Historical paper

Remembering Mr B.

Carl F. Craver a,*, Benjamin Graham b and R. Shayna Rosenbaum c,d

a Philosophy-Neuroscience-Psychology Program, Washington University in St. Louis, United States
b J.D. Candidate, Yale Law School, United States
c Department of Psychology and Neuroscience Graduate Diploma Program, York University, Toronto, Canada
d Rotman Research Institute, Baycrest, Toronto, Canada

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Abstract

In the accompanying translation and film, Gustav Störring describes the psychological profile of Mr. B. (Franz Breundl), a victim of carbon monoxide poisoning with a nearly complete short-term memory deficit. Störring diagnoses Mr. B. as lacking entirely the capacity to register or retain any information in consciousness for longer than two seconds. Here we introduce these historical documents, describe their historical context, summarize and discuss the central features of the case, and consider the potential significance of the case for contemporary theories of working memory, the self, and personal identity.

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1. Introduction

Franz Breundl (July 30, 1902–August 30, 1986) began his double life as Mr. B. on May 31, 1926, when carbon monoxide from smelting ovens flooded his workspace in Gelsenkirchen’s mammoth Schalker Verein. In the months, years, and decades to follow, this blast furnace repairman was seen by some of the most eminent European neurologists and psychologists. These specialists coalesced around the opinion that neurological damage resulting from the poisoning had caused Mr. B. to lose entirely his Merkfähigkeit: his capacity to register experiences in memory. Mr. B., they claimed, could hold nothing in consciousness for longer than about two seconds.

* Corresponding author. Philosophy-Neuroscience-Psychology Program, 1 Brookings Drive, St. Louis, MO 63105, United States.
E-mail address: ccraver@artsci.wustl.edu (C.F. Craver).
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Mr. B.’s story was common knowledge among mid-Twentieth Century German psychologists, psychiatrists, and neurologists. His case report gave rise to what Oliver Zangwill called, “a controversy almost without parallel in the annals of psychiatry” (1967, p. 113). Gustav E. Störring’s (1936) “Gedächtnisverlust durch Gasvergiftung: Ein Mensch ohne Zeitgedächtnis” (“Memory loss by gas poisoning: A man without memory of time”), and the sound film produced to accompany it, constitute Störring’s most compelling presentation of the case and his most detailed argument for its theoretical significance. The article is translated below. The film is available as supplemental material at http://dx.doi.org/10.1016/j.cortex.2013.11.001 (Störring 1935).

For Störring, the case of Mr. B. offers unprecedented evidence about the organization of human experience. He describes Mr. B. as a “pure experiment of nature” in which the capacity for registration, the Merkfähigkeit, “drops out” of the cognitive architecture leaving all his other cognitive capacities intact. Störring’s insistence on the purity of Mr. B.’s deficit is no doubt partly responsible for some of the controversy that soon engulfed the case. Yet if one can bracket these concerns, as neuroscience has learned to do for Tan, H.M., Phineas Gage and other cornerstone case studies in contemporary neuroscience, then perhaps Mr. B. offers contemporary researchers an opportunity to rethink the architecture of human experience from a new perspective. The case leads us to ask: What possible organization of cognitive mechanisms could give rise to Mr. B.’s pattern of symptoms? Is the capacity for registration, as Störring argues, a singular, independently disruptable cognitive capacity? How is this Merkfähigkeit related to more contemporary theories of working memory (Baddeley, 2012; Cowan, 2010) and event perception (Radvansky & Zacks, 2011; Zacks, Speer, Swallow, Braver, & Reynolds, 2007; Zacks, Speer, Swallow, & Maley, 2010)? Might the case of Mr. B., viewed with a sympathetic eye, offer new materials for constructing models of working memory processes and systems?

Störring also emphasizes a humanistic, philosophical orientation toward Breundl’s life. For Störring, Breundl is Mr. B., a living thought experiment in which aspects of a distinctively human life persist without the ability to register conscious experiences in memory. Störring wonders, and tests, whether a person who has only about two seconds of consciousness, and no memorial bridges linking these apparent islands of experience, could nonetheless persist through time. What results is an engaging exploration of the relationship between the capacity to register one’s experiences and the diachronic continuity of human consciousness and action. Störring balances his experimental investigations on Mr. B. with anecdotes from Breundl’s life. He discusses Breundl’s moral life and his marriage to Anni. He tells stories about hiking, eating, and drinking beer with Breundl. Throughout, Störring accentuates the threads of continuity that continue to bind together the events in Mr. B.’s life despite the fact that he can no longer retain anything for longer than a few seconds.

2. The making of Mr. B.

In the early hours of the morning of his accident, Breundl’s coworkers took him to the nearby Evangelische Krankenhaus in Gelsenkirchen. He was conscious on arrival. Although he stayed in the hospital for nearly two weeks, he was released, apparently without a psychiatric diagnosis. He returned to work on June 9, but was sent home on June 12 because he had difficulty remembering even simple instructions. A neurological specialist at this time described his memory as ‘nil’.

On August 9, 1926 Breundl was admitted to the Bergmannsheil Krankenhaus in nearby Bochum, where he stayed until September 16. Records there describe him as unable to retain any experience for longer than three to five seconds. They describe him also as disoriented, distraught, and embarrassed at his condition. And they present him as having some retrograde memory loss for the days (but not months) prior to his accident. Ten years later, Störring describes Mr. B.’s retrograde memory as intact until the day of the accident.

On December 5, Breundl was admitted to the Würzburg Psychiatric Institute where he was observed by Martin Reichardt, an expert on brain swelling and the author of the well-known textbook, Allgemeine und Spezielle Psychiatrie (1918). Reichardt had recently accepted an appointment as director of the University Psychiatric Hospital (a post he held from 1925 to 1939). In 1927, Breundl was examined by Ernst Grünthal, then a young neuropsychiatrist trained in Würzburg by both Reichardt and Emil Kraepelin, the latter known particularly for his pioneering work on the amnesias, the dementias, and on what would come to be called schizophrenia. Störring did not meet Breundl until 1929. Störring trained in Würzburg from 1928 to 1932, but would eventually become the Director of the Clinic for Psychiatry and Psychotherapy at the University of Kiel in 1954. Grünthal and Störring coauthored five articles about the case. In short, Breundl became Mr. B. through the combined efforts of some of the best minds in German neuropsychiatry (Fig. 1).

During these years, Breundl’s life outside the clinic continued, of course, but details are sparse. We know that Breundl and Anni married in 1930, completing an engagement begun six years prior to Breundl’s accident. We know that Anni’s

Fig. 1 – Franz Breundl (middle) with Anni (his wife; left) and Gustav Störring (right).
This stipulation is designed to capture the aspect of the case contents of conscious experience for longer than two seconds. That the term registration means just the capacity to hold the contents or fail to do justice to the full scope of his deficits. We stipulate that Breundl but an act of scientific insight, a construction that crystallizes a symptom pattern into a diagnosis: Merkunfähigkeit.

Grünthal and Störring (1930a,b) use this diagnostic term in the title of their first paper on Mr. B., “Über das Verhalten bei umschriebener, völliger Merkunfähigkeit” (“On behavior in isolated, complete loss of the capacity for registration”), published in the year Breundl and Anni wed. The positive term, Merkfähigkeit, appears in the bolder title of Störring’s 1931 case report: “Über den ersten reinen Fall eines Menschen mit völlig isolierten Verlust der Merkfähigkeit” (“On the first pure case of a man with complete, isolated loss of registration”). “Merkfähigkeit” might be translated literally as the ability to notice, be aware of, discover, memorize, or realize. Such translations either fail to do justice to Mr. B.’s residual capacities or fail to do justice to the full scope of his deficits. We translate Merkfähigkeit as “the ability to register”. We stipulate that the term registration means just the capacity to hold the contents of conscious experience for longer than two seconds. This stipulation is designed to capture the aspect of the case that Grünthal and Störring find most compelling.

Although Grünthal and Störring collaborated on this case well into the 1950s, their work was interrupted in 1934 when the Nazis forced Grüntal from his post at Würzburg. Grüntal fled Germany to Switzerland, where he worked at the Psychiatric University Hospital in Bern until he retired in 1965 (Kalus, Müller, & Strik, 2002). Störring, who had begun his habilitation in Munich (1932–4), was at this time on his way to a short-lived post at Greifswald (1936), followed by an appointment at Göttingen (1936–49) that was interrupted by the war. Störring served five years as a psychiatric medical officer in the Luftwaffe. Cocks (1997) describes a close professional relationship between Störring and Matthias Heinrich Göring, both before and during Störring’s work in a neurological and psychiatric hospital in Paris during the German occupation of France (Cocks, 1997; Voelkel, 2000).

Meanwhile, Würzburg was fast becoming a center for Nazi biology and medicine. It hosted an Institute for Genetics and Racial Research. The Maternity Hospital at Würzburg performed abortions and sterilizations on psychiatric patients and disabled men, women, and children between 1939 and 1941. Werner Heyde, appointed professor of psychiatry at Würzburg in 1939, was an architect of the Aktion T4, calling for the mass murder of people judged to have psychiatric and somatic abnormalities (Stolberg, 2012). It is indeed curious that Breundl survived this period.3

In 1935, Störring made the sound film of Mr. B. (Störring, 1935). He debated the film in July at the International Congress of Neurology in London. (Störring’s earlier silent film of the case is apparently lost). The sound film alternates between a lecture, in which Störring, wearing a white lab coat, presents the central details of the case to his colleagues, and a series of demonstrations, in which Störring interrogates and quizzes Mr. B. to reveal his deficits and his residual capacities. The resulting film is fascinating and disturbing in equal measure. This video is available online at http://dx.doi.org/10.1016/j.cortex.2013.11.001.

Störring’s style of questioning, adapted to Breundl’s two-second memory, involves staccato commands repeated rapidly before Breundl acts. In one chilling scene, Störring demonstrates Breundl’s ignorance of current affairs: “Have you heard of Hitler? Heard of Hitler? Heard of Hitler? Heard of Hitler?” Breundl shrugs nonchalantly. Moments later, Störring asks him repeatedly if there are many communists in Gelsenkirchen. Gelsenkirchen was a communist stronghold before the Nazis came to power. In May 1923 strike over food prices, communists took over the shops of Gelsenkirchen and hoisted a red flag over its central police station. Breundl answers with the enthusiasm of a 1920s steel worker, not the horrified anxiety such a question would evoke in a communist in Hitler’s Germany. Störring’s demonstration of the Claparède test is as stunning a visual demonstration of Mr. B.’s inability to register experiences as it is a compelling glimpse at experimental neuropsychiatry in the days before Institutional Review Boards. The article translated below, published in 1936

3 The term was apparently introduced by Wernicke (1900) to describe a kind of memorization apparent in the ordinary use of language. Jaspers describes it as the ability to feed the memory new material. Peters (1968), who worked under Störring at Kiel, places the Merkfähigkeit, confusingly, in two locations of a memory box-and-arrow diagram that he calls “a compilation of memory systems”. The first of three boxes in sequence is labeled “Merkfähigkeit — Einspeicherung” (or storage). The second box, labeled “Gedächtnis”, or memory, is separated into an “unmittelbares Gedächtnis” (or “immediate memory”) and “Gedächtnis im engeren Sinne” (“memory in the narrow sense”). Merkfähigkeit is also included in the “immediate memory” category, along with “short-term memory,” the “Kurzspeicher” (short-term store), and “Fluoreszenzgedächtnis.”

4 No doubt, there is a fascinating backstory to this scientific narrative. The T4 Aktion was officially in effect from 1939 to 1941, and Breundl lived until 1986. It is not entirely clear that Breundl would have been a target of the T4 Aktion, given that he was not institutionalized and that his disorder was caused by an accident rather than inheritance. As Gerhild Williams notes (personal communication), Störring’s case description emphasizes that Mr. B. is a good German, unchanged from the day of his accident, with a hearty love of nature and an appreciation for Romantic music. He argues repeatedly that Mr. B. is altogether ignorant of the political affairs of his day. He also repeatedly emphasizes that Mr. B. abstains from sex. There is no non-circumstantial evidence, however, to substantiate a claim that Störring was trying to save Breundl from extermination through his scientific efforts. In his obituary for Störring, Henner Voelkel (who will appear in the narrative below) notes that the war left a deep mark on Störring and shaped his future political orientation (Voelkel 2000). After the war, Störring started and presided over the Society for the Study of Practical Psychology, one mission of which was to study how, in Volkel’s words, “an ancient society of civilized people could stoop so low.” That said, Störring served in the Luftwaffe until the war ended and was a known associate of Herman Göring.

