Abstract: In this article it is argued that Popper’s well-known deductive and falsificationistic epistemology is historically rooted in German psychology, notably the work of Otto Selz. Drawing on Popper’s early and still unpublished psychological manuscripts it is shown how Otto Selz’s psychology of thinking with its emphasis on the guiding role of schematic anticipations gave the impetus to Popper’s theory of problem solving, his theory of the Searchlight, and its attendant rejection of empiricism, the so-called Bucket theory of knowledge. In the second part of the article it is argued that Selz’s theory of schematic anticipations is rooted in Meinong’s Gegenstandstheorie. Because Meinong’s theory was partly an attempt to do justice to the objectivity of thinking, this may explain why the anti-psychologist Popper felt nevertheless attracted to the psychology of Selz.

To judge from his autobiography Unended Quest, Sir Karl Popper’s involvement with the psychology of his youth was brief but intense.1 He started his career studying and teaching pedagogy at the Pedagogic Institute in Vienna. He also attended lectures of the German psychologist Karl Bühler, formerly related to the Würzburger School of Denkpsychologie, at the Psychology Institute in Vienna. He learned more from Bühler than from any other teacher, and in 1928 he wrote his Ph.D. in the psychology of thinking (Denkpsychologie) under Bühler’s (and Moritz Schlick’s) supervision. Soon he found that some of his results in psychology had been anticipated by Bühler and by a psychologist loosely related to the Würzburger School, Otto Selz. By his own account this discovery was one

1 Popper 1974.
of the motives he abandoned psychology and turned to philosophy. The shift would be quite radical for in his first major work *Logic of Scientific Discovery*, the psychology of scientific discovery would be rigorously dispelled from the area of the philosophy of science. The involvement with psychology turned out to be a sin of his youth.

Yet in his work on the idea of objective knowledge from the 1960s onwards, the name of Bühler began to surface, especially in relation to his theory of linguistic functions. In his work on the mind-body problem from the 1970s, Bühler’s theory figured prominently in the defence of a pluralistic and evolutionary approach to the study of mind. Was this reliance on his former teacher a sign of general decline – by the 1970s Popper was already in his seventies – or had his interest in mind, language and evolution deeper grounds in his philosophy? Some critics saw in his reluctance to accept some influential developments in the contemporary study of mind, notably behaviourism, physicalism, Chomsky’s theory of language and Newell’s and Simon’s information processing psychology, support for the first hypothesis, but historical evidence points out that his interest in mind, language and evolution had in fact been part of his epistemology from the beginning; indeed, as I argued in my *Popper, Otto Selz and the Rise of Evolutionary Epistemology*, it even had emerged from his early preoccupations with psychology and pedagogy. Popper in fact had never abandoned the work of Bühler and in particular of Selz, but rather had transformed it into an epistemological theory with wide-ranging consequences. Study of this process of transformation has made clear that the reasons for Popper’s critical stance were not simply of a man who was

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2 Popper 1935.
3 Ter Hark 2004. For an early account of Popper and psychology see Berkson/Wettersten 1984. Although Selz is shortly discussed in their book, he is not presented as a figure read by the young Popper. The authors came even to a conclusion opposite to mine: “Popper’s and Selz’s views are different” (10). In Wettersten 1992, little attention is paid either to Popper’s unpublished psychological works or their background. In his recent biography of Popper (Hacohen 2000), Malachi Hacohen devotes a chapter to Popper’s psychological works, but he fails to discuss the broader context in German psychology and biology, thereby giving the young Popper more credit than he deserves.
behind his times, and who reacted annoyingly and conservatively to some modern trends, but had to do with his insight that much of contemporary thought about the mind conformed to basic tenets of theories recognized by Bühler, Selz and the tradition to which they belonged as inadequate. Moreover, in arguing for an evolutionary approach to mind and language Popper had been even ahead of his time.

In this article, I first sketch in general contours the rise of Popper’s epistemological outlook out of his early involvement with “German” Denkpsychologie. Because further study has taught me that Selz and Bühler were immensely indebted to the Grazer school of Alexius Meinong, I subsequently discuss Selz’s background in Meinongian Gegenstandstheorie. Although Meinong’s relation with the Würzburg school has not gone unnoticed, Selz’s indebtedness to him has not been studied until now. My conclusion will be that the dependency of Selz’s psychology upon Gegenstandstheorie, or as it was also called, logic, can help explaining why the notorious antipsychologist Popper nevertheless appropriated the former’s work to such a large extent.

**Popper’s Psychology and Theory of Knowledge**

When in 1979 Popper’s *Die beiden Grundprobleme der Erkenntnistheorie* was published, it became clear to what extent the philosophy of science of *Die Logik der Forschung* rested on epistemological presuppositions. The book also seemed to provide a clue as to the relationship between the theory of knowledge and, as Popper called it, the psychology of knowledge (*Psychologie der Erkenntnis*). In the section ‘The possibility of a deductive psychology of knowledge’, Popper undertook the task of attacking what he called an inductive prejudice: the idea that only an inductive psychology of knowledge would be feasible. On this inductive sensualism, humans arrive at knowledge by generalising from individual experiences, in particular, perceptual experiences. Popper, by contrast, argued that knowledge and thinking have to be conceived as a system of “intellectual reactions” rather than of “receptions”.

