Frege, Sigwart, and Stoic logic

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Abstract: This very brief paper provides plausible answers to the two residual questions that Jamie Tappenden states, but leaves unanswered, in his 2024 paper 'Following Bobzien: Some notes on Frege's development and engagement with his environment', namely, why Frege read Sigwart's *Logik* and what caused Frege to read Prantl.

1. Introduction

The distinguished Frege scholar Jamie Tappenden recently contended the following two points:[1] *First*, he argues that the similarities between the Stoics and the early Frege have a different character than later similarities, and that it is possible to explain the early similarities without recourse to Stoic logic. More precisely, he argues that Frege's own approach in his *Begriffsschrift* necessitated them, and that *if* Frege borrowed from the Stoics in this early period, it was only as a gilding of the lily that Frege himself had already successfully grown and tended to. This complements what is suggested both in Gabriel, Hülser and Schlotter's 2009 article 'Zur Miete bei Frege' and in Bobzien's 'Frege plagiarized the Stoics' (*Bobzien 2021*). *Second*, Tappenden argues that from the evidence we have, it appears that Frege read logic texts, historical and contemporary, generally only when there was a specific trigger, typically criticism of his own work. Tappenden makes a highly plausible case for his claims.[2] On both points, I bow to Tappenden's expertise on Frege's place in 19th century philosophy.

In the same piece Tappenden asks two questions. *First*, he notes that his second point above leaves without explanation one logician's work that we know Frege read. This is Christoph von Sigwart's then well-known logic text *Logik*, vol. 1, *Die Lehre vom Urtheil, vom Begriff und vom Schluss* (*Sigwart 1873*). We know that Frege took notes from this work, notes that are lost, alas.[3] We do not know why Frege read Sigwart in the first place (*Tappenden 2024*, 3, with fn.5). *Second*, Tappenden agrees with *Bobzien 2021* that Frege borrowed via Prantl's 1855 first volume of his *History of Western Logic* (*Prantl 1855*) from Stoic logic without acknowledging that he does so. Given Tappenden's argument that generally Frege read logic texts only when he had a specific reason to do so, he asks the legitimate question: *What was the trigger for Frege to read Prantl?* He suggests that the classical philologist Hirzel, who was Frege's tenant for over twenty years, may well have provided the trigger.[4]

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[1] *Tappenden 2024*.

[2] *Tappenden 2024*. Accordingly, I retract what I said in *Bobzien 2021*, 153, that is, that Frege read a lot of logic, including Wundt's, without offering any qualification of the kind Tappenden has shown should have been provided.

[3] We know from Scholz's list of the contents of Frege's Nachlass as published in *Veraart 1976*, 103 that Frege took nineteen small pages of notes from *Sigwart 1873*, Vol. I.

[4] Tappenden in his reply to the author at a session of the 2022 APA Eastern Division Meeting and subsequently in personal correspondence.

In the following I offer answers to the two questions why Frege read Sigwart and what the trigger was for Frege to read Prantl. I suggest that the trigger most probably was not Hirzel and also explain why it is unlikely that Hirzel helped Frege with translations from the Greek.

2. Why would Frege read Sigwart and what prompted Frege to read Prantl?

Of all the traditional logic taught at Frege's time, the then so-called 'hypothetical syllogisms' (which are *not Stoic*[5]) would have been of particular interest to Frege, since he has his own, new, theory of hypothetical (i.e., conditional) and disjunctive judgements, and the hypothetical syllogisms include hypothetical and – depending on one's historical source – disjunctive judgements as premises. So, at Frege's time, this is the closest in traditional logic (as opposed to innovative authors versed also in contemporary mathematics like Boole and DeMorgan) where we may expect Frege to have looked for some logical soulmates.[6] We know that Sigwart's work was well-received and widely known. We also know *that* Frege looked at Vol. 1 of the first edition of Sigwart's *Logik* (*Sigwart 1873*). I offer a suggestion for *why* he did: since Frege introduced his own notion of a conditional ('hypothetical judgement' in his words), he was interested in the traditional views on hypothetical judgements, that were absent in Aristotelian term logic; and Sigwart was the contemporary expert on this topic (see also below).