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in the Archiv für die gesamte Psychologie, was written to accompany the film.

3. Mr. B.’s symptom profile

Störring describes Mr. B.’s memory as, “a wax tablet that has immediately become rock hard, upon which old marks remain legible, but upon which no new impression leaves a record.” He calls Mr. B. an “absolute man of the present” because he is incapable of holding any perception or thought in consciousness for longer than approximately 1.6 seconds. Störring derives this temporal estimate using a cue-word response method and a stopwatch. Mr. B. cannot understand questions lasting longer than one or two seconds, he is unable to follow sequentially presented information, and he does not appear to benefit from repeated performance of tasks. Mr. B.'s vision, hearing, and smell are unaffected; however the second-second limit to his conscious experience holds across all of his sensory modalities.

As noted above, Störring used Claparède’s test to demonstrate the severity of Mr. B.’s deficit. In this test, Störring asks for Mr. B.’s hand. Mr. B. offers it readily. Störring then pricks it with a pin. After a short pause, he again asks Mr. B. for his hand; again, another prick. And so on. In the first administration of the test (described in the text), Störring pricks Mr. B. “many times” before Mr. B. becomes visibly agitated and runs away. Asked why he ran away, Mr. B. cannot say. Asked if it had something to do with a pin, he says no. Asked for his hand, he readily gives it. But now, a short time after the first flight response, it takes only one pinprick to send him running again. When Störring repeated the test another day, he again had to stick Breundl repeatedly before he became agitated and withdrew. Störring remarks that the familiar adage, ‘a burnt child dreads the fire’, “has no validity” for Mr. B. since the day of the accident.

Mr. B.’s inability to hold information in consciousness is accompanied by a severe anterograde memory deficit. His personal memories appear to end on the day of the accident. He continues to believe it is the day of his accident, and he continues to believe that he is located in Gelsenkirchen, working at the Schalker Verein, despite the fact that he has moved several times since. Both his conscious thoughts and his memory recall appear to be bound to stimuli in the prefrontal cortex. He continues to look forward to his wedding day and continues to abstain from premarital sex despite having lost his self-control. His emotional responses also appear to be intact, showing fear, love of nature, and a sincere and affectionate disposition. He also retains his religious and practical orientation. He does not present as having lost his self-control. He responds normally to hunger, to thirst, and to the need to relieve himself. His emotional responses also appear to be intact, showing fear, love of nature, and love toward his wife. Even his barroom etiquette appears to be preserved; Mr. B., “holds his beer as well as he did before, like a Bavarian who has long enjoyed drinking”.

This is the sense in which Mr. B. is a “pure” experiment of nature. Störring summarizes the key features of the case: “As if through a miracle, the old memories and the remaining personality remained intact up to the point of the gas poisoning. Only the capacity for registration was damaged, and as never before observed, it is completely absent.” At an empirical level, then, Störring presents the case as a dissociation in which the capacity for registration can, “drop out of the mental framework while no other primary disorder is present.” Störring discusses in passing the implications of this dissociation for theories of forgetting, theories of the emotions, and theories of intentional action.

However, the master argument at the heart of Störring’s presentation defends a more philosophical, or theoretical, thesis: that a person incapable of registration is nonetheless capable of maintaining a sense of continuity over time. It is clear from the footnotes and references in the text that Störring owes a significant intellectual debt for this line of thought to the philosophical and theological views developed by his father, Gustav W. Störring, in his 1900 Psychologie des menschlichen Gefühlslebens. In particular, the younger Störring finds in Mr. B. evidence for the central role of emotions in the constitution of the self. The thesis of Störring’s master argument is stated in the final paragraph:

We are here confronted with the incredible fact that this person with his single second — if left to his own resources — must experience the impression of lasting duration and harmonious flow. He need not always be re-excited from second to second because he experiences no gap between one second and the next; this person with a second-long
consciousness nevertheless has an awareness of the continuity of his experience.

On the way to this conclusion, Störring defends a series of propositions: that Mr. B. can perform extended actions, that he responds meaningfully to his “instincts” (with particular emphasis on hunger, thirst, taste, and bodily urges), that he continues to enjoy his former interests, that his character has been preserved, that his verbal output is appropriate, and that he appears to have a sense of his own continuity.

Störring relies for this argument on what are today called embodied and embedded features of Mr. B.’s cognitive life (Brooks, 1999; Clark, 1998; Haugeland, 1998). Emotions, bodily instincts, and features of the world suffice to drive Mr. B.’s extended actions in the absence of the ability to register and so retain conscious experiences across extended periods of time. By appealing to such bodily and contextual factors, Störring argues that one’s sense of the continuity of consciousness need not rely upon continuous connections among conscious experiences. At times he pushes further: the apparent continuity of consciousness requires neither the continuity of consciousness nor bonds of memory connecting islands of conscious experience. This apparent continuity is sustained fundamentally by bodily states, such as the emotions, the instincts, and one’s context in the world. It is also sustained by tasks and situations that have an inherent “command” structure built into them (which Störring calls an Aufforderungscharakter); for example, a crumpled piece of paper on the floor leads Breundl to pick it up and deposit it in the trashcan whereas a fresh piece of paper on the floor is placed on the table.5 In short, Störring argues that Breundl’s body and environment scaffold both his capacity for extended actions and his sense of enduring consciousness over time.

4. Comparing Breundl

How does Mr. B.’s deficit fit among the known cases of memory disorders? This question was pressing for the neurologists and psychiatrists who struggled with Störring and Grünthal to understand the case at the time. Zangwill (1967) reviews several cases. He mentions Rieger’s (1888–9) case study, in which a victim of a traumatic brain injury presents with a multimodal retention deficit accompanied by progressive intellectual deterioration and dysphasia (a neurologically induced inability to communicate). Zangwill suggests that the apparent short-term memory deficit might be a secondary consequence of the dysphasia. Zangwill also mentions Liepmann’s (1910; 2002) case study of Korsakoff’s syndrome, with severe anterograde amnesia and fixed spatiotemporal disorientation. Unlike Mr. B., however, the patient exhibits a graded retrograde amnesia over twenty-five years and a spared short-term memory; furthermore, the case is complicated by general intellectual deterioration. Störring and Grünthal discuss Mabille and Pitres’ (1913) case of a stroke victim with caudate damage and anterograde amnesia in the absence of retrograde amnesia, like Mr. B., and fixed spatiotemporal disorientation. However, this patient could answer questions of normal length and had a reduced memory span of between 5 and 50 seconds, whereas Mr. B.’s had only 1–2 seconds.

Zangwill also mentions Conrad’s (1953) case of an amnesic syndrome following meningitis who had a memory span of approximately one minute. But Conrad’s case was nonetheless able to respond to questions of normal length and had a normal digit span. Zangwill notes that none of these cases matches the case of Mr. B. exactly; in many of the cases, the short-term memory for digit span and spoken language appears to be intact, as expected in Korsakoff’s syndrome and meningitis. Zangwill thus concludes: “By and large it cannot be said that any of the above cases gives strong support to Grünthal and Störring’s conception of a ‘complete and isolated’ defect of memory retention” (p. 123). Conversely, one might conclude that this review shows just how unprecedented and unique the case of Mr. B. is.

Mr. B. is similarly difficult to locate within contemporary taxonomies of the amnesias (see Rosenbaum et al., 2005; Rosenbaum, Murphy, & Rich, 2011 for reviews). The two most distinctive features of Mr. B., his near absence of short-term memory and the multimodal nature of his deficit, apparently remain without precedent. People with medial temporal lobe (MTL) amnesias (such as H.M., K.C., and E.P.), for example, can exhibit complete anterograde amnesia, but this disorder tends to be accompanied by at least a graded (and often, for episodic memory, extensive) retrograde amnesia (cf. Fujii, Moscovitch, & Nadel, 2000; Kirwan, Galvan, Bayley, & Squire, 2008; Rosenbaum et al., 2008; Steinworth, Levine, & Corkin, 2005). People with MTL amnesia typically have a much longer short-term memory span than does Mr. B. They can hold conversations and perform extended tasks (see Rose, Olsen, Craik, & Rosenbaum, 2012). Finally, people with MTL amnesias typically retain some capacity to update their semantic knowledge, including their self-knowledge (see Klein, Loftus, & Kihlstrom, 1996). Yet Mr. B.’s self-knowledge is fixed to the time and place of his accident.

The MTL case that perhaps most closely resembles Mr. B. is the former musician Clive Wearing, whose memory span was reduced to only a few seconds due to viral encephalitis (Sacks, 2007). As illustrated in several books, one written by his wife Deborah (Wearing, 2005), and video documentaries, Wearing was quite bothered by his state of constant re-awakening, of being a “prisoner of consciousness”. His emotional reaction, filled with fear and desperation, is in stark contrast to Breundl’s calm, almost accepting demeanor, one that reflects his former personality and perhaps the rigid expectations of the times. Wearing suffers from a severe retrograde amnesia, unlike Breundl, perhaps a sign of differences in the extent of brain damage in the two cases, both within the MTL and elsewhere.

Mr. B. is perhaps more like people with deficits in sensory or working memory (see Shallice & Warrington, 1979; Vallar & Shallice, 1990). For example, J.B. presents with an impaired verbal memory span but is nonetheless able to maintain a successful life as a secretary and mother. K.F. exhibits

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5 Henner Voellk (2000) describes Störring as being driven more by emotion than cool rationality and as being aware of his own tendencies in this regard. This emphasis resonates with Störring’s master argument concerning Mr. B., and also with a common story about how the German people came in so short a time to be so broadly sympathetic with Nazi ideology.

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short-term memory deficits for auditory letters, digits, and animal sounds, without impaired speech production (unlike Reiger’s case above), but has comparatively spared short-term memory in the visual domain. Vallar and Shallice describe another person with a selective phonological short-term memory deficit who, after sustaining a left temporo-parietal lesion, is able to repeat only one to two letters. Crucially, all of these classic cases of working memory deficits have reduced, but not absent, working memory capacity, as would appear to be the case in Mr. B. Furthermore, all of the known cases of working memory deficits differentially affect one sensory modality, leaving the others spared. Mr. B.’s deficit spans the sensory modalities.

For these reasons, Breundl’s case resists tidy explanation in terms of Baddeley’s model of working memory (see Baddeley, 2012). The Baddeley model is composed of three slave systems (the phonological loop, the visuo-spatial sketchpad, and the episodic buffer) and a central executive that controls the slave systems and combines their contents into coherent episodes. The phonological loop and the visuo-spatial sketchpad are each thought to contain a short-term cache (the phonological store and visual cache) and independent mechanisms for reactivating contents of the caches over time (the phonological loop and the scribe, respectively). The episodic buffer combines elements from multiple modalities into sequenced episodes, as when one remembers an extended event or a movie scene. Baddeley introduced the latter system in part to account for the fact that amnesics who have lost the ability to store information are nonetheless able to recall stories and episodes that last longer than could be maintained by the phonological loop or the visuo-spatial sketchpad alone.

Although Mr. B. does have difficulty assembling complex sequences into episodes, as is the function of the episodic buffer, Mr. B.’s deficit appears to be a consequence of a more fundamental inability to retain information, from whatever modality, for longer than 1–2 seconds. Mr. B.’s limited temporal window appears to suggest a malfunction in the phonological and visuo-spatial slave systems together, but the fact that it affects all of Mr. B.’s sensory modalities (unlike the deficits observed in other people with working memory deficits) is difficult to square with the idea that each of the slave systems has a proprietary cache and reactivation mechanism (unless Mr. B. miraculously damaged each of them independently and equally). Taken at face value, the case of Mr. B. would then suggest that these distinct reactivation mechanisms might share a common necessary mechanism, perhaps a control process regulating how experience is assembled into meaningful packages.

For this reason, it is useful to consider how Mr. B. fits within current models of event perception (Zacks et al., 2010). According to Zacks’ model, individuals construct event models that guide perceptual processing and prediction. As an event changes, it becomes less predictable. As prediction error rises, the event construction system flushes the old event model and replaces it with a new one. It is clear from Störring’s description and from the film that Mr. B. can construct multimodal event models to answer even complicated questions. He can, for example, answer verbal questions about visually presented objects. He can also engage in extended actions that combine different cognitive and sensory components into a whole, if only for the moment. For example, Störring repeatedly instructs Mr. B. to turn on a light in broad daylight. When Mr. B. reaches the light switch, he becomes confused and looks back and forth from the window to the switch. From the perspective of models of event perception, Mr. B. appears to have extremely unstable event models. Either his models are updated far too frequently or, perhaps, they are updated in all the wrong places. Indeed, such a deficit might be predicted to follow from damage to subcortical structures in the striatum or midbrain regions, regions proposed to be necessary for generating the error signal that triggers old event models to be replaced by new event models (Zacks et al., 2007).