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1 Lindenfeld 1980.
2 Popper 1979, 24.
within the cognitive system he explicitly made the comparison with physiological reactions. Although for both systems the triggering conditions lie in external stimuli, the specific course physiological and intellectual reactions take depends on the “subjective conditions of the reacting apparatus itself”. Intellectual reactions, therefore, were drawn from the mind rather than from the world, and the question is how they nonetheless proved themselves adaptive in objective circumstances. Subjectively preformed reactions, he claimed, get adapted to the environment by means of “trying-out behaviour” (*probierendes Verhalten*). If adaptation takes place via trying-out behaviour, he concluded, the process of fitting reactions onto aspects of situations preceded in time the vital adequacy (*Bewährung*) of such co-ordinations, which therefore could be called “anticipatory” as regards their adequacy. And as long as the reaction has not proven itself adequate, it could be called an “unfounded prejudice”. Popper emphasized that the fulfilment often fails to occur and hence that the anticipatory co-ordination between reaction and stimulus is always tentative. His alternative to the sensualistic psychology of knowledge then was a biologically inspired theory according to which our knowledge of the external world was drawn from “trying-out anticipations, which are co-ordinated tentatively to the ‘material’ of receptions”.

By his own account, Popper had constructed this psychology of knowledge by modelling it on his preceding theory of knowledge. This modelling was based on a “principle of transference”, the idea that what is valid in logic is also valid in psychology. His theory of knowledge, sketched in the opening section of *Die beiden Grundprobleme*, was an attempt to force a breakthrough in the deadlock between classical rationalism and classical empiricism, thereby making room for one of his most characteristic (and valuable) ideas, namely the hypothetical and fallible nature of all knowledge. As he put this idea there: the most general axioms of natural science are formulated without logical or empirical justification, but in contrast to rationalism they are not accepted as a priori true, but as merely problematic, unfounded anticipations or tentative hypotheses. However, their verification or refutation proceeds, strictly empirical, only on the basis of

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experience: by deducing propositions (predictions) which can immediately be checked empirically.  

Deductive-empiricism is also the core of Popper’s philosophy of the natural sciences as developed in his masterpiece *Logic of Scientific Discovery*. It was not until 1948 that he resumed the early psychological thread but now under the name of epistemology. The contrast between inductive sensualism and the theory of anticipations was replaced by that between the ‘bucket theory’ and the ‘searchlight theory’ of mind and knowledge. Both theories were called epistemological rather than psychological. Empiricism received the nickname of ‘bucket theory’ because it conceived of the mind as nothing but the conduit for sense-impressions, an empty bucket to be filled by the accumulation and storage of information. According to Popper’s alternative theory, knowledge or “dispositions” are acquired through the method of trial and error elimination. This method, Popper contended, consists essentially of three stages: forming a problem or expectation, trying out a number of solutions of the problem, eliminating or discarding false solutions as erroneous. A key feature of Popper’s theory of trial and error elimination, and the reason for speaking of a searchlight theory of knowledge and mind, is his insistence that problems or expectations took precedence over observations. Observations are always preceded by expectations, points of view, questions or problems which, as a searchlight, illuminated a certain area, thereby enabling the organism or the scientist to know what to observe in the first place. The bucket theory of Locke, Berkeley and Hume, he repeatedly claimed, was a myth.

*Popper’s Work in Childpsychology and Pedagogy 1927*

Popper by his own account claimed to have developed this anti-Humean, deductive psychology of knowledge in his *‘Gewohnheit’ und ‘Gesetzerlebnis’ in der Erziehung* (1927), as part of a theory of dogmatic

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10 The lecture was published as Popper 1972.
thinking. He subjected the childish phenomenon of dogmatic thinking to a detailed conceptual and empirical analysis resulting in a complex experience, the “experience of regularity” (Gesetzerlebnis, virtually untranslatable, incorporating the double suggestion of lived experience and normative requirements), and consisting of three more elementary experiences: attitude (Einstellung), finding (Setzung), and standing by one’s opinion (Festhalten). Children, according to the young Popper, expected regularities everywhere and seek to find them even where there are none. They typically stick to their expectations even when inadequate and when they ought to accept their inadequacy. In many cases the resistance to (critical) demands of modification prompts or is even due to what he called “the fear of the unfamiliar” and the need for assurance or certainty.

With this analysis Popper hoped to contribute to an urgent pedagogical problem, put on the agenda by the proponent of the labour schools in Austria, Eduard Burger, of delimiting more precisely where and when to put limits to the free activity of pupils. Providing the boundary between the “stage of habit” and the “stage of self-activity” with “an exact psychological foundation” was the aim of his analysis and phenomenology of dogmatic thinking.

The discussion of dogmatic thinking then differed significantly from the epistemological context provided by Hume’s problem of induction. Popper even himself endorsed induction as a matter of course. Right at the beginning of his thesis he claimed that his own method was essentially inductive. The problem of demarcation, according to Popper’s own account solved before the problem of induction, was equally absent. Yet a related discussion about the boundary between Adlerian characterology and empirical psychology, in the sense of Oswald Külpe’s and Bühler’s Denkpsychologie, was touched upon by Popper. Rather than rejecting characterology as pseudo-science, Popper’s attitude was much more

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11 Popper 1927. This was a protothesis students following the two-year teacher-training program at the Pedagogic Institute of Vienna had to submit at the end of their course. See ter Hark 2002 for a detailed discussion of Popper’s thesis.
12 Popper 1927, 3.
compromising. His own description of the dogmatic attitude even revealed clear traces of his affinity with characterology. Thus, he appealed to a key concept of Adler’s ‘individual psychology’, the idea of assurance (Sicherung), to explain the fear of the unfamiliar. Fear, both Adler and Popper contended, is based on the unfamiliar, or on the lack of control. Children invent all sorts of safety measures against this imminent lack of control. Indeed, Popper claimed, “One takes safety measures because one is in fear.”

