *A* to have a certain truth-value must recognize that *B* has the same truth-value and vice versa; where the content of both *A* and *B* is easily graspable.

The qualification "where the content of both *A* and *B* is easily graspable" constrains the applicability of the criterion to exclude complex sentences. With a complex sentence, I mean a sentence that is not easily graspable. One might argue that this is not a problematic restriction of the applicability of the same-sense criterion. After all, the same-sense criterion for complex sentences could be said to be a matter of the senses of the subsentential parts of the sentences.

However, such an approach raises the question of how the subsentential parts of complex sentences are organized. Any answer to this question will lead to a problem

analogous to the one raised for the criterion of intensional isomorphism. If the relevant criterion is that the components of the complex sentence must have the same sense and the connections relating the components and the order of application of the components must be the same as well, then small differences in application steps may make sentences that we would intuitively consider to have the same sense turn out to have different senses. I will put this worry to the side for the moment. I will come back to it at the end of this section when I suggest a modification of (CogEquiv) that does not require restricting it to sentences that are easily graspable but not immediately recognized to be true. First however, I will consider Frege's second qualification.

The second qualification allows for a way of circumventing the second problem, that is, the problem of accounting for differences in the senses of tautologies and contradictions. Jointly with the criterion of (CogEquiv) it provides for the following necessary and sufficient condition for sameness of sense:

(Criterion)[1] Two sentences A and B have the same sense iff

(i)   they are cognitively equivalent, that is, anyone who understands both A and B and takes A to have a certain truth-value must recognize that B has the same truth-value and vice versa; where the content of both A and B is easily graspable.

(ii)   neither A nor B contains a part which is such that one cannot understand the sentence without immediately recognizing its truth-value.

The idea is that in contrast to contingently true or false sentences, one will immediately recognize the truth-value of a simple tautology or contradiction simply in virtue of understanding the sentence. The second clause in (Criterion)[1] is supposed to restrict the criterion so as to exclude such sentences.

Clause (ii) also restricts the criterion so as to exclude counterexample pairs such as "Snow is white" and "Snow is white iff (grass is green or grass is not green)", where "iff" is read materially. Intuitively, these sentences have different senses, but it is obvious to anyone with a basic grasp of propositional calculus that they will have the same truth-value.

However, there are again a number of problems. Apart from the question of how to understand the "immediately" in play, the problem with (Criterion)[1] is that it constrains the applicability of the same-sense criterion even more. While (Criterion)[1] circumvents the problem of accounting for differences in the senses of tautologies and contradictions, it does so by constraining the applicability of the criterion to exclude not only complex sentences, but also simple analytically or necessarily true (or false) sentences.

A further problem is that clause (ii) excludes sentence pairs that intuitively have the same sense. Suppose we have some trivially true logical constant '⊤', and suppose 'A' is contingent. Then by (ii), "A & ⊤" and "⊤ & A" cannot have the same sense—even though neither is a logical truth or falsehood. So (ii) excludes more than just logical and necessary a priori truths and falsehoods.

An alternative way of dealing with the second problem is to make it a condition that the understanding of A provides a rational bridge or is constitutively connected to the understanding of B. This idea yields the following necessary and sufficient condition for sameness of sense:

(Criterion)[2] Two sentences *A* and *B* have the same sense iff

(i)   they are cognitively equivalent, that is, anyone who understands both *A* and *B* and takes *A* to have a certain truth-value must recognize that *B* has the same truth-value and vice versa; where the content of both *A* and *B* is easily graspable.

(ii) the understanding of *A* is constitutively connected to the understanding of *B* and vice versa.

In contrast to Frege's qualification, (ii) does not constrain the applicability of the criterion to exclude necessarily or analytically true (or false) sentences. However, the applicability of (Criterion)[2] is still restricted to exclude complex sentences. By addressing the third problem raised for (CogEquiv), I will articulate a same-sense criterion that is not restricted in any of the ways that Frege deemed necessary.