According to a third perspective, working memory phenomena reflect a more fundamental feature of the architecture of human experience (Cowan, 2010). On this view, although any number of items might be activated in long-term memory at any given moment, only approximately four such items can be held in focus. So-called working memory phenomena are more adequately seen as consequences of this informational bottleneck. Viewed from this perspective, Mr. B. might be seen as having damage to a mechanism required to maintain items in focus.

Regardless of which perspective one takes on the nature of working memory, the case of Mr. B. emphasizes that the emotions no less than auditory and visual information must be accommodated in any complete theory of working memory. Störring emphasizes time and again that the emotions help Mr. B. to bridge between his unremembered seconds of consciousness, fueling extended actions and preserving his sense of continuity against the shifting sands of his moment-to-moment consciousness.

Exactly what one should conclude from the case of Mr. B. is, in our view, an open question. However, Mr. B.’s thorough, multimodal, sensory or working memory deficit appears to be utterly unique in the recorded history of neuropsychology. If the case can be trusted, it offers novel material for thinking about the causal organization of working memory systems and cognitive control more generally. Precisely how one decides to treat the case, however, will depend on how one resolves the controversy that would add a surprising turn to the story of Mr. B. just after the war’s end.

5. The controversy

Cognitive neuropsychology faces two important challenges raised by the passage of time. The first challenge is that clinical cases are dynamic processes, not static entities. At a neurological level, brains damaged by disease or insult can recover and reorganize with time. At a more organismic level, patients might learn to compensate for their deficits or, in more tragic circumstances, develop secondary psychological symptoms as a result of their primary cognitive deficits. The
people described in case reports can learn and mature just as they can forget and decline. All long-term neuropsychological case studies must at some point confront the fact that the object of scientific investigation can change over time, either as a result of the investigation itself, or as a result of numerous other, independent mechanisms.

The second challenge raised by time is that neurocognitive case studies are always (to some extent) frozen in time. Unlike other areas of science, where the phenomenon under investigation is repeatable in practice from one experimental setup to the next, human neuropsychology often deals with a more particular subject matter; the most revealing deficit pattern might occur (and be noticed) only once in several generations, if ever. When the person behind such a case study dies or ceases to be accessible to science, the temporal window for data collection closes. With time, science changes its standards for testing and reporting case studies, and the dominant theoretical models used to interpret those case studies evolve. Yet the data from case studies always inevitably fades into the past.

Both these features, the dynamic object and the frozen perspective, are combined in the controversy that surrounded the case of Mr. B. (see Zangwill, 1967; whose account is the basis of our summary). The controversy turns primarily on two questions: (i) whether Mr. B.’s deficit is “organic” in nature or a secondary symptom of some sort, and (ii) whether Mr. B. partially recovered from his primary deficit.

In 1930, when Störring presented the case at the 24th Annual Conference of the Bavarian Psychiatric Association in Würzburg, the details and interpretation of the case appear to have been fully accepted by everyone present, including Oswald Bumke (Kraepelin’s successor at the University of Munich, with whom Störring worked from 1932 to 1934), Hugo Spatz (Director of the Kaiser Wilhelm Institute for Brain Research), and Martin Reichardt (who originally diagnosed Breundl). Störring (1931) stresses the fact that every psychiatrist who had investigated Mr. B. had rejected the idea that his symptoms resulted from hysteria. In a 1934 discussion of the case, Karl Kleist (director of the University Neuropsychiatric Clinic at Frankfurt am Main) says he has no doubt that Mr. B.’s condition is organic. In fact, he claims to have seen such a case himself, though not one as pure as Mr. B.

Nearly a quarter century after the initial case report, in 1949, the Erlangen psychiatrist, Heinrich Scheller, visited Breundl twice, once with Störring, and once alone. These visits led to a critical 1950 review in Nervenarzt (followed by a longer piece in 1956). Scheller argues, contrary to Reichardt, Störring, and Grünthal’s diagnosis, that Mr. B.’s memory disorder is psychogenic, not organic. He emphasizes that Mr. B.’s case is utterly unique despite the generally high incidence of carbon monoxide poisoning. In particular, no other patient shows such a fixed disorientation in time and place, and no other patient shows such thorough anterograde amnesia without any corresponding retrograde amnesia. Additionally, Scheller notes a few occasions on which Breundl’s memory appears to exceed Störring and Grünthal’s description: he smiles knowingly at a photo of Adolf Hitler, recognizes the swastika as a party symbol, and he is able to complete household tasks, such as laying linoleum. Finally, Scheller notes that Breundl has no major neurological symptoms: his ventricles appeared to have a normal shape and size, and his electroencephalogram (EEG) (taken in 1935 by no less an expert than Hans Berger) showed no apparent aberrations (Berger 1936). Scheller concludes that Breundl’s condition is a secondary hypochondrial reaction to a primary neurological insult that led Breundl, with the assistance of his wife, to overestimate the severity of his symptoms.

Grünthal and Störring (1950) responded immediately. Although they acknowledge that Mr. B.’s symptoms might have changed somewhat since his initial examination, they insist that the original disorder is nonetheless still present, and they point out that Scheller has no convincing explanation of how a happy and well-adjusted worker would develop such hysterical symptoms. Breundl had no motivation to feign his illness (as he had already been granted full compensation from the company), and Scheller, they claim, fails to identify a plausible psychogenic cause (though he does hint that the disorder might have been worsened by having a domineering wife). Grünthal and Störring again stress that all of the initial investigators of the case explicitly rejected hysteria as a plausible explanation for Mr. B.’s symptoms. From a contemporary perspective, it should be noted that Breundl might have sustained neurological damage that could not be detected by 1930’s era ventricular imaging and EEG machines. Furthermore, it is now well known that psychogenic amnesias often show disproportionately severe retrograde amnesia with spared (or less severe deficits in) anterograde memory (see Kapur, 1999; Kopelman, 2002; Staniloiu, Markowitsch, & Brand, 2010).

Nonetheless, Grünthal and Störring agreed that the case should be reopened. Störring commissioned Hans Scheele, who met Breundl while working under Reichardt in Würzburg, to reexamine him. Grünthal commissioned Annemarie and Hans Heimann (of the Waldau Psychiatric University Hospital in Bern). In each case (Heimann & Heimann, 1952; Scheele, 1951), the authors support Grünthal and Störring’s original observations. Scheele, in fact, claims that nobody who has had personal experience with Breundl could doubt the veracity of the case.

Yet the controversy did not die. On February 27, 1953, Störring, Grünthal and Heimann presented the case of Mr. B. at the Bern Psychological Society. Fritz Lotmar, a German neurologist and pathologist who had emigrated to Bern in 1934, was in the audience. Animated by the discussion, Lotmar published a critical response in the Schweizer Archiv für Neurologie und Psychiatrie (Lotmar, 1954). In that response, Lotmar reiterates the concern that Breundl might be faking his deficit to receive disability compensation. He also points out that the earliest hospital report on Breundl fails to mention amnesia. As evidence, Lotmar points to examples in the film in which Mr. B. appears to answer questions longer than

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7 Data can, of course, be extracted from post-mortem analysis of brain tissue, or example as has been done for Phineas Gage (Van Horn, Irimia, Torgerson, Chambers, & Kikinis, 2012) and H.M. (Annese et al. 2014). Breundl’s brain was not preserved, and he outlined by three decades the active scientific discussion of Mr. B. The film perhaps contains clues that could be mined for data invisible even to Störring (such as eye-tracking data). Yet in many respects, the case of Mr. B. is science in amber, dimly visible but out of reach.
three seconds. He also argues that Breundl’s deficits are not as “pure” as Störring suggests. In particular, he argues, Mr. B. shows a lack of initiative and spontaneity and, at times, offers evasive or implausible answers to questions that suggest some kind of hysterical pseudo-dementia.

This criticism provoked a rapid response from Grüenthal and Störring in the same journal (Grüenthal & Störring, 1954). They note that Lotmar never actually met Breundl, and they stress that Breundl’s financial compensation was guaranteed long before the case rose to prominence (though surely Breundl would have some incentive to avoid being exposed as a fraud). They also find Lotmar’s diagnosis implausible, given that hysterical amnesias are typically retrograde, not anterograde.

Contemporary neuroscience can perhaps shed some light on the fact that Breundl was not diagnosed with a memory deficit until weeks after the accident. Post-anoxic neuropathy can have a significantly delayed onset (Neubauer, Neubauer, Ko Chi Nu, & Maxfield, 2006) and carbon monoxide poisoning is sometimes associated with diffuse white matter demyelination and sustained frontal lobe/executive dysfunction (see Cocito et al., 2005; Deckel, 1994). From this more contemporary perspective, the diagnosis of hysteria is somewhat less plausible than the idea that Mr. B.’s deficits arose as a secondary neurological consequence of demyelination in high-bandwidth network connections in the brain.

In 1956, 30 years after Breundl’s life-changing injury, his wife declared that she would no longer allow researchers access to him. This was especially concerning to Grüenthal and Störring, given that much of the controversy turned on the relationship between Breundl’s current condition and the original description of the case.

In a bizarre twist, Störring hired two young clinicians at the Neurological and Psychiatric Clinic at Kiel, Vollk and Stolze, to pose as tourists vacationing near Breundl’s home. They observed him for two weeks before disclosing themselves to his wife, who then granted them a final interview. Vollk and Stolze (1956) report that Mr. B. now appears to know that his wife is present even when she is out of view. They observe that he can do simple jobs, that he can follow conversations, that he can understand long sentences, and (surprisingly) that he is aware of the atomic bomb. His wife now reports that his memory lasts, at most, 15 minutes. Vollk and Stolze offer a psychodynamic hypothesis: Mr. B.’s symptoms are the result of a psychogenic pseudo-dementia. Mr. B., they suggest, was harboring immense guilt for having premarital sex and for having contracted a venereal disease. This guilt, they continue, caused Mr. B. to transfer his prior dependence on his overprotective mother onto his wife, which dependence manifested itself in the reported cognitive disability.

Grüenthal and Störring (1956) were forced by Völkel and Stolze’s report to relent: “the circumscribed retention defect with ‘one-second consciousness’ no longer exists.” Breundl has partially recovered. They also suggest that Breundl might have changed over thirty years. They suggest that his syndrome evolved from an “organic disorder” into a secondary, psychogenic reaction. Although they acknowledge they might have been duped by a con artist, they insist that Breundl’s behavior, as shown in the film, was too convincing in the past and too unconvingin the present to have been affected.

An alternative, more contemporary-sounding, hypothesis might be formulated as follows: Mr. B., having suffered a massive insult to executive function, consciously or unconsciously learned from his caretakers how to perform his symptoms over time (cf. Dennett, 1992). This symptomatic co-creation between the clinician and the neuropsychological patient has been well documented in numerous contexts (Dennett, 1992; Hacking, 1995). Perhaps Breundl, through repeated study and public demonstration, came over time to display the symptom profile that Grüenthal and Störring saw in him. Given the apparent damage to his executive systems, Breundl might have been especially susceptible to subtle forms of suggestion from his physician/researcher.

Zangwill himself is inclined toward such a hypothesis: “The mode of onset and the mechanism sustaining amnesia in a case such as that of B. are still entirely obscure, and in the view of the present writer, are unlikely to be understood wholly in psychological terms. As Syz (1937) has said of his own case, the case of B. does not completely conform to any of the known types of memory disorder, whether they occur on an organic or a functional basis”. Zangwill concludes: “We appear to have reached the limits of usefulness of this particular dichotomy.” (Zangwill, 1967, p. 126).

Zangwill does not expand on this tantalizing suggestion—that it is no longer useful to distinguish the psychiatric from the neurological disorders. Perhaps he means something like this. If Mr. B.’s symptomology is “organic”, a direct result of the poisoning, this reflects one way that a mind-brain can become disordered. If Mr. B.’s symptomology is a secondary hysterical reaction, the case represents another way that a mind-brain can become disordered. Either way, it is curious that it became disordered in precisely the way that it did—that it is possible, via whatever mechanism, to produce a person who to all appearances cannot register experiences. Considered as an instance of the first etiological pathway, the case of Mr. B. might teach us something about the mechanisms of working memory and attention. Perhaps new generations of psychiatrists and neurologists will find in the article and the film suggestive evidence, or at least material for thought, concerning the organization of human memory and experience. Considered as an instance of the second etiological pathway, the case of Mr. B. might teach us something about the construction of the self: how a neurological disorder in a particular social context can lead to the creation of new and previously unimaginable ways of being human.