What does Sigwart say on hypothetical judgements in his *Logik*? Its seventh section is entitled 'the hypothetical and the disjunctive judgments'. On its first page (p. 234) it mentions the Stoics. On the same page it also refers the reader to Sigwart's own sixty-six-page study about hypothetical judgements, published two years previously. Sigwart writes: 'For the following see my "Contributions to the theory of the hypothetical judgement" (Tübingen, Laupp) 1870'.[7] The chapter on hypothetical judgements in *Sigwart 1873* (241–252) is largely a *synopsis* of this earlier work. And when, in his *Logik*, Sigwart picks up the Stoics a page or so later, he writes (*Sigwart 1873*, 242, emphasis in the original; all translations from Sigwart my own):

> The Stoics were the first who recognized that in a sentence-connection [of antecedent and consequent] there lies an *assertion in the genuine sense*; namely the judgement that between antecedent and consequent there exists the relation […] that the assumption of the antecedent is made necessary by the assumption of the consequent.[8]

Note that the Stoic view here given, that in a hypothetical sentence with antecedent and consequent there lies an assertion (which I understand as a way of saying that a hypothetical sentence is something by expressing which one can make an assertion), was *not* the going

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[5] See e.g., *Bobzien 1997, 2000, 2002*.

[6] Sigwart's Logik was not simply traditional logic. He introduced his own concept of the hypothetical judgement. This is something Frege may have been aware of. Sigwart suggests that in a hypothetical judgement the antecedent and consequent are not themselves judgements but only possible judgements, e.g. *Sigwart 1871*, 37. See also *Linneweber-Lammerskitten 1988*.

[7] This is a reference to *Sigwart 1871*. The actual publication date of the work is 1871.

[8] „Allein liegt doch, wie zuerst die Stoiker** bestimmt erkannt haben, eine Behauptung in einer solchen Satzverbindung, welche ein *Urtheil* im *eigentlichen Sinne* ist; die Behauptung nemlich, dass […] die Annahme des Vordersatzes die Annahme des Nachsatzes nothwendig mache; […]'

understanding of what happens in a hypothetical judgement. Note also that it is basically Frege's view in his *Begriffsschrift* (*Frege 1871*, §5).

At the end of the cited sentence, Sigwart refers again to his earlier work, and here more specifically to its page 12: Sigwart wants readers interested in the hypothetical judgement, which we can assume de facto included Frege, to look at page 12 of his essay on hypothetical judgements (*Sigwart 1871*). Let us assume that Frege was intrigued by the fact that there was someone – the Stoics – who, like him, thought that in a hypothetical judgement taken as a whole, there lies one assertion, and that he followed Sigwart's recommendation. On that page 12 we read, as first sentence of the parallel but longer section on the Stoics (*Sigwart 1871*, 12, emphasis mine):

> The Stoics were the first who definitely understood the sentence 'if A is, so is B' as a judgement that equals a simple judgement insofar as truth and falsehood belong to it, so that it contains a certain assertion. […] [The Stoics] call such a judgement […] a *sunêmmenon*, and it is for them a kind of non-simple judgement, besides which they also distinguished the *conjunctive*, the *disjunctive*, the *causal* and similar ones.[9]

After this passage, Sigwart adds a footnote, which says: 'Details in Prantl, Vol. I, pp. 440ff.'[10] In fact, Sigwart cites Carl Prantl a lot in his *hypothetical judgement* piece – at least fourteen times. Of these ten are on the first fifteen pages.[11] And it gets better. In the next sentence Sigwart tells us about the Stoics, that for them (*Sigwart 1871*, 12)

> The connective 'if' claims that the consequent follows from the antecedent, and the truth (Richtigkeit) of the [hypothetical] judgement depends on whether the asserted consequence is actually sound.[12]

And then, right after (*Sigwart 1871*, 13)

> Regarding the criteria of the soundness of such judgements there were several rules. Some [Stoics] seem to have said: the hypothetical judgement is true when the opposite of the consequent contradicts the antecedent, false when it does not contradict the it;[13]

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[9] 'Erst die Stoiker haben bestimmt den Satz, "wenn A ist, so ist B", als Ein Urtheil aufgefasst, das dem einfachen Urtheil darin gleich ist, dass ihm Wahrheit oder Falschheit zukommt, dass es also eine bestimmte Behauptung enthält' [...] '[Die Stoiker] nennen jenes Urtheil [...] ein *synêmmenon*, und es ist ihnen eine Art des nicht einfachen Urtheils, neben welcher noch das copulative, das disjunctive, das causale und vergleichende unterschieden werden'.

[10] 'Das Nähere bei Prantl I, 440ff. Zeller III, I, 93ff.' (Sigwart 1871, fn. 16).

[11] On p. 3, p. 7, p. 8, p. 9, p. 10, p. 11, p. 12, p. 13 p. 14, p. 15, p. 22, p. 23, p. 49, p. 51. Sigwart also cites Prantl four times in his *Logik*: p. 177 (Aristotle's *onoma aoriston*), p. 184, Aristotle; p. 186, Aristotle, again in the same footnote, on *A est A* and the Middle Ages. This is also mentioned in *Bobzien 2021*, pp. 152-153.