His descriptions of the various ways in which forms of assurance typical of fear of the unfamiliar manifest themselves in human character aligned him to characterology and individual psychology, and were still far removed from the later epistemological reflections on dogmatic thinking. For instance, cowardliness was an assurance against the unpleasant experience of Angst: “[…] the coward wishes rather not to risk anything; he is constantly on the alert for the situation in which he really has to be afraid of something: in this way he spares and indulges himself (thus is ‘weak of will’).”

He went on: “For us this assurance is interesting since we can determine in this form of not-risking a rejection of what is new […]”. Yet it was especially this characterological aspect of Popper’s early view of dogmatic thinking which resonated in his later views of the growth of (scientific) knowledge. Dogmatic trials, as dogmatic thinking was then called, are ones which reject what is new and hold on to what is familiar. Even his opposite description of the critical attitude seems to have been shaped by his early endorsement of Adlerian characterology; it is the attitude of taking (intellectual) risks by putting forward “bold theories”. But an important (later) insight also contributing to a deductive theory of knowledge is lacking in the thesis. Critical thinking, he would later emphasize, can proceed only on the basis of a preceding phase of dogmatic thinking, a phase in which an expectation is formed so that error elimination can begin to work on it. This view implies a much more positive appreciation of the role of dogmatic thinking than to be found in the thesis.

13 Adler 1927, 192.
14 Popper 1927, 64.
15 Ibid., 65.
16 Ibid.
for rather than claiming that dogmatic thinking is a necessary stage before critical thinking could emerge, the young Popper, wholeheartedly in the spirit of the school reform movement, was worried about the social effects of an education through habit: “It will be clear from the start that ‘habit’ etc. as a means of education may have only a narrowly confined scope if it will not run counter to the tasks of the educating generation.”

**The Shift towards Denkpsychologie 1928-1931**

In his dissertation *Zur Methodenfrage der Denkpsychologie*, he would come closer to a theory of trial and error elimination. The young Popper took his cue from Bühler’s recently published *Die Krise der Psychologie*. Bühler defended a methodological pluralism for psychology, based on his theory of linguistic functions. His main point of criticism was that no school in psychology was capable of doing justice to what were the three basic characteristics of human conduct: inner experience (*Erlebnis*), meaningful behaviour (*sinnvolles Benehmen*), and their relation to culture (*Gebilde des objektiven Geistes*). A unitary science of psychology, Bühler maintained, was the science of the triad experience–behaviour–culture.

Popper’s first goal was to defend Bühler’s pluralistic methodology against the objections of contemporary physicalism. For reasons that will become clear later I will postpone this discussion until the end of the article. Demonstrating the indispensability of Bühler’s pluralistic methodology for Denkpsychologie was his second goal. Yet this was not his only target; a separate problem that ran through his discussion of the three aspects of thinking was the biological or evolutionary theory of cognitive development. It is in the context of that problem that his interest in the theory of trial and error elimination took shape. It is also here that the formative influence of Otto Selz becomes most apparent. He referred approvingly to the former’s theory of “trying-out behaviour” (*probiertes Verhalten*), and remarked that Selz’s interpretation of Wolfgang Köhler’s

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[18] Popper 1928.
findings of the intelligent achievements of chimpanzees in terms of his own theory of trying-out behaviour was clearly “strongly biologically oriented”. His most significant reference to Selz occurred while discussing the need of what Bühler called the aspect of culture for Denkpsychologie. There he suddenly turned to the method of scientific research (Forschungsseite). The importance of Denkpsychologie for the study of objective products of the mind, notably science, lie, he believed, in its providing a model for understanding the growth of science:

Perhaps there are important parallels in the methods and operations of the scientific and the “pre-scientific” induction?

To give just one example: The Selzian concept of trying-out behaviour ["probierenden Verhaltens"] seems to me to have important parallels in objective scientific research. Science tries out its methods, its “models” (as Bühler puts it), and in such a way as to correspond completely with the Selzian scheme [“dem Selzschen Schema”]. As is well known the actual ways of scientific research in no way correspond with the logical principles of the representation; as little as the operations ["Operationen"] described by Selz correspond with the objective logical operations. Despite this science is in the end clearly driven by tasks [“aufgabensteuert”], the determining tendencies [“determinierenden Tendenzen”] come clearly to the fore.21

The earliest sign of his concern with the nature of scientific research, this passage, with Selz calling the tune, unmistakably showed Popper’s ideas on the logic of scientific discovery emerging in the context of the psychology of scientific discovery. Although rejecting the relevance of the psychology of discovery for the philosophy of science in The Logic of Scientific Discovery in the post war years, he unwaveringly adhered to his proposal to compare individual and scientific cognition, and used the (Selzian) method of trial and error as a measure. Indeed, he gave the (Selzian) method of trial and error the highest general sense possible, incorporating not only individual psychology but all the sciences, including the Geisteswissenschaften, and evolution. The rejection of any Geisteswissenschaft, and the attendant proposal of the methodological unity of the sciences, however, had to wait another sixteen years when writing, respectively, The Poverty of Historicism and The Open Society and its Enemies. At this juncture Popper seemed not that far. Another indication of the still rudimentary grasp of the depth and