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8 The case of Mr. B. also plays out against a changing backdrop of German psychiatry as a whole. In particular, the question of whether Mr. B.’s deficit is organic or psychogenic had particular relevance in the context of disputes over the significance of biological models versus psychodynamic models in psychiatry; see Cocks (1997).
6. Conclusion

The intellectual value of Bremund’s story is far broader than its continued scientific relevance. The case is also relevant to people across the disciplinary divides of modern academia. It is a window on neuropsychology in early Twentieth Century Germany and into the effect of the political and social changes in Germany on academic psychiatrists. It is a window on conflicts within German psychiatry about the proper role of neurobiological and psychodynamic approaches to the study and treatment of psychiatric disorders. The film footage of Mr. B. raises a host of questions about the practice of filming patients and the conventions of demonstration in the history of neuropsychology. Those coming from the perspective of disability studies will perhaps be curious to learn more about this severely and terminally disabled man who survived the disability studies will perhaps be curious to learn more about this severely and terminally disabled man who survived the extermination policies implemented in the town of his diagnosis. Those interested in the history of psychological concepts will find the Merkfähigkeit an indispensable part of the history of the concept of working memory. Philosophers will likely see this case as a living thought experiment demonstrating personal continuity in the absence of memory. Yet most fundamentally, the case of Mr. B. holds our attention because it seems to offer insight into the mechanisms that make a distinctively human life possible. We hope this translation, paraphrasing Störring, will provoke the most diverse experts to bring new perspectives to this case and its significance, if not for science, then for our understanding of the place of neuroscience in its wider cultural and historical context.

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Memory loss by gas poisoning: A man without memory of time*

By Gustav E. Störring

Translated by: Benjamin Graham and Carl F. Craver

a J.D. Candidate, Yale Law School, United States
b Philosophy-Neuroscience-Psychology Program, Washington University in St. Louis, United States

Foreword

Over the past few years I have observed a patient who to this date stands alone in science: a man, who from a specific day on has been able to retain no experience for longer than about one second before forgetting it forever. This case is of such fundamental scientific import because, in contrast to all the similar cases known as of yet, his memory for fresh impressions—the so-called capacity for registration—is completely absent, though no other primary emotional disorder is otherwise present.

In other observed cases of patients with disorders of registration, one could always detect traces of registration in which events of greater interest were better retained than those of less interest. Furthermore, with the earlier observed patients with disorders of registration, one would find multiple emotional and mental disorders: deficits in old knowledge, disorders of judgment, and disorders of temperament and will. Impairment of the personality as a whole always appeared alongside the disorder of registration. This too needs little further explanation, as up until now, disorders of registration have always presented alongside diffuse pathological changes in the brain, which naturally cause other psychological disorders. As is well known, such disorders are especially pronounced in certain sicknesses of the brain—in the elderly, in cases of paralysis; and in cases of brain injury following severe cranial trauma or poisoning, in which carbon monoxide and alcohol play an especially large role.

The famous patient of Liepmann, who because of severe chronic alcohol abuse came to forget almost all his experiences instantaneously, is cited as an example of a profound disorder of registration. However, his memories of his healthy times also suffered. About 30 years of his life were erased; the fifty-year-old journalist believed he was a student and believed that his long-dead parents were still alive. All the answers that the patient gave to questions about political events were anchored to a time thirty years past. A very remarkable case from Rieger, who conducted the first systematic attempt at an intelligence test, showed an almost total loss of the capacity for registration after brain injury—though admittedly alongside many other disorders. This curious patient is reported to have repeatedly sniffed sickly smelling fluids with continuously renewed horror. Especially strong emotional experiences could, however, be retained longer. When his doctors carelessly talked about how informative his autopsy would someday be, the patient noticed and held it against his doctors long afterwards.

Even more similar to our case is a patient of H. Mabille and A. Pitres. The case deals with a thirty-four year old man who, after a stroke following syphilis, could no longer remember; his memories were left standing on the day of his admission to the hospital. Ten, fifteen, twenty years after his admittance, he always believed that he had been admitted just that morning and knew little about the customs of the hospital, as if he had just arrived. For example, he never knew his place in the dining hall and never found his own bed. This patient differs considerably from ours in that he could retain new impressions for at least fifteen seconds and could therefore understand and speak multiple sentences in succession; additionally, this case also presents with weaknesses of intelligence and disturbances of temperament. He shows, for example, no interest in his environment. Despite evidence to the contrary, he was very excitable. His impairment of judgment, although minor, expresses itself in that he denied knowing a man he had once seen earlier in Paris, claiming the man was certainly foreign to him. His autopsy revealed large areas of softening in both hemispheres in front of the head of the caudate nucleus.

Our patient presents with an absolute failure of registration; no experience is held in memory, even if it is emotionally laden and often repeated. Each experience remains in his consciousness only for about one second before it dissipates. But besides this total failure of registration, no other primary neurological disorder is present. I emphasize that no other primary disorder is present. The observed emotional changes in our patient, as will become apparent below, can be understood as direct effects of his failure of registration. The patient remains precisely the same person that he was before his gas poisoning, with one exception: he is unable to remember. Notably, his old memories, in contrast to the other cases with severe disorders of registration, are in their previous condition.

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[1] [TN: As noted in the introduction, we translate the term “Merkfähigkeit” as the capacity for registration because the word does not have a standard meaning in contemporary psychology. “Merkunfähigkeit” is translated variously as the inability to register or as a deficit in registration. “Merkstörung” is translated as a disorder of registration. In each case, we have italicized the construction to highlight its artificiality. We leave it to others to decide to what extent Störring’s Merkfähigkeit is related to such contemporary concepts as working memory and short-term memory.]


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He retains the knowledge and abilities he acquired before his gas poisoning. One can best compare his memory apparatus with a wax board that suddenly became rock hard, upon which all the old grooves remain legible while new impressions leave no record behind. We have in this unparalleled case a completely pure experiment of nature. In a curious trick of nature, the severe gas poisoning has erased only this specific memory function—the capacity for registration—totally and in isolation, leaving the remaining personality intact.

It is naturally of the utmost scientific interest and also extremely moving to see how human mental life looks when, in an otherwise fully normal person, the capacity for registration suddenly fails; when the continuity of mental life lasts up to a specific day and, despite retained consciousness, is from then on interrupted, appearing to be divided into periods of a few seconds. Here one can study how an otherwise completely normal person, for whom only a second is available, thinks, feels, and behaves in that second.

When I first saw the patient in 1929 in the Würzburger Nervenklinik—where in 1927 Professor Reichardt and the former senior physician Dr. Grünthal first recognized his uniqueness—I was excited and shocked. I was committed at once, as I remain today, to the task of learning and presenting to my colleagues what this utterly unique case contributes to science. For such a case has never before been observed. In a monographic presentation I attempted to extract the most important problems that the case presents, and in part resolves. After occasional demonstrations of the patient at psychological and neurological congresses, most recently at the International Neurological Congress in London at the end of July of 1935, and on the basis of critical observations and scores of inquiries by colleagues in the field, I have consistently experienced that making a somewhat full and concrete picture of the mental life of those who have lost the capacity for registration—not to mention empathizing with such a mental life—presents difficulties for my colleagues. The totality of the registration deficit in this case has some analogy with previously described cases that are similar, though qualitatively less complete. Yet the disorder’s isolation, namely the fact that the memory function drops out of the mental framework while no other primary disorder is present, appears incomprehensible and almost unbelievable to most specialists. In previously described cases of non-hysterical disorders of registration resulting from diffuse brain injuries, one always finds other primary emotional disorders. Why should the entire personality be left intact in just this case? Critics of this sort could easily bolster their case by describing the remarkably perplexed behavior the patient exhibits in public demonstrations at congresses. Yet this perplexed behavior is simply a direct consequence of his inability to register experiences. The flightiness of his mental processes results from the fact that he has only a second in which to think.

In any case, I learned two things from this: first that it is important to provide a concrete description of the patient’s behavior that is as unencumbered by theory as possible; and second, that in public demonstrations, it is best to create situations in which his perplexity does not interfere. I complete

the first task in this paper and the second in an audio film. The production of a comprehensive scientific audio film by Ufa was made possible through the generous funding from the Deutsche Forschungsgemeinschaft and through the donation of picture and audio materials from the I.G. Farben Leverkusen. I hope to have convincingly presented the authenticity and pureness of this case of registration failure for the present and for scientific posterity. It will also clearly emerge that the failure to register is not hysterically induced.

The work at hand, in which I also report supplementary results from encephalography and electroencephalography, should also stand as an explanation of the audio film. To make the writing more easily understandable for psychologists and other specialists, I have avoided the use of medical terminology as much as possible. May this work provoke the most diverse scientific experts to think so that new perspectives on this case, which I do not myself see, might subsequently arise.

How the memory disorder resulting from gas poisoning presents

When and where the healthy B. suffered his gas poisoning

Our patient, Franz B., comes from a healthy farm family in the Upper Palatinate. He was born on June 30, 1902. Before the injury, he was always healthy. He was a very good student, just like his siblings, and he completed his apprenticeship as a metalworker. After his apprenticeship, he worked as a repairman for blast furnaces in many factories across Germany and as a metalworker in mines. His last position was in Gelsenkirchen, where he worked as a repairman for blast furnaces and where his accident befell him. B. was quite talented, unusually diligent and ambitious, and about to be promoted when on May 31, 1926, at the age of twenty-five, his existence changed entirely.

B. was found unconscious at his workplace at one o’clock in the morning; he had vomited. Blast furnace gases had penetrated his workroom. He had been working actively and alert an hour earlier when his colleague left to eat in a room about two meters above him. This lunchroom suddenly filled with gases from the blast furnace. B. was found unconscious on the floor, breathing only with much effort, and he could not be awakened. He was transported to a hospital and was conscious upon admission. He could not remember the gas poisoning. He felt totally healthy and requested that he be deemed fit for work and released. His request was denied. No memory disorder was observed during the short hospital stay. After his release from the hospital, when B. began work again, it became apparent that he immediately forgot every order he was given. As a result, he was sent away and a medical examination was conducted. In this examination, a severe disorder of registration was confirmed, and it was determined that B. was therefore incapable of continuing his work. B. received full accident benefits and has since (so nine and a half years by now) resided in his hometown in the Upper Palatinate.

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In the first apparent weeks, his disorder of registration was not as severe as it was in the later tests. Yet he clearly noticed his deficit back then and wrote down his room number in the hospital as a result. He suffered greatly from his inability to retain impressions and was very distressed by it when his fiancée visited him in Gelsenkirchen. As is typical of disorders of registration after brain damage, his memory disorder became progressively worse so that by 1927, at the Würzburger Nervenklinik (under Prof. Reichardt), an examination confirmed an absolute deficit in registration. Now, the patient no longer knows about his weakness of memory; he cannot remember it. As a result, he no longer suffers.

Time stood still for B. on the day of his poisoning

It became apparent in this analysis (as well as in all the later ones) that B.’s memory stood still on May 31, 1926. He can remember well that he worked the night shift that day, and he knows about a conversation he had with the colleague who left him an hour before the gas poisoning, but he knows nothing more about the gas poisoning itself. For him, it is always May 30, 1926, and he still believes he is twenty-four years old; he knows nothing of the many years between. No new impression is held in his brain. He also believes that he resides in Gelsenkirchen where the poisoning happened, even though he has lived in his hometown in the Upper Palatinate for more than nine years. He believes that he worked the previous night and knows neither that he suffered from gas poisoning nor that he has been unable to work for over nine years. He lives entirely in the old time; he can only witness the new time in moments he immediately forgets. Yet the past is still alive to him; he retains fully his old memories up until the day of the gas poisoning. Time, however, stood still on May 30, 1926. Consequently, he knows nothing of the political revolutions of the last few years. In his view, Hindenburg is the President and Marx is the Chancellor, and so they will always remain for him.

Because he is still the same person he was before, he still has his old career plans; for example, he intends—as was always his wish and was acute in his time—to go to Russia as a repairman. B. was engaged in 1920 and still plans to marry his bride in the fall of 1926. He is a person of high moral standards, as is his wife, eight years his elder. Throughout this long engagement, they maintained pure marital relations consistent with their ethical and religious views. His fiancée stayed with him despite the consequences of his poisoning and married him in 1930. She did so even though she had observed his altered condition for four years and even though her relatives urgently advised and protested against it. She valued his personality too much to be able to leave him in his misfortune. As his wife, who knows him best both before and after the poisoning, emphasizes, his nature, the core of his personality, has not changed as a result.