The third problem was that someone might understand both *A* and *B* but be deeply confused and as a consequence not recognize that *B* expresses a truth (or falsehood) despite recognizing that *A* expresses a truth (or falsehood). One way of dealing with this problem is to adjust the criterion for cognitive equivalence in the following way:

(CogEquiv)** Two sentences *A* and *B* are cognitively equivalent iff anyone who understands both *A* and *B* and takes *A* to have a certain truth-value is *rationally committed* to recognize that *B* has the same truth-value and vice versa.

This would yield the following necessary and sufficient condition:

(Criterion)[3] Two sentences *A* and *B* have the same sense iff

(i)   anyone who understands both *A* and *B* and takes *A* to have a certain truth-value is *rationally committed* to recognize that *B* has the same truth-value and vice versa.

(ii) the understanding of *A* is constitutively connected to the understanding of *B* and vice versa.[4]

The idea is not just that any *rational being* who understands both *A* and *B* and takes *A* to express a truth (or falsehood) must recognize that *B* expresses a truth (or falsehood) and vice versa. By articulating the same-sense criterion in terms of *rational commitments* a number of problems are avoided. Someone might recognize *A* to express a truth, but for any number of reasons may never get around or not be able to recognize *B* to be true. He may not get around to recognizing *B* to be true, because he gets distracted or dies. He may not be able to recognize *B* to be true, because he does not have a sufficient grasp of the language. Since he is not a competent speaker

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[4] For alternative criteria of sameness of sense, see Brandom (1986), Burge (1984, 1990), Dummett (1973, 1981), Evans (1982), Kaplan (1989), McDowell (1977); Perry (2001), Ricketts (1986), Taschek (1992), Thiel (1965), Van Heijenoort (1977) and Weiner (1990). It would lead too far afield to discuss each of these criteria in detail in this paper. I will reserve this project for a future occasion. Evans (1982, p. 19) articulates his criterion in the following passage: "We must not discriminate ways of thinking so finely that no difference of epistemic attitude can rest upon the discrimination…Equally, we must not make our discrimination of ways of thinking of objects so coarse that we reckon a subject to be thinking about an object in the same way in two episodes of thinking about it, when it would be perfectly possible for the subject coherently to take different attitudes towards the thoughts thus entertained".

of his language, he may not recognize that the sentence "That is the horse ridden by the Queen" expresses the same thought as the sentence "That is the steed ridden by the Queen" when pointing at the same animal.[5] He is nonetheless rationally committed to believing "That is the steed ridden by the Queen", if he believes "That is the horse ridden by the Queen". Since (Criterion)[3] is a matter of what a person is rationally committed to, the fact that someone may be distracted or may not be a competent speaker of the language is neither here nor there. One is nonetheless rationally committed to recognizing B be to be true, once one has recognized A to be true.

(Criterion)[3] satisfies the two desiderata for a same-sense criterion articulated in the introduction. Sentence that have the same sense according to (Criterion)[3] ought to be intersubstitutable *salva veritate* in contexts of belief ascription. Of course, someone may have inconsistent beliefs and as a consequence it may not be possible to substitute A with B in contexts of beliefs that she endorses, although A and B have the same sense. The important point is that A and B *ought* to be intersubstitutable: the person is rationally committed to endorsing B, if she endorses A. The fact that she has inconsistent beliefs does not affect this normative statement.

The second desideratum was that the same-sense criterion be as widely applicable as possible. How does the criterion fare in this respect? Recall that in response to the first problem, we qualified (CogEquiv) with "where the content of both A and B is easily graspable". This constrained the applicability of the criterion to exclude complex sentences. Given this constraint, the same-sense criterion for complex sentences could be said to be in part a matter of the senses of the subsentential parts of the sentences. However, this raised the problem of how the subsentential parts are organized, which lead to a problem analogous to the one raised for intensional isomorphism.