[12] 'Die Conjunction "wenn" behauptet nämlich, dass der Nachsatz dem Vordersatz folge, und die Richtigkeit des Urtheils hängt also davon ab, ob die behauptete Folge wirklich gültig ist.'

[13] 'Ueber (*sic*) die Kriterien der Gültigkeit eines solchen Urtheils wurden nun allerdings verschiedene Regeln aufgestellt. Die einen [the Stoics] nämlich scheinen gesagt zu haben: das hypothetische Urtheil ist wahr, wenn das Gegentheil des Nachsatzes dem Vordersatze widerspricht, falsch, wenn er ihm nicht widerspricht'.

At this point Sigwart adds another lengthy footnote. In it he quotes both Diogenes Laertius' and Sextus Empiricus' reports of the Stoic and Megaric views on the topic *and* provides *Philo of Megara's truth-functional criterion of the conditional* from Sextus (Diog.Laert. 7.81, Sext. *PH* 2.110–1, with a partial parallel in Sext. *M* 8.113-15).[14] In this context Sigwart again *refers to Prantl*, this time to page 464, as well as to Zeller (Zeller 1856), as reference.

Let us piece together what we have so far. We know that, when it comes to *traditional* logic, Frege would have had an interest in discussions of hypothetical judgements (hypothetische Urtheile), which were the closest to our contemporary conditionals in traditional logic at the time. We know he read Sigwart's *Logik* and took copious notes. We know that on the first page on hypothetical judgements in *Logik* Sigwart says something intriguing about the Stoics and hypothetical judgements and refers the reader to page 12 of his own '*hypothetical judgement*' study (*Sigwart 1871*). We know that on pages 12 and 13 of that study, Sigwart says more exciting things about the Stoics on propositional logic and on the truth-functionality of the conditional, *and* that for reference and details he repeatedly refers the reader to *Prantl 1855*. Thus, we seem to have a couple of answers here. Interest in traditional hypothetical and disjunctive judgements may have prompted Frege to read the relevant chapter in Sigwart's *Logik*. And Frege pursuing Sigwart's reference to something that sounded in several respects *just like* his own logic from the *Begriffsschrift* may have prompted him to look at the Stoic logic chapter in Prantl, more precisely at the recommended pages 440ff and 464. The existence of Prantl's work must have been known to Frege independently, simply because it was so widely cited by logicians and philosophers in their publications and lectures, including several he knew in person.[15]

As an aside I note that at this point someone may reasonably ask: could Frege have obtained the idea for his truth-functional conditional in the *Begriffsschrift* from Sigwart's presentation of Philo's truth-functional conditional? or from Prantl's? Either is possible.[16] However, it seems not likely. The number of parallels between Stoic logic and Frege's work in Frege's later oeuvre is vastly larger than with the *Begriffsschrift* and in Frege's earlier work more generally. This suggests that the Stoic impact on Frege via Prantl dated rather after 1879, which is plausible in many ways.[17]

3. A note on Hirzel and Eucken

From what has been said so far, Hirzel was not *needed* as a trigger for Frege to read Prantl's chapter on the Stoics. It is likely that Frege was already prompted to consult Prantl on the Stoics

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[14] For the accounts of Megaric and Stoic conditionals in Sextus and Diogenes see e.g. *Barnes, Bobzien, and Mignucci 1999*, 84-86, 106-109.

[15] Besides Sigwart, these include Eucken, Hirzel, *Zeller 1856–68*, *Trendelenburg 1862*, Vol. I, 33, 311, *Ueberweg 1871*, p. 19.

[16] As noted in *Bobzien 2021*, 191-192, the truth-conditional representation of the Frege's conditional in his *Begriffschrift* §5 (*Frege 1879*, 5) is almost identical to Prantl's and Sigwart's (who refers to Prantl, see above).

[17] This is also assumed in *Gabriel, Hülser and Schlotter 2009*, *Bobzien 2021*, *Tappenden 2024, 2–3.*

by reading Sigwart. So I disagree with Tappenden[18] about the role Hirzel may have played in getting Frege to study the Stoics.