Today, however, B. knows nothing of his marriage, though he has lived with his wife daily for more than five years. At the office of the civil registry, when he was asked whether he wanted to marry his fiancée, he answered affirmatively—because he always had the intent—but forgot everything in the blink of an eye. His attitude toward his wife, offers a realistic picture of the early part of their engagement. Consequently, no children have come of the five years of marriage. For his wife, the present life amounts to a great sacrifice; she must find it more oppressive than she first suspected to live with a man who, in a certain respect, is mentally dead, who forgets in the blink of an eye even the most moving experiences. Because for him, the life he knows ended on May 30, 1926.

This phenomenon—the registration deficit—is fairly comprehensible for the layman. In daily life one can often observe in old men that older knowledge is retained and available, while new knowledge rarely sticks at all. As a result, some old men are partly heralds of good old times, which they can describe in such detail as to produce weariness in their listener, and are on the other hand adverse to everything new. In such cases, the ability to retain experiences suffers not through gas poisoning, but rather through the brain’s aging process. It is well known that the young best acquire new memory material, that this ability peaks around thirty years, and that from this point it gradually fades.

One recognizes from this and similar observations that one must distinguish two types of memory function which can be damaged independently: 1) the old memories and 2) the ability to store new experiences and memory material. The latter ability, in contrast to the old memories, is also called the memory for new impressions, and since Wernicke, is denoted by the succinct term Merkfähigkeit. With all injuries that affect the brain, this capacity for registration is far more sensitive and more easily disturbed than are old memories. With severe injuries, one almost always finds a disorder of old memories alongside a disorder of registration.7

However, in our case, as if through a miracle, the old memories and the remaining personality remain intact up until the point of the poisoning. Only the capacity for registration was damaged, and as never before observed, it is completely absent.

It is almost impossible to appreciate on the basis of pure theory how the mental life of a human appears when the capacity for registration fails completely. One would never predict that something like this could occur. Our patient, however, shows us clearly how the mental life of a man with precisely such a deficit plays out.

B. has but a second at his disposal

When one works closely with Mr. B., one quickly makes the remarkable observation that conversation with him is totally impossible. He forgets questions that are asked of him in the blink of an eye. When one asks him for his name, he turns towards the questioner and prepares to answer. By then,

6 [TN: The most obvious translation for Altdgedächtnis is “long term memory”, though the term would likely not have been used in English in 1936. We allow ourselves this anachronism.]

7 Indeed, the more recent memories are even more sensitive and are lost easier after injury than those that are older and farther removed. For this reason, as a result of brain injury—for example, after a severe cranial fracture—a regressive memory disorder will result, the so-called retrograde amnesia. In the case of the journalist mentioned in the forward, the regressive memory disorder amounted to about thirty years.
enough time has generally passed that he has already forgotten the question. As soon as the question has faded away, B. has already forgotten its content. To respond, he must hear the question again as he answers. One must repeat the question without interruption to compensate for his missing memory.

If one breaks off the question abruptly when he begins to answer, B. becomes perplexed in the middle or end of his sentence because he no longer knows why he is speaking. If one then turns him towards the questioner, the situation becomes more embarrassing for B. because he does not know what one wants from him; he no longer knows that he has been asked a question.

Yes—his registration failure makes itself disruptively observable in conversation: when longer questions are directed at him, he forgets the beginning of the question by the time he reaches the end.

Using a stopwatch, it is easy to determine the amount of time required for B. to answer a question asked only once. This is best done with an association test in which one asks a subject to respond to a given word (trigger word) as quickly as possible with the first word that comes to mind (reaction word). Admittedly, it is impossible to explain this task to B.; he would just forget. One must say what one wants him to do in very abbreviated form. For example, if one names the trigger word “rose” alone, no reaction follows. However, if one says “Answer! Rose!” he reacts with an appropriate word “thorns.” To “small,” he says “large”; to “king,” “emperor”; to “many,” “few”; to “sun,” “moon”; to “love,” “hate”; etc. In the short time available to him, he always answers with the tightest, most appropriate cognitive association. Of course, one must always prompt him with the word “answer” before the target word because otherwise he would not know what one wants him to do.

In this manner, one can easily confirm that no more than 1–1.2 seconds may elapse for the question and answer together if an answer is to follow. One must voice the task “answer + trigger word” very quickly to B. if he is to respond appropriately. If more than 1.2 seconds pass (at the very most, 1.6 seconds), one will either receive no answer at all, or he will say the reaction word incompletely and hesitantly, becoming perplexed as a result. For example, to “love” he will say the first sound “ha...” balk, and then grab helplessly at his head. From these simple experiments it can be seen that B. has only 1–1.2 seconds available at a time.9

During this experiment when we received a single reaction word answer from B. to a short, quick question, he would accordingly prepare to answer other short questions with a sentence or a few words, and because of this, he was never able to get past the beginning with new questions. One must just ask

short, concise questions of him and repeat them until he answers. In this way, one can receive an appropriate answer for everything. His wife, who has adapted herself to his memory disorder, naturally speaks to him in this manner by repeating her questions continuously; in public, she does so quietly so as not to cause a stir.

One can observe this phenomenon most vividly in the audio film. One hears how B. becomes stuck in the middle of his answers. One sees that he becomes completely perplexed when the question is not repeated and that he answers successfully without becoming perplexed when he is asked continuously without interruption.

As quickly as he forgets the question, he naturally forgets the instructions for any actions as well. In response to the instruction “Turn on the light,” B. looks to the ceiling at the light in question. From there he follows the wire with his eyes, catches sight of the switch, and is at the point of standing up from his chair. If one stops repeating the question at this point, he remains seated. If he is already standing, he stands there confused and does not know what he is supposed to do. He obviously feels from his inner drive to action that he wants to do something, and he admits as much when asked. He says, “Yes... I don’t know what.” For him it feels similar to how a normal person feels when they stand to do something and then immediately forget what it was.

If one repeats the instruction consistently, he appears—when he has not just glanced at the switch—as if he has returned to the beginning: looks at the light, follows the wire to the switch, goes over to it, and, with sufficiently frequent instruction, turns on the light. However, if one stops the repeated instruction when he has his hand on the switch, he does not turn on the light. He becomes perplexed and confused because he does not know why he is senselessly turning the light on in broad daylight. That he considers it absurd follows from the fact that during the repeated instruction, he will spontaneously say, “It’s really very bright already!” or “It’s daytime!”

Everyone will now ask themselves how he behaves when asked after nightfall; he turns the light on, even when one stops the instruction near the end of the task. One already sees from this task that B. meaningfully evaluates every situation in the second at his disposal.

However, it is not just the spoken word that he forgets forever in the blink of an eye. Rather everything he hears exists for him only as long as he perceives it. The most beautiful music that pleases him in the moment, as well as a loud bang that immediately frightens him, are as if they had never been after they dissipate from his memory! In the second at his disposal, he can distinguish a waltz from a march because in this single second, he can grasp meter and rhythm.

He also knows of the things in front of his eyes only so long as he sees them.

When I was with him in the movie theatre, B. naturally knew where he was. He seemed interested, and the film held his undivided attention. Watching funny films, he laughed only when the comedy arose from the scene before his eyes, not when it arose from chronologically sequential situations. During a Mickey Mouse film, B. was thoroughly entertained and slapped his knees with delight. He had always had a good
sense of humor. At the moment the film ended, with the joy still reflected in his face, I asked him whether he had liked it. He said, "Yes, I think it’s starting." Asked during the intermission where he was, B. looked around and, with his eyes on the curtain, guessed "in the theater." During the film, he again recognized correctly that he was in the movie theater. Afterwards, walking out of the theater, he no longer knew he had seen a movie. When asked, he believed that he had last been to the movie theater two to three weeks earlier—and in Gelsenkirchen at that. (In reality, he was at the movie theater nine and a half years ago—two and a half weeks before the poisoning in Gelsenkirchen.) At this point, I would like to report in passing how B. responded to an audio film, a kind of film unknown to him in his healthy days. When I asked him to explain the dialogue in the film, he surmised that the film must have a gramophone accompaniment. This shows that the knowledge he had acquired prior to 1926 allows him to comment in an intelligent manner on things that are totally new to him.

One can demonstrate with the following easily reproducible experiment—and always with the same results—that he no longer knows of things that have disappeared from his field of view. If one shows him an object, like a knife or a clock, he recognizes it immediately; if one then removes the object from view by closing a hand, for example, then in the moment following, he knows nothing about the fact that he was just shown something. If one asks him in the same moment that the object disappears before his eyes, "what have I shown you?" or "what did you see?" he looks around himself helplessly and has no idea what one wants from him. Because he forgets what he perceives one moment to the next, he is also unable to combine chronologically sequenced scenes into a unified picture. In an auditorium with nothing but a board, rows of desks, and a projector in the back of the room, B. thinks that he is in a classroom when he has his eyes on the board. If one turns him around so that he sees the projector rather than the board, he believes he is in a movie theater. He does not know that he believed it was a classroom just a moment before; he therefore does not experience the contradiction between these utterances.

The following telling experiment belongs in the same framework: if one asks B. what time of year it is while he beholds the winter landscape out the window, he will correctly say that it is winter; turn him around in the room so that he no longer sees the winter landscape, and he assumes that it is the end of May, therefore spring. The latter comment again illustrates that it is still the end of May 1926 for him. If he sees the winter landscape again, he judges it is winter. This test can be repeated time and again with the same result. B. does not experience all of this like dream—in which we can have similarly erratic and contradictory experiences—but rather with a fully waking consciousness and an active mind. What applies to vision and hearing applies to every other sense as well. He forgets every sensory stimulus directly after it dissipates, even when it is strong and gratuitously repeated. Every smell or taste, no matter how pleasant or unpleasant, is forgotten forever after the source disappears. If one gives him a foul smelling liquid to sniff repeatedly, he will become appalled anew each time. Spontaneously, he will reach for the bottle with the foul smelling liquid, like Rieger’s patient, who always smelled of the bottle with renewed curiosity. With B. one finds no uninhibited curiosity; he has not changed other than his absolute memory failure. Likewise, B. forgets tactile sensations (light touches, pressure, etc.) as soon as the sensation ceases.

The same can be observed with pain stimuli. Stick him in the hand with a needle, and he pulls his hand away in surprise. A second later, he will extend his hand again upon request, and is equally surprised and appalled by every following prick. He no longer knows of the needle prick and reports afterwards that he has felt no sensation of pain.

With heavy repetition, B. becomes increasingly internally agitated, finally beginning to cry, but he always extends his hand upon request and does not know what will come. After becoming unsettled, he gives his hand only hesitantly. Suddenly he leaps instinctively and anxiously, running blindly away, but he soon stands still and looks around helplessly, shaking and crying. Asked what has happened, he does not know. Asked if he has been stuck with a pin, he says no. When he is led back to the chair, he pushes forward instinctively. Internally, he is in an unsettled and agitated state, with an accelerated pulse and anxious breathing, but when asked, he does not know why. When he is shown the needle and a motion is made as if to stick him again, he says that such a pinprick is insignificant.

The first time this flight reaction ensued after many such stimuli, it emerged quickly and immediately afterwards, while B. was still agitated. The same experiment repeated on another day—after the unrest and agitation, the aroused heartbeat, and the rapid breathing had subsided—still required many pain stimuli to trigger the emotional expression and flight reaction. B. learned nothing from the experience. Because of his registration defect, the sentence, “a burnt child dreads the fire,” which applies not only to humans but also to animals, has no validity for B.’s life since the poisoning.

Given that B. becomes increasingly agitated, unsettled, and anxious after the frequent repetition of pinpricks, the question arises whether he has some memory of the sensation of pain, even if unconsciously. But he claims no knowledge of the pain.

The flight reaction is, however, immediately understandable by psychologists who have worked on human emotional states. Pain stimuli, which fade quickly, nonetheless leave behind an inner agitation, displeasure, and anxiousness. They are physically grounded in the altered heart rate, breathing, and the quivering of the musculature.

The following example demonstrates the same principle: if one brings B. to a state of anger through repeated insults and then—while he still has an angry facial expression, angry breathing, agitated heart rate, and altered tension in his musculature—asks what he is angry about, he does not know, though he confesses to being inwardly agitated. Here too the emotional experience leaves behind an unpleasant emotion after its cause has been forgotten.

Everyone is familiar with such aftershocks of emotions in their own lives. After a great excitement, one can still physically feel something of the emotion for a long time, even after the cause is forgotten. One would say then that the emotion, or more specifically the emotional state, has taken on a
dispositional character. In many sensitive people, this can cause a resonation of the emotions in the body; for one person, the joy (and anxiety) affect the stomach, for another the intestines, for a third it is felt in the heart, and so on.