This problem is circumvented if we work with (Criterion)[3]. By contrast to Frege's formulation of the same-sense criterion, (Criterion)[3] need not be constrained to easily graspable sentences. Since the criterion is a matter of being rationally committed to recognizing that two sentences have the same truth-value once one has understood the sentences, the criterion applies to complex and hard to grasp sentences in the very same way as it applies to simple and easy to grasp sentences. As a consequence, the worry of how the subsentential parts of complex sentences are organized does not arise.

Frege's criterion excluded not only complex sentences, but also simple analytically or necessarily true or false sentences. By qualifying the principle of cognitive equivalence with the principle that the understanding of A is constitutively connected to the understanding of B and vice versa, the scope of (Criterion)[3] need not be restricted to exclude tautologies and contradictions. So (Criterion)[3] applies to sentences regardless of whether they are simple, complex, contingently true (or false), or necessarily true (or false). But the same principle should apply not just to all sentences, but also to subsentential expressions. I will address this issue in the next section.

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[5] The example stems from Frege's (1918/1984, p. 23) paper "The Thought".

5 Sameness of subsentential expressions

Frege considered the sameness of subsentential expressions in the following passage of his paper "Über die *Begriffsschrift* des Herrn Peano und meine eigene":

> [i]f, in a combination of signs 'Φ(A)', which has a meaning [*Bedeutung*], a sign 'A' is replaced by another 'Δ' with the same meaning [*Bedeutung*], then obviously the new combination of signs 'Φ(Δ)' will mean the same thing as the original 'Φ(A)'. But if the sense of 'Δ' deviates from that of 'A', then in general the sense of 'Φ(Δ)' will also deviate from the sense of 'Φ(A)'. (1897/1984, p. 241)

According to this idea, two subsentential expressions have the same sense if substituting one for another in a particular sentence does not change the sense of the sentence. In light of the same-sense criterion developed so far, we can formulate the idea in the following way:

(Criterion)^SamenessSub Two subsentential expressions *a* and *b* have the same sense iff

(i)   anyone who understands both a sentence *A* containing *a* and a sentence *B* in which *a* is substituted with *b* and takes *A* to have a certain truth-value is rationally committed to recognize *B* as having the same truth-value and vice versa.

(ii) the understanding of *A* is constitutively connected to the understanding of *B* and vice versa.

In order to substantiate this criterion for the sameness of subsentential expressions, it will be necessary to say a bit more about the relation between the sense of sentences and the sense of subsentential expressions. Frege makes seemingly contradictory claims about the relation between sentential sense and the sense of its components. In his *Grundlagen der Arithmetik*, he writes:

> It is enough if the sentence taken as a whole has a sense; it is this that confers on its parts also their content. (1884/1950, p. 71)

Here Frege suggests that it is not necessary to think of subsentential expressions as having a sense outside of the context of a sentence. In contrast, he writes in *Logic in Mathematics* that the sense of subsentential expressions *contribute* to the sense of the sentence thereby suggesting that they have a sense independently of their role in sentences. He says of the sentence, 'Etna is higher than Vesuvius':

> in this sentence we have the proper name, 'Etna', which makes a contribution to the sense of the whole sentence (…) It is therefore essential (…) that the name 'Etna' should have a sense, since otherwise the sentence would not have a sense, would not express a thought. (1969/1979, p. 233)

Similarly, he writes in the *Grundgesetze*:

> The names, whether simple or themselves composite, of which the name of a truth-value consists, contribute to the expression of the thought, and this contribution of the individual [component] is its sense. (1893–1903/1964, p. 90)

These claims can be reconciled. Frege's remarks in *Logic in Mathematics* do not necessarily imply that 'Etna' must *first* have a sense if the sentence about Etna should have a sense. I will call the view that words must have a sense prior to having a role in sentences a strong compositional interpretation of sentential sense. Bell's (1979, p. 120) notion of input sense, according to which the sense of a sentence is determined by the sense of its component parts, amounts to such a strong compositional understanding of sentential sense. Frege's remarks on compositionality, however, imply only that—to consider again the example above—the sentence about Etna *would* not have a sense, if 'Etna' *could* not be attributed a sense. It is left open how 'Etna' acquires its sense.