20 Popper 1928, 57 f.
21 Ibid., 69 f.
implications of Selz’s work at this juncture was his repeated use of the term “induction”. For Selz’s detailed and frontal assault on association psychology, and his defence of a theory of schematic anticipations, in fact boiled down to a view of the animal or human organism as an active cognitive subject constantly putting forward tentative proposals or hypotheses rather than as a passive recipient, patiently waiting for the accumulation of information to be inductively safe. From Popper’s final psychological publication before turning to philosophy, it becomes clear that he made a move nearer in the direction of a deductive theory of knowledge by first discarding, again within the framework of Selz’s psychology, the bucket theory of knowledge.

In a short publication, “Die Gedächtnispflege unter dem Gesichtspunkt der Selbsttätigkeit”, published in the monthly journal of pedagogical reform, *Quelle*, edited by Eduard Burger, Popper again proposed to deal with a pedagogical controversy from a psychological point of view.²² By now his stance in psychology had shifted definitively from a blend of *Denkpsychologie* and characterology to the work of Selz. In particular, he sought to show how Selz’s theory of schematic anticipations could help to resolve a debate between, on the one hand, the *Lernschule*, and, on the other, the *Arbeitsschule* concerning the role of memorisation in education. The labour schools attempted to steer education away from a drill school approach, typical of the *Lernschule*, towards seeking children’s active engagement through self-discovery. Having a huge amount of knowledge at one’s disposal was the ruling principle of the *Lernschule* (*Stoffprinzip*). This principle demanded a lot of memorisation. Mnemonic exercise was achieved, according to the school, by accumulation of knowledge and frequent repetition of this material. The ensuing description of the psychology underlying the pedagogical program of the *Lernschule* shows Popper using for the first time a metaphor which would figure prominently in his later writings on epistemology: “To the *Lernschule* memory is nothing but a container of material, a sort of bucket of knowledge.”²³ The essence of memory, on this view, was to let in and store knowledge by mechanical and associative processes. As Popper now reminded, the decisive turn away

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²² Popper 1931.
from association psychology “was initiated by Kant and carried through, according to strict experimental methods, by the school of Külpe, especially Bühler and Selz.” The fundamental mistake of association psychology, he argued, was its attempt to derive the whole of human memory, even the whole of intellectual capacities, from a single and simple form of associative memory (what he called the bucket). Popper’s alternative account of the genesis of the different functions of memory followed Selz’s Denkpsychologie in detail. Even when processing nonsense syllables in the laboratory, Popper contended, subjects did not proceed purely mechanical but often attempted to establish meaningful connections between stimuli. With this understanding of meaning, Popper concluded, thinking entered memory and “The laws of the mechanisms of association are replaced by the ‘laws of ordered thinking’ (Selz).” And a few lines further: “Selz has coined the name ‘intellectual operations’ for the functions of thinking.” That Popper’s alternative account of memory and memorisation wholly depended for its conception on ideas he took over from Selz is corroborated by a further passage in which the latter’s theory of schematic anticipation was put forward as providing the Arbeitsschule with the required notion of psychological activity underlying even rote memory:

Selz has shown that “reproductive thinking” is an extremely active process, a production process [Arbeitsvorgang]. The important method, the important tool of this production process, is the scheme of thought [Denkschema]. In this scheme an unoccupied space [Leerstelle] takes the place of lacking thoughts (or pieces of thought), thoughts that have to be reproduced. The systematic completion of these unoccupied spaces of the scheme (the “determined complex-change”) leads to reproduction.

Rather than being a passive and mechanical process, Selz has taught, human memory turned out to be a systematic reconstructing of schematic anticipations and their gaps. Denkpsychologie had clearly demonstrated,

24 Ibid.
25 Ibid., 613.
26 Ibid., 616.
Popper explained, that forgotten information had not simply been overlooked but had left “an unoccupied space in memory, analogous to the unknown $x$ in a mathematical equation, which prompts the urge to fill it in (complex completion).”\textsuperscript{27} Retrieving information from memory thus became a process of “methodically reconstructing of schemes of thought.”\textsuperscript{28} In this way inculcating information could be changed from a dull mechanical process into a conscious and methodical procedure evoking the child’s interest and giving it pleasure.