Now the advocates of doctrines of the unconscious—who always assume that unconscious emotional processes are at work when emotional phenomenen are not readily understood—declare that the lasting after-effects of the emotion arise because the initial cause is still active in the unconscious. They can also contest the aforementioned normal psychological cases by claiming that the mental life possesses an autonomy for which only very specific and unique rules apply.

In the case of B., however, one sees with clarity an experiment in which the mental life occupies an exceptional position within the human psyche (and this surely applies to the lives of animals as well). While his more intellectual processes, his diverse sensory perceptions, and his every concept and thought can remain in consciousness only for about a second—for the time between its appearance and its dissipation—the corresponding mental excitations last longer because they are physically anchored. This is the sole reason that B. remains agitated and anxious despite the fact that he immediately forgets the painful pinpricks. He remains angrily aroused even long after he has forgotten that he was insulted.

The philosophers of ancient Greece saw, more or less, the tight relationship that one’s mental life and especially one’s emotional state—the affect—have with the body. This is why they incorrectly placed the seat of mental life in the heart. Recently, the American psychologist, W. James, along with the Danish doctor and psychologist C. Lange, attempted to formulate this set of facts scientifically. However, in a rather one-sided manner, James exaggerated the role of externally visible physical corollaries of the emotions when he wrote this sentence: “We do not cry because we are sad, rather we are sad because we cry.” He overlooked the fact that one can make a crying expression without any corresponding experience of emotional trauma. An actor can cry without being sad. The mechanism of crying can also be triggered by feelings of joy.

The great power emotion can exert through its physical anchoring despite an absolute failure of registration can also be seen in the following example:

A procedure (an encephalography) was supposed to be carried out with B. For this purpose, he was to be taken to the X-ray room full of doctors. Upon arriving, B., who had been completely calm until this point, became immediately very agitated, looked around anxiously and distraught, and refused to go into the room. With encouragement, he agreed to come along, but he became so agitated that his entire body shook. Then a curious thing happened: the man—who forgets in a moment everything that he wants to say and do—began to speak, though only in short sentences. He repeatedly said, “I have to go home,” or else, “I’ve lost my way,” and although he had only a second at his disposal, he pushed his way instinctively out of the room, next out of the lobby, and, finally out of the clinic itself. The otherwise logical and calm B., who had never harmed even a hair on anyone’s head, struck out at the doormen who were holding him. He tore himself free, saying, “Let me go! I’ve lost my way!” and ran further off the grounds of the clinic and towards the city. He was not settled when I spoke to him calmly, asking him to come with me. Rather he insisted that he was lost and wanted to go home, shaking all the while. His wife finally had to be called. She said that he remained inwardly excited for more than an hour afterwards and only gradually calmed down after a walk.

On another day, however, after the excitement had completely faded, B. went with me into the X-ray room without resistance, as if he had never in his life been to that room. Admittedly, this time no one besides myself and the assistants was present. One sees again in this case—like the anxiety after the needle sticks—that no trace of the deep anxiety is left behind.

It is important to notice in this example that in his extreme state of anxiety, he immediately determined that he must have lost his way. Furthermore, his escape from the clinic involved a long series of events even though he had only a second at his disposal. Each individual event in this cohesive series (tearing himself free of the doorman, the push out of the clinic, etc.) worked purposefully towards getting him out of this foreign and scary situation—and all of this occurred long after B. had turned his back on the seemingly dangerous situation.

How was that possible? As previously mentioned, the physically anchored feelings of anxiousness and anxiety continue to have their effects long after their cause has been forgotten. This long lasting anxiety signals to B. that something is amiss. While he cannot remember the apparently dangerous situation, there remains a persistent attendance caused by the physical feelings of anxiousness and anxiety. Because of this persistent attendance, B. can no longer “forget” that he is in the wrong place, that he has lost his way, etc. Thus came his purposeful, lengthy escape from the clinic. Unlike his evanescent perceptions, ideas, and thoughts, the physically anchored feeling of anxiety in this series of events crosses the bridge from one second to the next. This physical feeling manages to bind together the flow of a consciousness that had been split as a result of the inability to register experiences in memory.

Here one also sees that emotions exhibit a unifying, or as the psychologist F. Krueger recently called it, an integrating function, and, most importantly, that this integrating function is possible because of their physical anchoring. The emotions last longer and are more intense in consciousness, and can therefore give direction to human mental life. Thanks to the philosopher and psychologist G. Störring, we have shown the special status of emotional life in human existence and know its impact on ethics and education. As the following example shows, this case provides a wonderful confirmation of his tenets.

This contrasts with the unbelievable leaps of experience B. undergoes from second to second, as can be observed in the audio film from his interactions with his wife. When he is turned away from his wife:

Where is your wife? “In Wa.” Wa. lies in the Upper Palatinate.

Where are you? “In Gelsenkirchen.”

How far is Wa. from Gelsenkirchen? “700 km.”

Almost exactly correct!

When did you last see your fiancée? “She was there at Pentecost.” This is accurate.

His wife visited him in Gelsenkirchen at Pentecost shortly before the gas poisoning in 1926.

When he is turned towards his wife:

Who is that? “Yes, my bride!”

Married? “No.”

Do you want to get married? “Yes.”

When I presented B. at the Twenty-Fourth Annual Assembly of Bavarian Psychiatrists, I conducted this experiment, turning B. towards his wife and then away. In the discussion that followed, it was remarked that one cannot doubt the authenticity of this organic disorder when one considers how intuitively and naturally B. rejoices at the sight of his wife. This behavior alone is sufficient to rule out a hysterical disorder as the cause of B.’s symptoms.

The following provides further evidence that B. is unaware that he now lives with his wife. If one directs B. to his wedding ring, which his wife understandably still places on his right hand, he laughs as if he is embarrassed about the mistake and moves the ring to his left hand. His behavior is so convincing that any doubt as to authenticity can be eliminated.

Today, his face shines with bright joy when he looks at his wife. But how will it be in 20 or 30 years when his “eternal bride” has aged so that he hardly recognizes her anymore? He knows her only from the time before the gas poisoning, when she was still his fiancé. He also knows only how she looked when she came to visit him in Gelsenkirchen shortly before the gas poisoning; he knows nothing of their life together because his memory and his time have stood still. As a result of his registration deficit, he cannot grow accustomed to new impressions. Decades from now, his face will no longer shine with joy when he sees his wife. It will reveal the staggering tragedy as he looks at the person he so loved, who sacrificed everything for him, and who is now foreign to him, as the strange external changes slowly sadden him. Even today, after five years of personal observation, I can determine that B.’s joy at seeing his wife is mixed with discomfort, and he admits upon questioning that his ‘fiancé’ has changed.

Sentimental impressions are not blurred by new ones. In him there will be no trace of his experiences since the gas poisoning, no so-called engram ever formed. His memory apparatus can, as Grünthal and I expressed in our first short communication in 1930, be compared with a wax tablet that has immediately become rock hard, upon which old marks remain legible, but upon which no new impression leaves a record. It is not the passage of time but rather new experiences that lead the old impressions to be forgotten.

Because he can only live in just a few seconds, forgetting the experiences therein immediately, and since moreover the past up until the day of the gas poisoning is the only time about which B. knows anything—in fact, every detail—some readers will assume that B. lives in his past. One could assume that he now thinks especially intensively about the experiences from his healthy time.

These assumptions, however, are erroneous simply because he can only hold the memories of his time before the gas poisoning in mind for the duration of about a second. If B. were to think about an earlier experience for longer than a second, this would already come under the domain of the capacity for registration that he no longer possesses.

This single experiment of nature clearly delineates the scope of Algedächtnis [long-term memory] from the capacity for registration. It thus allows us to show once and for all what the long-term memory can accomplish on its own and what it cannot.

Yet at first glance, it seems even stranger that thinking about the past is fundamentally outside of B.’s free will. Although the past up until the day of the gas poisoning is the only time that B. can still call his own, it is now impossible for him to think about a previous experience at will.

As a result of his memory failure, B. has become an absolute man of the present, and he can only think about the past when the present reminds him of it.

B. always lives in the situation his senses provide him because the perceptual impressions that work on his senses in the moment impress themselves upon his second-long consciousness. To this point, no registration is required. The memories from his healthy time rest in his long-term memory and can only fill his consciousness when the immediate perceptual experiences of the present remind him of them.

For this reason he must be characterized as an absolute man of the present, but even so, he understandably still views every present impression with the knowledge and concepts of the past, which are naturally available to him in the moment. However, his thoughts are much more bound to the stimulus than is the case in a normal person with an intact capacity for registration; that is, what he thinks about the present perceptual impression is unequivocally decided by the particular impression. It does not depend on the thoughts of the preceding second.

Since his gas poisoning, he is an absolute man of the present, though he only knows his past.

With B., not a single experience is retained, even when it is repeated often and inwardly moving. His memory and his time stood still on the day of his gas poisoning. For him, the day before his poisoning is an unalterable, eternal yesterday, while the last nine and a half years and the coming years belong to an eternal today, about which he retains nothing.
This was already shown explicitly in the simple association test discussed above. For the truncated instruction “answer: rose,” B. always answers with the tightest association, “thorns.” He does so on different days and even when the preceding conversation was actually about tulips or flowers or plants. B. never once reacted to the stimulus word “rose” with “tulips,” “flowers,” or “plants,” or anything similar, because for him the acoustic task “answer: rose” is all that exists, and he always reacts with the association most familiar to him based on his previous memories: “thorns.” For the same reason, he routinely answers, as we have heard, to the stimulus word “emperor” with the reaction word “king,” to “love” with the word “hate.”

Thus everything that B. thinks, feels, and desires is determined by the situation before his senses. In this regard, the structure of B.’s consciousness is fundamentally different from that of a normal person, who can willfully focus on something. As a consequence of his memory failure and the fact that he has only a single second at his disposal, B. can no longer focus on things. His thoughts, feelings, and desires are decided by the situation itself.

This eminently important fact about the altered structure of his consciousness will become much clearer when we next attempt to show how B. lives in his single second and what he can still manage with his single second of consciousness.

Why B. becomes perplexed so easily, but is not always perplexed

Now that we know that B. has become an absolute man of the present and that he can think about the past only when the present reminds him of it, we can answer the two most important questions: why B. becomes perplexed so easily, and why he is not always perplexed.

As noted above, B. often becomes perplexed as a result of his disorder. When one converses with him, one sees him become perplexed because he no longer knows the beginning of a question by the time he hears the end. As we have heard, his perplexity presents itself particularly when someone ignorant of his disorder tries to speak to him without constantly repeating the question. B. sees then that the person speaking to him wants something of him, but he does not know what it is, and he will then become not only perplexed but inwardly quite anxious. When one asks B. a question, one will, at the beginning, easily make the mistake of not repeating the question enough and of carrying a preceding reference into a new question. One wonders then why B. looks at the questioner uncomprehendingly or perplexedly and why he is not always perplexed.

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With such mistakes, one recognizes anew that B. always reacts with mathematical precision; conversely, the questioner forgets that the man before him always lives in individual seconds, which he immediately forgets. Through repeated lapses into the same mistakes, one can finally begin to conceive of the disturbance in the flow of B.’s consciousness, and it becomes quite a unique experience.

Incidentally, I made such mistakes often during my examination of B. Thus, for example, when B. gave the answer “thorns” during the above association test, I incorrectly assumed that the entire instruction “I will say a word, then as quickly as possible give an answer: rose” was entirely in the present for him. Because of this, I believed that he had more than a second at his disposal. In actuality, only the end of the sentence, “answer: rose,” was in the present for him, and this short instruction was enough for him to know what one wanted of him.

If B. is in the room when one converses with his wife or anyone else, he appears to be confused because he cannot follow the conversation. If one laughs enough about some observation or the like, he will give a hopeful smile similar to the forced smile of someone who does not understand a joke. One sees that B. always becomes easily perplexed when interacting with the environment around him and that he is, as we will see below, at his happiest when he observes nature calmly and alone, which he has long loved.

We understand without further evidence why B. becomes perplexed when one no longer instructs B. to turn on the light during the day. Because for him, it must appear senseless to turn on the light in broad daylight and to find that he already has his hand on the switch even though the instruction no longer lies in the present. In fact, if B. were not to become perplexed, then we would say that he must have some other defect besides his memory failure. However in this embarrassing situation, he does something very logical that has yet to be mentioned. He turns himself right away to the door next to the switch and leaves the room that is foreign to him. In this seemingly embarrassing situation, he feels the pressure to do something, so he does what seems to him the most logical thing to do in this situation. In this way, he recovers his mental poise.