Perhaps Frege asked Hirzel if he could borrow his Prantl. We can assume Hirzel owned a copy, since his father was the publisher and Hirzel himself refers to Prantl in his work – if not nearly as often as Sigwart and not in the context of logic proper. Or perhaps Frege asked the philosopher Rudolf Christoph Eucken, who lived right across the street, to borrow *his* copy. My bet would be on Eucken. Eucken used Prantl in his logic lectures. These lectures included a part on the history of logic and in this Eucken touched on Stoic logic.[19] Eucken was a philosopher with some knowledge of logic. Evidence suggests that Eucken had shown an interest in getting Frege to read this or that, including Trendelenburg. Moreover, Eucken knew Frege's *Begriffsschrift*.[20]

We know no such things about Hirzel. Hirzel had no background in philosophy whatsoever. His degrees and positions are all in classical philology. His teachers were Classicists without expertise in philosophy. Hirzel had an interest in what were then considered philosophical, or philosophico-historical (*philosophiegeschichtliche*) questions. When one reads Hirzel's works on ancient philosophy, one finds it very hard to imagine that Frege would have found them interesting: when was the word *logikê* first used to denote a philosophical discipline? (Not a problem on Frege's radar.) How did the notion of *ousia* develop in ancient philosophy? (Not a problem on Frege's radar.) I see no overlap in interest. Saying that both were interested in Stoic logic is basically a fallacy of ambiguity. What Hirzel thought of as Stoic logic and what he was interested in had very, very little to do with what Frege considered logic.

Tappenden 2024, 3–4, correctly emphasizes that Frege talked to other academics when it was relevant to his works. But note that these others, the ones that Frege mentions, or we know of, were all either mathematicians or natural scientists. These were people that spoke a language and used a methodology that Frege understood. Specifically, Tappenden (*2024*, 2) notes that Frege had *oral* academic conversations with various mathematicians and scientists. Frege *may* also have talked to philosophers. There seems to be no direct evidence of *oral* conversations with philosophers except for the then budding Wittgenstein (*Reck & Awodey 2004*, 24–5). Whether he ever talked about logic with the shy young student Carnap, we do not know, but it is rather unlikely.[21] Tappenden mentions *written* correspondence with the philosophers Stumpf

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[18] *Tappenden 2024*, 2.

[19] *Kreiser 2001*, 289–290.

[20] Eucken is another possible source from whom Frege could have gotten encouragement to look at the Stoics. This presupposes that Eucken understood Frege's *Begriffsschrift* sufficiently to notice similarities with Prantl's Stoics – something we do not know, though he is better qualified for this than Hirzel. The known interactions between Frege and Eucken seem to predate his moving in across Frege.

[21] In Carnap's own words: 'Why did I not seek Frege out? I was too shy; he was after all very withdrawn. When I thawed out later in the Vienna Circle, it was too late' (Gabriel 2004, 10). And from Carnap's report on Frege's lectures we learn the following, taken from *Reck & Awodey 2004*, 18-21. Fall of 1910: '[Frege] was rather shy, extremely introverted […]. The possibility of a discussion seemed to be out of the question. {And I never heard that a student ever went to Frege's office in order to talk to him. But my friend and I […] had our private discussions on this new form of logic.' Summer of 1913, with only three students present: 'There were still no questions or discussions.' Carnap's report of his attendance of the summer of 1914 lectures do not mention any discussion either. Carnap's good friend Wilhelm Flitner, who attended Frege's lectures with him, reports 'During his time as a student, Carnap never spoke a word with Frege; likewise, I only exchanged a few insignificant words with him, at his door,

and Dingler, a brief written rejection note from Ulrici, and indirect indication for possible interaction with Eucken. Overall evidence for *oral* interaction with established philosophers is extremely slim. I believe with Tappenden that it is possible that Eucken 'nudged Frege towards Sigwart on hypothetical judgements, and perhaps gave an additional nudge toward Prantl'(*2024*, 2)'. There is no evidence that Frege had philological or philosophical conversations with Hirzel. Hirzel was a classical philologist, not a philosopher. We do not know whether Frege and Hirzel were bosom buddies (*Bobzien 2024*, xxx). Here I simply suggest that for an answer to Tappenden's two questions, we need not assume they were, or even that they ever talked about philosophy. Pace *Tappenden 2024*, 2, Hirzel also was not needed to help Frege translate Stoic logic texts, since Frege's knowledge of Greek would have been more than sufficient for this purpose.[22]

4. Conclusion

We can then answer Tappenden's two questions (1) why Frege read Sigwart's *Logik* and (2) why he read Prantl's chapter on Stoic logic in his *History of Western Logic*. Frege read Sigwart – possibly among other texts – out of an interest in hypothetical judgements and hypothetical syllogisms, of which Sigwart gives detailed treatment and in which he was known to specialize in the 1870s. Sigwart's references to the Stoics, and to Prantl as his source for Stoic logic, were a likely prompt both for Frege's rising interest in Stoic logic *and* for Frege reading Prantl's chapter on Stoic logic.

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when I had to deliver something. Outside of the university one didn't dare to address Frege. […] In his lectures he rarely glanced at his students', *Reck & Awodey 2004*, 121-22.

[22] *Bobzien 2021*, 153.

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