It was also this Selzian theory which seems to have been crucial in bringing together the early theory of dogmatic thinking and the method of trial and error, conceived both as a theory of learning and an epistemological theory. Having noted that the bottom-up attempt of compiling the higher forms of thinking from the mechanisms of association, so characteristic of association psychology had completely failed, Popper was anxious to point out that memorisation guided by “the laws of ordered thinking”, although equally mechanical, was yet completely different from associative memory; he dubbed it “automatised insightful memory” (mechanisiertes judizioses Gedächtnis). Automatised insightful memory he defined by opposition with the (failed) bottom-up approach of association psychology, its genesis proceeding the other way round. The key distinction was that in a theory of ordered thinking the process of mechanisation set in later than in an associative theory. Only after the pupil had familiarized himself with the relevant piece of memorial knowledge by means of the intellectual operations as described by Selz, could mechanisation be initiated. The result in both cases seemed to be the same, yet the difference was as big as that between a skilled “piano player and a gramophone record”\textsuperscript{29}. As this analogy indicates, insightful memory becoming automatic was a process on a par with the development of skills, of know-how. An interesting consequence of this Selzian approach to memory was that “Where these reactions, these processes of reconstruction, are not shaped yet, there is

\textsuperscript{27} Ibid.
\textsuperscript{28} Ibid.
\textsuperscript{29} Ibid., 613.
nothing which can be abbreviated.” In the context of the article this was a pedagogical warning not to let the process of mechanisation begin too soon, but at the same time can be seen as conveying the non-inductive epistemological message that, since learning (mechanisation of skills) could take place only on the basis of already shaped intellectual operations, these intellectual operations had to precede empirical knowledge-acquisition.

Popper’s “deductive-empiricism” then was clearly a synthesis of the Selzian emphasis on the genetic priority of tentative and risky anticipations in problem solving and the epistemological requirement that justifying proceeds on the basis of experience, and hence an unmistakable sign of the interaction between Popper’s psychological and philosophical theory of knowledge in the early 1930s.

**Otto Selz: Life and Reception**

Given this importance of Selz, why so little is known about him, his work and its historical background? There were both biographical and institutional factors responsible for the meagre reception of his work.

Selz lived much of his life in seclusion, cherishing the tranquillity he needed to develop his epistemological, psychological and pedagogical ideas. Only a passport photograph has remained of him. In his scientific work Selz was increasingly marginalized owing to his unremitting criticism of colleagues but also to his formidable complex style of writing. Allied to the Würzburg School he did not shrink back from launching frontal attacks on the ideas of some of its members. Aside from one pupil, Jules Bahle, who closely collaborated with him, and the Dutch scholars Adriaan de Groot and Frans Prins who applied his ideas in respectively psychology and pedagogy, he never founded a school, and after 1933 his name disappears almost completely from the German psychological literature.

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30 Selz was introduced in the English speaking world by Humphrey 1951. Frijda/de Groot 1980 provided English translations of some of Selz’s work and also contained chapters on his work. In the German language Seebohm 1970 was an important contribution.
He was born on 14 February 1881, in Munich. Pressed by his father into a legal career, Selz studied law, but in spite of being admitted to the bar in 1908 he felt no vocation for an occupation as lawyer. During his studies of law Selz also studied philosophy with Theodor Lipps in Munich and with Carl Stumpf in Berlin. In 1909 he took his Ph.D in philosophy at the University of Munich. In this dissertation, he was concerned with the question, much debated in the 17th and 18th centuries, whether there is an objective world outside of our consciousness and how to know this world. After his Ph.D, Selz went to Bonn to do experimental investigations in the laboratory of Külpe. Both Külpe and Bühler were among his subjects, and he probably attended some of their seminars. These investigations resulted in his first major work, his Habilitationsschrift Über die Gesetze des geordneten Denkverlaufs. In the First World War, Selz served in the army at the West-front, and after having been wounded, he was decorated with the Iron Cross in 1917. After the war he returned to Bonn for several years as Privatdozent. With his second major work in the psychology of thinking, Zur Psychologie des produktiven Denkens und des Irrtums, its publication being postponed owing to the First World War, Selz’s intellectual prestige was incontestably on the increase, and in 1923 he was called for the chair of Philosophy, Psychology and Pedagogy at the Handelshochschule in Mannheim. Meanwhile the psychological institute of Mannheim headed by Selz, who became Rector of the Handelshochschule in 1929-1930, flourished and after receiving the Ius Promovendi, the first dissertations on Denkpsychologie and pedagogy began to appear, among them Jules Bahle’s cognitive psychological investigations of musical composing. All this came to a sobering halt after January 30, 1933, when Hitler was appointed Chancellor of Germany. The Ministry of Culture and Education issued an edict in the spring of 1933 demanding that Otto Selz resigned his work, the official reason being the maintenance of security and order in Baden. Selz was no longer allowed to continue both his teaching activities and his research at the Institute. October 25 the Handelshochschule was finally closed, and the Institute became incorporated within the University of Heidelberg. Since Heidelberg had made no arrangements for Selz, the official reading goes, Selz was unceremoniously stripped out of his career and livelihood. The truth of the matter was of course Selz’s being a non-Aryan.

Most expelled psychologists left Germany and migrated to the United States. Not so Selz. He led a withdrawn life in Mannheim, where the opportunities to do experimental work being gravely diminished, he threw himself into purely theoretical work on the Aufbau of the phenomenal world. After the Reichskristallnacht he was caught and

31 Selz 1910.
32 Selz 1913.
33 Selz 1922.
34 Bahle 1930.
deported to the concentration camp of Dachau from which he was freed in December 1938. In May 1939 he finally migrated to the Netherlands, first to Blithen, then to Amsterdam where he lived in a small apartment in the Cliostraat. The one desirable outcome of this shameful episode was that Selz came into contact with the Dutch pedagogue Phillip Kohnstamm and A. D. de Groot. Selz taught at the Amsterdam Teachers Seminar (*Nutseminarium*) on psychology and pedagogy, and participated in scientific discussions at the Faculty of Psychology, hugely enriching the field of psychology. After the German invasion in May 1940 Selz corresponded with Kurt Koffka, who had emigrated to America, but despite Koffka’s efforts nothing came of it. He declined the offer of his Dutch friends to find a hiding place for him, replying that the Iron Cross he had won during the First World War would surely protect him. He was not spared the horrors of the Holocaust, though. In July 1943 he was captured again by the Nazis and deported to the concentration camp Westerbork. A postcard telling that he wants to give courses in Westerbork is the last sign of life. On August 24 he is put on train Nr. DA 703 to Auschwitz. He either “died” in transit from suffocation or exhaustion – he was suffering from heart problems – or was murdered by being sent to the gas chambers.