But it is not only in his interaction with people that he becomes easily perplexed. He also becomes perplexed by the perception that objects he knew from before have changed. Since his gas poisoning, the world has changed considerably in many respects, and B. must wonder and become perplexed about all of these changes. He wonders and becomes perplexed when he looks at himself in the mirror because nine and a half years ago he looked different, and unlike a normal person with an intact memory, he does not gradually grow accustomed to his aging face. He is surprised anew every time he looks in the mirror. Once he got a very short haircut, and every time he looked in the mirror, he became very perplexed and gave a confused laugh. What will he say when he sees himself as an old man, fully grey in the mirror?

Above all else, his perplexity becomes apparent in situations that are foreign to him, but only when one asks him where he is. He believes that he is in Gelsenkirchen given that he knows absolutely nothing of what happened later. In the Würzburg Clinic garden, with a view of the neighboring wine garden, the city that lay below, and the Fortress Marienberg, I asked him the following questions:
Where are we? B. is completely perplexed. “Yeah, this is...”

Where are we? “Yeah, isn’t this Gelsenkirchen?” He looks around, fully perplexed.

Are you anxious? “No.”

Are you perplexed? “Yes.”

Where are we? “I don’t know...” B. shrugs his shoulders, fully perplexed.

Do you believe that we are in Würzburg? “Could be.”

Where are we? “I don’t see anything I recognize.”

Do you know this city? “Yeah... I don’t know it,” scratching his chin as if confused.

Is it Gelsenkirchen? “No.”

How did you get here? “Yeah, I’m going home,” and turns to go.

How do you feel? “Yeah, I don’t know,” perplexedly shaking his head.

Do you feel strange? “Yes... strange, yes.”

Why do you feel strange? “I don’t know why I feel that way.” Then spontaneously, “Where is the train station?”

Why do you want to know where the train station is? “Yeah, so that I can go home,” and he turns around so that he no longer sees the landscape.

How long have you been here? “I’ve been here for a year.” (He means Gelsenkirchen.)

He turns back to the vineyards: Been here long? “Not here.”

Been here long? “No, I’m driving home.” Perplexed, anxious.

This is Gelsenkirchen! “No,” he said as he pointed to the vineyard.

This must be Gelsenkirchen! “No, that castle isn’t,” as he points to the Fortress Marienberg.

Do you recognize it? “I have seen such vineyards.”

Could it be Würzburg? “It isn’t Gelsenkirchen.”

Could it be Würzburg? “Yes, it could.”

Why could it be Würzburg? “Yeah, because there are vineyards there.”

Another time he was asked the following in a doctor’s examination room:

Where are we? “Yeah, I don’t know.”

Where are we? “Yeah, I don’t know how I feel.”

Do you feel like you are in a dream? Quickly: “No, not a dream.”

Do you feel strange? Looks around himself perplexed and says, upon repeated question, “Yeah, this is from a doctor,” looks at the operating table very perplexed. Before this question, he was calm and in no way perplexed. He was asked further:

How is your mood? Looks around... “I want out...” and looks out of the window.

Anxious? “Yeah, what should I say...?” “Yeah...” and he stands up, giving the impression that he is anxious.

Please have a seat! “I am not tired!” He sits down after repeated instruction without resistance.

How do you feel that you have changed? “I don’t know how I feel.”

How do you feel that you have changed? “I have to work!”

If one constantly asks B. in such situations where he is or how he got here, his perplexity increases to intense confusion and anxiousness.

In this example, it is worth noting that in response to these questions, B. only becomes perplexed when he is confronted in questions by the fact that he is not in Gelsenkirchen, but rather in a totally different setting with vineyards. If one does not ask about his location, he is quite happy to be enjoying nature.

When he is in a setting he has never seen before but one does not ask him about his current location, he seldom becomes perplexed. This summer, when I was with him at the Baltic Sea many times, one could see him standing there on the sea, smitten and absorbed as he enjoyed nature. He rushed excitedly into the waves. I will never forget the view of B. when I was with him on the chalk cliffs (at Stubbenkammer) as he stood there, deeply moved and wholly under the wonderful spell of nature. Yet he was in no way perplexed! He never asked how he came to be in these foreign surroundings.

But why would he not become perplexed in such a situation? And why did he not ask how he came to be there, given that he must assume that he spends his time in Gelsenkirchen? He can no longer think about such things because, as we know, he has become an absolute man of the present.

When he finds himself enjoying a pretty place, his consciousness is completely filled by it, and he has only this single mental attitude forced upon him by his present situation. He sees, hears, and feels nothing that would remind him of Gelsenkirchen. There is nothing before his senses that could awaken thoughts of the past.

It would be different if he were alone and very hungry, so that he lost interest in nature and began to wonder where he was. B. would have to become perplexed because the present feeling of hunger would, as we will hear later, force this question: How did I get here, and how do I get home, that is, to Gelsenkirchen?

He also asked himself where he was when the long-lasting, physically anchored feeling of anxiousness alerted him to the fact that he was in the wrong place.

It is a great fortune for B. that he cannot hold in mind something for three or five seconds rather than one; otherwise, he could always ask himself the question that makes
him so perplexed and anxious, and he would find no joy in the present. In those few seconds, he would know enough to entertain his tragic loss and would become one of the unhappiest people imaginable on God’s earth. In the first few weeks after the poisoning, as we mentioned above, B. still had three to five seconds of registration capacity, and at the time, he was truly perplexed and in despair.

Nature, however, meant him well and let the unlucky man forget everything immediately, leaving him only a second with this absolute inability to register experience in memory.

**What B. can still accomplish despite his second-long consciousness**

Until this point, we have restricted ourselves to presenting the disorder and its direct consequences for B. We have tried to show everything B. cannot do since his time and memory stood still, forcing him to live in individual seconds.

Even the descriptions of this basic disorder must be recorded as an essential enrichment of science because this lone experiment of nature has flawlessly proved that a single psychophysical function—the capacity for registration—can fail completely, whereas we knew from previous cases only that it could be more or less intensely disturbed.

If we were to end our discussion of this case at this point, the reader would be justifiably disappointed because he would have received no answer to the most important scientific questions that this case presents, namely how a man with a second-long consciousness thinks, feels, and behaves—how he actually lives and breathes.

Everyone at all interested in the human psyche will have already asked himself how this person behaves with his single second. In that second, can he reason logically, or will he perhaps no longer act, unable to motivate himself, sitting around lethargically without any willful impulse because in that single second, he is ignorant of what he thought, desired, and felt in the second before?

Let us assume that he is able to execute an action despite having only a second of consciousness at his disposal. One would wonder how that is possible. By analyzing a single such action, one could gain an unprecedented glimpse deep into the human psyche. Consider the anxious experience described above, in which B. instinctively rushed out of the building in a state of great agitation even though he no longer knew the cause of his agitation. We recognized from this example the eminently important fact that emotion plays an important role in the human psyche, and what is more, that it does so because it is physically anchored.

This pure experiment of nature presents a rich source for many further scientific questions and findings. We must put in the effort to study B. as precisely as possible and in the most diverse circumstances, to observe how he behaves under experimental conditions as well as in daily life. We must do so because it is difficult, if not impossible, to develop a viable picture of the psyche of this person on the basis of pure imagination alone, even if one assumes that no other primary disorder is present.

The meaning and scope of our observations on these matters depends on the question of whether the disorder is isolated, that is, whether any other psychological disorders are present. Should we find disorders of intelligence or emotion that are independent of the memory failure, we could draw no conclusions from B.’s behavior about such general questions. We could not declare that we have a pure experiment of nature that will show us and science as a whole how the human psyche appears when its consciousness is only a second long. It is therefore necessary that we next briefly show that B., apart from his failure of registration, exhibits no disorders of intelligence, of emotion, or of any other type.

**His intelligence did not suffer from the gas poisoning**

As we mentioned above, B. appears to retain his general intelligence and his knowledge from school, experience, and life from before the day of his poisoning. By asking appropriately short questions, we were able to demonstrate that B. has excellent knowledge for his level of education.

However, tests of his range of knowledge run into serious problems and, to the superficial observer, can indicate a disorder where none exists. For example, if one asks him about the major rivers of Germany, he names only the largest and most familiar—the Rhine, the Donau, and the Elbe—because he instantly forgets that he has already named them. Or let him recite every tree that he knows; he names the most common and does not get past them. In reality, he has been interested in botany for a long time, and one can go on a walk with him even today to ascertain that he is incredibly well informed.

When testing his range of knowledge, one must always bear in mind that everything he says disappears for him in a moment’s time. If one accounts for this in the analysis, one can be convinced that he possesses a rich store of knowledge. He is well informed, for example, about historical dates and figures, knows Bismarck and his importance, can report details about the world war when asked, and so forth. With things related to his job, he provides excellent information, and he is very attached to his career. He clarifies drawings of mechanical parts that he finished between 1920 and 1922 with short and precise answers; after clarifying such a figure, he will spontaneously point to the one below it and say, “Here is the bumper seen from above.” He can specify the exact year he finished each drawing. If one places him in front of machines, he gazes at them with understanding and interest.

Though he has not lost even one iota of knowledge from the gas poisoning, he has also not learned anything new since that day. His time stood still. His prior world-view remains unchanged; and so it will remain so long as he lives.

His mental development ceased on May 31, 1926. But his intellectual abilities have not diminished, unlike what one typically observes in people whose mental development has stopped. Not at all! B. retains the essence of intelligence, namely the ability to independently and correctly reach judgments.

Tests of his ability to make judgments run into the same problems as do tests of his ken. Ask him, for instance, about the difference between a child and a dwarf, and he can only answer frequently repeated questions with brief answers. He might say: “dwarves remain small...” or “children grow” or in the case of a totally separate repetition, “dwarves won’t get
bigger." Yet he cannot give the entire answer in the second at his disposal: “A child grows and a dwarf remains small.” When asked about the difference between a pond and a stream, he can for the same reasons only answer: “A pond is still water and...” or in another attempt “A stream flows”. Yet he cannot say one after the other in a single sentence. But he immediately grasps the difference; he just lacks time to formulate and express his answer.

It is easier for him to give definitions. For instance: What is a chair? “Something to sit in”; What is a cause? “A reason for something.” It is also easier for him to name opposites. Ask him for the opposite of long, he will say “short”; for the opposite of large, he will say “small”; for the opposite of false, he will say “genuine.”

Yet we see no weakness of judgment when B. listens to an audio film and thinks it is a film with a gramophone accompaniment, or when he sees the date in the newspaper and says it must be misprinted. He reaches the best judgment with his available knowledge and assumptions.

One has just as little reason to assume that B. has a disorder of judgment when he is in an auditorium and describes it as a classroom while facing the board, or as a cinema when facing the projector. In such cases, the perceptions are temporally arranged such that he no longer knows in the present what was said and thought the second before.

If one wants a correct picture of his ability to judge, one must use tests that neutralize the factor of time. Thus B. correctly recognizes and judges the most difficult and complex of situations provided he can survey the situation in a single glance. It is not necessary at this point to give an abundance of new examples; rather we need only remember what we have already seen and heard. He correctly identified that a procedure was about to be undertaken when he walked into the x-ray room and saw the doctors. And consider the situations in which B. became perplexed. B.’s perplexity always arose because he correctly interpreted the present situation. He became perplexed when he stood before the light switch in broad daylight and was no longer instructed to turn it on. He will become perplexed when he is only partially asked a question and has the answer on his lips but no longer knows why he wanted to say something in the first place. He becomes perplexed when one looks at him with a questioning expression when he no longer knows what or even that he was asked.

It is particularly noteworthy that very little time elapses before he becomes perplexed in such situations. As soon as one stops instructing him to turn on the light, he stops and becomes perplexed because he can judge the situation correctly and instantly. Such behavior is reliable evidence that his ability to judge is fully and vitally intact.

In the second at his disposal, B. makes no senseless actions, and he does not become entangled in contradictions; as we have seen so clearly, he becomes instantly perplexed when, for example, we asked him where he was when he sat he in front of the vineyards with a view of Würzburg. His perplexity indicates that he promptly realizes he is not in Gelsenkirchen. He readily realizes that the present situation contradicts that assumption; he is convinced by the strength of reality. So long as the evidence is before his eyes, he insists that his judgment is correct and will not allow himself to be persuaded that he is in Gelsenkirchen, no matter how uncomfortable and uncanny his baffling disorientation is.

From the present description, every professional will realize that B. is not as open to suggestion as people who lack conclusions of their own or people with brain injuries whose power of judgment has suffered.

Within a second, B. accomplishes everything intellectual that we would expect from a thoroughly intelligent man at his level of education. We demonstrate this even more clearly below when we discuss B.’s residual abilities further.