Similarly, I would like to argue that Frege's famous "context principle" should not be understood as saying that previously senseless words receive a sense in the context of a sentence, which they lose as soon as the sentence is decomposed. I will call this a strong contextual understanding of the sense of subsentential expressions. Rather subsentential expressions have a sense in sentential contexts in which they *could* play a role.

So I would like to argue against both a strong compositional interpretation and a strong contextual understanding of subsentential sense.[6] Frege (1969/1979, p. 232) writes about the sentence 'Etna is higher than Vesuvius' that 'Etna' "makes a contribution to the sense of the whole sentence" and continues that "[t]his contribution is a part of the thought, it is the sense of the word 'Etna'". I understand this passage to be saying that subsentential expressions have a sense because of their role in a sentential context. This however does not imply that they do not have a sense, when they do not appear in an actual sentential context. It implies only that they would not have a sense if they would *never* appear in an actual sentential context. So subsentential expressions have a sense in virtue of the role they *could* play in sentences.

6 Sameness of environment-dependent senses

Does the suggested same-sense criterion apply even if one holds that senses are (in part) externally individuated? Consider the situation in which you see a white coffee cup and you have a thought about that particular coffee cup. There are powerful reasons to think that the content of your thought is at least in part dependent on the particular cup that you are perceiving.[7] Now, let's assume that unbeknownst to you someone replaces the cup with a numerically distinct but qualitatively indistinguishable white coffee cup. Let's assume also that the lighting conditions, your spatial relation to the cup, and everything else in your environment is exactly the same before and after the switch. If one accepts that the content of thought is at

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[6] Thiel (1965, p. 127) writes that "words only have a sense and Bedeutung in a sentential context, but do not acquire them through it" and thereby combines the two interpretations I aim to reject. Thiel interprets the remark on 'Etna' as saying that "the sentence about Etna would have no sense if the proper name 'Etna' did not *first* have a sense." (p. 125; italics added by me) This leads him to read Frege as saying that words do not acquire their sense through a sentential context.

[7] With "the content of a thought", I just mean the sense that individuates the relevant mental state.

least in part dependent on the particular cup perceived, then the content of your thought about the cup will be different after the switch. However, since everything looks exactly the same before and after the switch and since you did not notice and were not informed about the switch, you are not aware that you are related to a distinct cup. So if one accepts that the content is environment-dependent, the content of your thoughts is different before and after the switch, despite this fact not being introspectively accessible to you. Does (Criterion)^3 yield this result?

The same-sense criterion articulated with (Criterion)^3 is a matter of what one is rationally committed to. It is not up to one what one is rationally committed to. Indeed, one can be rationally committed to taking two sentences as having the same truth-value, even if they do not *seem* to have the same sense. Similarly, one may not be rationally committed to take one sentence to be true once one has taken the other to be true, even if they seem to have the same sense. In the example about the two coffee cups, one is not rationally committed to taking the sentence that expresses your thought after the switch as having the same truth-value as the sentence that expresses your thought before the switch, even though introspectively nothing seems to have changed before and after the switch.

7 Conclusion

I have considered several possible criteria of sameness of sense and argued for a version of the idea that two sentences have the same sense if they are epistemically equipollent. More specifically, I argued for (Criterion)^3, according to which two sentences A and B have the same sense iff (i) anyone who understands both A and B and takes A to have a certain truth-value is *rationally committed* to recognize that B has the same truth-value and vice versa and (ii) the understanding of A is constitutively connected to the understanding of B and vice versa. This necessary and sufficient condition for sameness of sense can be extended to subsentential expressions and applies even if one holds that senses are environment-dependent. The sameness of subsentential expressions is a matter of being intersubstitutable in sentences that have the same sense according to (Criterion)^3. Since the criterion individuates senses in terms of what we are rationally committed to, it applies to environment-dependent senses: even if we cannot introspectively tell two mental states apart, they may nonetheless have distinct senses due to the fact that they are of different objects in the world. So mental states in different environments can have different senses, even though the environments may seem the very same to one.

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