At an institutional level Selz’s work has suffered greatly as a result of being associated with the Würzburg school of *Denkpsychologie*, especially with its theory of imageless thought. With this notion, based on experimental introspective findings, the Würzburger psychologists and philosophers (Külpe) believed to have demonstrated the inadequacy of the traditional definition of the mind in terms of sensations, images and feelings. The experiments of Karl Marbe, Heinrich Watt, Narziss Ach and also Bühler, produced evidence for the existence of thought-elements, that were not reducible to these classical ingredients. But soon controversy arose over the admission of these thought-elements, both in Germany where Wundt attacked the doctrine on methodological grounds, and in the USA, where Titchener and his collaborators found no evidence for them. According to Ogden, pupil of both Külpe and Titchener, the controversy ultimately created a favourable moment for the rise of the opposite of the psychology

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36 Even nowadays this view is espoused, see e.g. Wettersten 1992, 128.
of thinking, behaviourism. Yet imageless thought passed into the limbo of inert conceptions, and Selz shared its fate.

Yet Selz’s account of imageless thought was different from the mainstream of the Würzburg school. If these differences had been noticed at an earlier phase, the short-sighted reaction of Titchener and his allies might have been prevented. Now Selz had to wait for a wider (posthumous) recognition of his achievements on Allen Newell and Herbert Simon who, aided by A. D. de Groot, reminded us that what Selz had discovered was that the study of memory and thought processes had to “make provision for two-termed relations as well as simple predicate links”. Simon was undeniably right in pointing out that Selz’s theory of thinking was in fact a theory of relational structures, but by not taking into account the historical context his portrayal was hopelessly anachronistic. Selz’s theory was as far removed from information-processing psychology, with its emphasis on unconscious factors, as it was from association psychology with its emphasis upon mechanical factors. His theory of relations was not based on an hypothesis concerning unobservable internal processes but was drawn from Gegenstandstheorie, in particular Meinong’s.

Selzian Denkpsychologie and Meinong’s Gegenstandstheorie

Despite its being centrally dealt with in his first volume of Die Gesetze des geordneten Denkens, the few commentators of this work apparently felt no need to take notice of Selz’s discussion of Gegenstandstheorie. To be sure, his version of Gegenstandstheorie was not quite original but rather a collage drawn from Meinong, Stumpf, Husserl and Külpe, yet he used it in a unique way in construing a psychology of thinking. What Selz did was to describe psychological phenomena by means of concepts introduced by and analyzed in a more general theory of objects, a theory encompassing not only psychology and the other empirical sciences, but also logic and mathematics. The two most important concepts were “relational fact”

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37 Ogden 1923, 224.
38 Simon 1980, 151.
(Sachverhältnis) and “relation” (Beziehung). It was precisely his use of the concepts of relational fact and relation which marked the departure of his Denkpsychologie from the mainstream of empiricism and associationism in Germany and earlier British empiricism. Confronted by the inability to introspect or to conceive non-localized relational properties, the empiricists always had denied a category of relational properties. Accordingly, relations tended to be treated as complexes the constituents of which were non-relational properties internal to the terms of the relation and, if there were additional elements, these were treated as non-relational properties in the mind.\(^39\)

The concepts of Sachverhältnis and of relation correspond closely to Meinong’s Komplexion, or what, in English, it would be better to call “complexes”, and relation. In his first work, Meinong sketched a theory of psychological abstraction as well as a theory of relations, both of which soon found their way in the psychological literature.\(^40\) His theory of relations was used by Christian von Ehrenfels in his seminal article Gestaltqualitäten, often seen as laying the basis for Gestalt psychology. Meinong’s mature theory of complexes (and relations) elaborated upon von Ehrenfels’s more intuitive notion of Gestaltqualität, by introducing more analytic terms, “members”, “complex”, “inferiora” and “superiora”. Among the objects of Gegenstandstheorie, there are some that have an intrinsic lack of independence; thus diversity, for example, can only be thought of in relation to differing terms. Such objects are based on others as indispensable presuppositions. Meinong called them “objects of higher order” (Gegenstände höherer Ordnung). The presupposed objects he called inferiora, in respect to which the objects of higher order are superiora.\(^41\) The inferiora show no such dependence on the superiora; they can in some cases exist when their superiora do not. Put in more modern terminology, objects of higher order are asymmetrically dependent upon – or supervene upon – inferiora or foundations. Thus a complex, like a melody, supervenes upon the members (tones). As a complex the melody consists both of inferiora, the various notes sung or played, and superiora, the melody emerging when the notes were taken together.

\(^{39}\) See on this Bergmann 1952.
\(^{40}\) Meinong 1877 and 1882.
\(^{41}\) In his early review of Meinong’s work (Russell 1904), Bertrand Russell used the expression “presupposed objects” for inferiora.
Relations are really *superiora*. The “betweeness” which connects Linz with Salzburg, to borrow Findlay’s example, demands the respective cities as its *inferiora*.\(^4^2\) The intimate connection between complexes and relations was expressed by a so-called principle of the coincidence of parts (*Partialkoinzidenz*), saying that a complex implies a relation, and vice versa. Saying that \(aRb\) is a complex does not mean, Meinong emphasized, “that a relative something is set beside two things which are possibly absolute, and that the three things together make up an objective collection. We must rather say that \(a\) and \(b\) belong to a whole by virtue of the relation \(R\) in which they stand. If therefore there is a relation between \(a\) and \(b\), there is *ipso facto* also a complex which has the terms of the relations as its constituents.”\(^4^3\) A complex is more than the collection of its constituents, in virtue of the combining relation.

Selz’s *Sachverhältnisse* belong to the category of objects of higher order. Like Meinong, Selz maintained that the definition of *Sachverhältnisse* was the task of *Gegenstandstheorie*, not psychology. And like Meinong, he argued that *Sachverhältnisse* are dependent (*Mitgegebenheiten*) for their existence upon objects that were independently given.\(^4^4\) And again like Meinong, Selz emphasized that a *Sachverhältnis* was not a mere sum of objects and relations, but “the fact that certain objects stand in a certain relation” (*das in einer bestimmten Beziehung Stehen bestimmter Gegenstände*).\(^4^5\) At the psychological level he defined the consciousness of relational facts as knowledge (*Wissen*). Human memory consisted of many such forms of knowing (*Wissensdispositionen*), which might become actualized (*aktuelles Wissen*) at appropriate occasions. One could become conscious of such relational structures merely by recalling but also by being informed. In the psychological experiments of the Würzburg school subjects were typically informed by receiving a task and a stimulus (word). Selz interpreted these findings as conforming to Meinong’s paradigm. What happened in such cases was that the consciousness of the task (e.g., find the coordinate of ‘farmer’) related to the dispositional knowledge to be actualized as the scheme of a relational structure to the completed structure.

\(^4^2\) Findlay 1933, 131.
\(^4^3\) Meinong 1899, 193.
\(^4^4\) Selz 1913, 134.
\(^4^5\) Ibid., 34.
Diagrams of schematic anticipations making clearly visible that the awareness of a problem was related to the cognitive whole to be realized as the scheme of a whole to the completed whole appeared in Selz’s Zur Psychologie des produktiven Denkens und des Irrtums and his Die Gesetze der produktiven und reproduktiven Geistestätigkeit.46

Fig. 1 A schematic anticipation of a cognitive whole

Selz’s diagrams proved immensely fertile, inspiring cognitive scientists, like Karl Duncker, A. D. de Groot and Herbert Simon.47 The basis for such diagrams however was laid by Meinong and by his pupil Witasek who used them in his investigation of higher order complexes.

The most significant use Selz made of Meinong’s psychology was the latter’s theory of indirect representation (indirektes Vorstellen). David Lindenfeld noted that Meinong’s notion of indirect representation was similar to Karl Bühler’s “indirect referring” (indirektes Meinen) as outlined in the publication that is often marked as the end of the Würzburg school.49 However, Bühler was less original than Lindenfeld and even Meinong suggested similar ideas.50 The distinction he drew between direct and indirect referring had been invented by Meinong almost 25 years earlier. He

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46 Selz 1922, 370, and 1924.
47 Duncker 1935; de Groot 1965; Simon 1980, 155.
48 Witasek 1897.
49 Lindenfeld 1980, 228.
50 In Meinong 1910, 205, the author quite naively saw the fact that Bühler used the same conceptual distinctions as a sign of the importance of his ideas rather than of the latter being influenced by him without acknowledging this.
even exploited Meinong’s related distinction between “indicated” (angezeigte) and “exercised” (ausgeführte) cognitive operations. Selz in his turn relied on Bühler but he also had first-hand knowledge of Meinong’s _Hume-Studien_.

Meinong’s theory of indirect representations stemmed from his early psychologistic period in which he conceived of relations as wholly psychological entities. In his later work he would sharply distinguish between, on the one hand, the mental act of relating and, on the other hand, relations as existent or subsistent structures, yet his view of the mental production of our ideas of relations maintained its importance until his last writings. His discovery of indirect representation was based on his broader insight that the meaning of many concepts is not fixed until the meaning of other concepts to which they are related is represented. The importance of relational concepts was especially shown, according to him, by the frequent occurrence of problem situations in which the only clue about an unknown element (\(b\)) of the problem situation was provided by the information one had about another element (\(a\)) and its relation (\(R\)) to (\(b\)). For instance, someone wants to form an idea of the physical height (\(b\)) of a person unknown to him based on the information that the person is as big as (\(R\)) an acquaintance (\(a\)). The knowledge situation is called indirect because the information about an element is determined by means of the information about its relation to an element one is acquainted with.

Significantly, the idea of indirect cognition was suggested to him by a mathematical analogy. In mathematics, he noted, one often operated with equations or abstract functions with one or more unknown elements. But what the mathematical situation especially showed about human problem solving was that transforming indirectly determined information into directly given information need not always occur automatically or immediately. Like mathematical operations mental operations might be merely ‘designated’ in the mind, without being ‘executed’ The calculation was, as it were, in off-line mode, disengaged from the system that passed it on to the action-controllers.\(^{51}\)

This distinction enabled Meinong to explain psychologically the apparent paradox how it was possible to think what is (logically) impossible, such as the round rectangle. The combination of ‘round’ and ‘rectangle’ could be thought in designated mode, but as soon as one made the attempt “to execute the designated task” the judgement that it could not be passed on to the on-line mode, or as Meinong put it, that it could not be displayed in intuitive (anschaulich) form, forced itself upon one definitely. ‘Round’ and ‘rectangle’

\(^{51}\) Meinong 1882, 99.
were given only indirectly, but its relative determinations lacked the required (absolute) data to get turned into direct and intuitive cognition.

In Bühler’s Habilitation, Meinong’s name appeared only towards the end of the first part, and it was Husserl who dominated his classification of “thought-elements”. Contrary to the tradition of associationism Bühler’s experimental results proved that irreducible Gedanken rather than sensations and mental images formed the core of thought experiences (Denkerlebnisse). His classification of the irreducible elements of thought experiences reflected Husserlian phenomenology no less than empirical findings. He distinguished between the consciousness of rule (Regelbewusstsein), the consciousness of relation (Beziehungsbewusstsein) and intentions. But, he added, there were also thoughts in which what was meant was known immediately. He called these thoughts acts of immediately knowing something (unmittelbares Wissen um etwas) and pointed to the analogy with Husserl’s reine signifische Akten. His further hypothesis concerning the nature of Wissen um etwas, however, was clearly rooted in Meinong’s Gegenstandstheorie and theory of relations.

He maintained that the “qualitative determinations” (Wasbestimmtheiten) of acts of immediately knowing something were “determinations of position within a conscious order” (Platzbestimmtheiten innerhalb einer bewussten Ordnung). This quite laborious wording in fact boiled down to the view that the object of thinking was indirectly determined not by its own features and properties but rather by its relations to other objects also belonging to the same order. The distinction between indirect and direct referring (in which case the object is present to consciousness), Bühler remarked in a footnote, was “analogous” to Meinong’s indirect and direct representation, but from a subsequent passage it becomes clear that his indebtedness to him was far greater than this acknowledgement suggested. Indirect referring, he pointed out, was a pervasive feature of abstract thinking as the example of mathematics taught. In tasks that had to be solved deductively, the unknown \( x \) was determined indirectly by its conditions, and the process of problem solving essentially consisted of transforming the indirect determination into a direct one. That he had here Meinong’s distinction between indicated and executed operations in mind is further supported by his concluding comment that in this way how one could think logically impossible objects, like a rectangular circle, became explicable: “its qualitative determinations are, so to speak, indirectly given in the task; directly they cannot be given.”

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52 Bühler 1907, 297-365. For an account of Husserl’s influence on the Würzburg school see Münch 1997, 89-122.
53 Bühler 1907, 358.
54 Ibid., 360.
55 Ibid.
Selz fitted this theory of indirect representation into his theory of complexes and schematic anticipations. Knowing objects, he claimed, is often mediated by one’s being conscious of the relational fact to which they belong.\textsuperscript{56} His findings furthermore convincingly demonstrated that knowing that an object \textit{A} is specifically related to a number of other objects is often more readily available than knowing concretely that \textit{A} is related to \textit{B}, or \textit{C} or \textit{D}.\textsuperscript{57} In some cases thinking of the object in off-line mode, in terms of its abstract relations, turned out to be sufficient for solving the problem. In other cases operating in off-line mode stepwise led to direct knowledge. Meinong’s armchair considerations about the role abstract operations irreducible to association and mental imagery played in thinking finally had led to an encompassing and empirically sound theory.

\textit{Conclusion}

In Selz, Meinong’s thoughts about indirect representation were transformed into a theory of abstract thinking that departed radically from the empiricist view that thinking was a process of cementing relations between mental representations given in advance. In fact, their view was the opposite: the network of relations the unknown item of knowledge maintained with other items was known from the start and in fact expedited the problem solving. Young Popper’s claim that Selzian problem solving was a process analogous to looking for the unknown \textit{x} in a mathematical equation showed awareness of the fact that (abstract) knowledge of relational structures precedes empirical knowledge, and hence contributed enormously to his deductive psychology and theory of knowledge. Embracing Selz despite his antipsychologism and his general dismissive attitude towards psychologists has now become explicable because of the former’s approach to problem solving via the realistic logic or epistemology of \textit{Gegenstandstheorie}. Indeed, given the formidable abstraction of Selz’s psychological theory, it in

\textsuperscript{56} Selz 1924, 34.
\textsuperscript{57} \textit{Ibid.}, 69.
fact approached a world 3 description of problem solving. Thus fluctuating between being a psychological and a logical theory of problem solving, Selz’s theory turned out to be the best of both worlds for Popper: a theory of world 2 cast in terms of world 3 processes, or a theory of world 3 assumed to be valid also for what happens in world 2. No other psychological theory therefore could equal Selz’s in also serving as a theory of objective knowledge, of an “epistemology without a knowing subject”.