**His mental life was not changed by the gas poisoning**

If we want to show that B. has remained the same in the core of his personality, namely in his emotions, as he was before the poisoning, then we must know at least the main features of his personality before the poisoning.

B. was always a quiet and matter of fact person. He had a reserved relationship with his job as metalworker, but he would talk about it with enthusiasm in healthy days. He was well informed and was a capable and ambitious worker. Aside from his job, he maintained from early childhood a great love for nature. He knew many plants and animals and would make subtle observations about nature. To those around him, he was decidedly good-natured and agreeable, sympathetic, and sensitive in every regard. He had a humble demeanor and an affectionate relationship with his family. As we said in the introduction, his parents were able farmers, and his siblings were described as gifted and full of character. In his relationship with his bride (currently his wife), his most prominent characteristics were sincerity, genuineness, true religiosity, and great practicality. His outlook on life was entirely positive, and he had a great sense of humor.

Everyone with experience in psychology will certainly fear that one would run into insurmountable difficulties in trying to plumb the depths of a personality in a person who has a second-long consciousness. We have already seen the difficulties that arise in testing his intelligence. It must be much harder, then, to examine the emotions that reflect his character and his interests, especially given that there are no known methods for examining such things as there are for testing general knowledge and intellectual abilities.

Everyone will be amazed when I declare that no man’s heart is so easy to gauge as this man’s, and this is so precisely because he lives in the present situation much more intensively than a normal person could. He is not distracted by thoughts of previous experiences, though his attitude and mental state are influenced by them, and he also does not think about what impression he makes on his surroundings. When he sees a comedy in the theater, he laughs because the film is funny rather than as a courtesy to the person who invited him; he knows nothing of the invitation. His emotional reaction to present impressions corresponds solely to the impression itself and to B.’s true character and interests.

This became especially apparent when we observed him on a walk, as we describe below. We will see the interest, love, and dedication with which he treats natural scenery and how absorbed he becomes looking at beautiful landscapes. One notices that he can be much happier than the rest of us and that he passionately savors the beautiful
effect of nature. Its inward effect is expressed directly on his face because in the second at his disposal, he can only appear as he really is.

We need then only to put him in the appropriate situation to read on his face what effect it has on him—to see what he finds interesting, exhilarating, or blasé. He has become more genuine and direct in his experience and is, in this sense, best compared with a child. I should also mention that B. has made an exceedingly sympathetic impression on everyone who has worked with him extensively—an impression grounded entirely in the fact that he has a genuine and immediate effect on us. His face has become the mirror of his soul in the truest sense of the word.

Since his emotional reactions are so natural, and since these appear more clearly and purely than in normal people, one can quickly gauge his character and his interests, the core of his personality, through simple questions. His answers do not appear to reflect mere knowledge of the thing in question. Rather a complete person seems to give each answer; one sees in this the clear and appropriate emotional reaction that springs into his eyes:

What are you interested in? “In my work.”
What do you want to be? “I am a metalworker...” In response to one of the later repetitions of this question, he said in a rather embarrassed way, “I don’t know how far I’ll go.” With such questions, one notices that he will begin to become suspicious and wonder why one is asking him. This occurs even in response to normal questions.
Are you ambitious in your work? “Oh, yes...” (becomes naturally embarrassed.)
What would you do if you won the lottery? “Wouldn’t happen!” He laughs. In response to a repetition of the same question he said, “What I’m doing now...” He thinks that he is still employed as a metalworker and emphasizes the word now himself. At least, one can take from this statement that his work is important to him.
Do you enjoy the outdoors? “Oh, yes!”
What would you do if you found a sick man on the street? “I would take him away.” He hesitated towards the end of this long sentence.
Are you good-natured? “Oh, yes.” He laughs, embarrassed.
What do you do when you are insulted? “It depends.” In response to another repetition of this question he said, “I would leave.”
Do you like to talk? “Yeah, it depends who it’s with.”
Are you talkative? “Oh, not so much.” He of course knows only how he was before; he does not know that he has become still and quiet as a result of his registration deficit.
When would you feel happy and when unhappy? “I’d feel happy if I had a wife and my own home.” He spoke faltering towards the end. He naturally does not know that he has been married to his wife for a long time and has a beautiful home.

What do you do when you are hit? “Don’t let it happen.” He laughs. In response to a repetition of the same question he once said “nothing” (he laughed reflectively).
Which would you prefer: pleasure or a good conscience? This question was said quickly and repeated. During the questioning, B. laughed persistently and finally said while laughing in a tone that was supposed to express the obviousness of what he said: “Yeah, a good conscience.”
Do you like to tell jokes? “No.”
Do you like to make funny comments? “Oh, yes.”
He smiled.

We will be content with these few samples to provide us with a picture of his personality.

B. also has no psychological or physical disorders

It is not my intent to give an exhaustive psychiatric neurological examination of B. in this paper, though one can deduce that aside from the complete inability to register, no other primary disorders are present.

For the professional who justifiably asks whether all the necessary psychiatric, physical, and specifically neurological examinations were conducted to rule out other disorders, I would recommend turning to the previous publications about B.13

For a rough overview, I briefly reiterate that B. has none of the abnormal symptoms one finds in patients with organic memory disorders. This fact must be emphasized since we heard at the beginning that true organic disorders tend to present, more or less, along with broad and diffuse cerebral changes that bring about many psychiatric disorders.

It is even more remarkable that the gas poisoning miraculously wiped out only the capacity for registration in isolation, leaving B.’s entire personality unchanged.

As we have seen, B. has no disorders in the most elevated parts of his personality—in neither his power of judgment nor his emotions. He is neither apathetic nor excessively euphoric. No disorder of irritability or emotional ability is present as one would find in cases of lighter organic brain damage or general fatigue due to stress. Rather, his emotions correspond to the present situation before his senses.

B. is not abnormally susceptible to fatigue or exhaustion. On the other hand, he has no sleeping disorders, sleeping just as well as he did in his healthy days—no more and no less. His inner drive is intact, as will later be described in context. Likewise, his resilience to strong physical and psychological demands has remained as strong as before. As he did before, he takes long trips with his wife without tiring. He is also not intolerant to alcohol as are many people with organic brain injuries, but rather holds his beer as well as he did before, like a Bavarian who has long enjoyed drinking.

13 Monatschrift für Psychiatrie und Neurologie Bd. 74 (1930) and Bd. 77 (1930).
The neurological examination likewise returned totally normal results; in particular, there are no signs of injury on the side of the brain stem where one would normally find the greatest changes after carbon monoxide poisoning (which is most likely the case after poisoning from a blast furnace). There are no symptoms of muscular rigidity, retardation of movements, or organic tremors, which the layman knows from the aftereffects of the severe, epidemic head cold. Furthermore, his facial expressions show none of the rigidity characteristic of these diseases. B. has lively facial expressions that reflect his experiences. Given the absence of such named symptoms of organic brain disorders, we expect no substantial brain atrophy.

Likewise, the encephalography, in which the cerebrospinal fluid is replaced with air, yielded totally normal results. No changes were detected on the surface of the brain, where air can be seen on the X-ray despite the remaining fluid, or in the ventricles, which have normal size and shape.

The electric waves coming from his brain show normal properties. Professor Berger from Jena found a normal electroencephalogram in his examination of the patient.

Because complete failure of registration is the only disorder present, we can justifiably speak of a pure experiment of nature. We are thus in a position to make observations about B. that are of a general and fundamental nature. Through him, we can study how the human psyche appears when memory stands still on a certain day and when, from then on, only a second-long consciousness remains.

He can accomplish prolonged actions, but only when meaningful

If we turn now to his actions, we can see directly which psychological forces make such prolonged actions possible. In every action that B. can accomplish, we can verify that he really has no other disorders besides his memory failure. Acts of volition are very likely to manifest a disorder, given that human action is one of the most complicated higher-order psychological processes and given that perceptions, thoughts, and feelings must be precisely balanced if they are to operate together properly. If B. had changes to his personality independent of his memory disorder, we would see them sooner in his actions. Our task, then, is to examine his actions from diverse perspectives with open eyes.

We have already seen that B. hesitates during illogical actions, as he did when he was supposed to turn on the light during the day. He stopped instantly and became immediately perplexed. In contrast, he consistently continues the action, even when the instruction is interrupted, when one tells him, for example, to lift an object lying on the floor. After the instruction has ceased, he does not stand there perplexed, but rather goes to the object, bends over, and picks it up. Afterwards he becomes perplexed at the object in his hand because he does not know how it came to be in his hands or what he should do with it. He will then look around for a place to put the object and lay it on a nearby chair, table, or some such. If one had told him before that he was to bring the object to the experimenter, he would of course not have done so after the instruction had ceased. A watch, a knife, a pencil, or some other similar object will provoke B. to lift it spontaneously, without any instruction, as soon as it falls within his field of vision. If the task concerns an object that belongs to him, say his knife or his watch, he will make an exceptionally surprised face if he sees it on the floor and will rush over to pick it up. He does not become perplexed; rather, he sticks the watch or the knife in his pocket with a matter-of-fact air. It ought to be clarified that he knows his watch and his knife from his healthy time. For example, he indicates when asked that he bought the knife in 1925. However, he does not recognize things he bought after the gas poisoning as his own unless they strongly resemble things he owned in the past. For this very reason, his wife always buys him things that resemble things in his past; she always picks the same cloth for his suits because otherwise he would not recognize them as his own.

It is impressive to observe the photographic fidelity with which he repeats different behaviors when he sees a foreign knife or his own knife on the floor. If it concerns his own knife, one sees his astonishment and recognition immediately. He always smacks his hands mechanically against the pockets of his pants while he goes to pick up the knife; he never behaves this way when he sees a foreign knife on the floor.

It is distressing to see how uniformly a person who has only one second at his disposal will behave in the same situation—one almost wants to say like an automaton. Through his disorder, B.’s actions have become entirely calculable, unlike people with intact registration, whom even the best psychologists and experts of human nature cannot predict. But perhaps someone will ask how a person with a second-long consciousness can keep track of the object on the floor long enough to pick it up? This action takes several seconds! Why does his gaze not wander to something else in the next second?

To understand this, we need only remind ourselves that in normal psychology, not everything that comes before our eyes in a moment is equally important. Rather, we overlook some things and take fully into our consciousness only that which somehow interests us or separates itself from the others. For instance, if we were to see a knife or a watch on the ground, such an object would also catch our eye; it would bother us because knives do not belong on the floor. Whether we would quickly stand and pick up the object is another question, though; we could have any number of reasons to let it lie.

As we already explained, B. lives much more intensively in the present than we do because he is not distracted by thoughts from the past or of the future. The object on the floor must bother him more than it does us. As soon as his gaze falls on the object on the floor, one sees that he is quite startled and that his gaze remains fixed, as if he is spellbound by the object. He has absolutely no reason to turn away from the object so long as nothing in his surroundings pulls his attention more strongly. Directly after seeing the object, he is overcome by the impulse to pick it up. It has the same effect on B. as would consistent instruction. The object before B’s eyes, indeed the object, replaces the constantly repeated instruction; to use an expression from the psychologist, Th. Lipps, one can say that this object, specifically the situation itself possesses,

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14 This intrusion, which may seem frightening to the layman, is completely harmless. In cases of organic brain disorders, it is not only used for diagnostic, but also for therapeutic purposes, since substantial improvements often result.
Aufforderungscharakter [stimulating nature].\textsuperscript{15} The drive to action that B. feels from the first moment on, which (like his emotions) continues to have an effect due to its physical anchoring, can have a considerable effect in significant situations.

One can show with experimental precision that, as with normal people, not every object possesses the same stimulating nature for B. Lay a small scrap of paper on the floor and B. will not pick it up spontaneously, even when it falls in his line of sight. If it involves a larger piece of paper, B. will go over to it and pick it up spontaneously. If one instructs B. to get the small scrap of paper that he will not pick up spontaneously, he will pick it up, even when one interrupts the instruction in the middle of the action. When he is already in action, the continuation of the action seems meaningful enough to him, even though he no longer knows of the instruction. He shows no signs of perplexity during this action.

The varying degree of stimulating nature possessed by objects in his surroundings presents itself more clearly in the following example. If one were to lay a meaningful object next to the scrap of paper on the floor, perhaps a watch, and then tell B., who is standing several meters away, to pick up the paper, he will go towards it as long as one continues the instruction. As soon as one stops instructing him, astonishment comes over his face, he turns immediately to the watch lying in the same field of view, and he picks it up. He lets the small piece of paper lie without further ado.

From this single action and its variations, one can form a rough picture of the kinds of lasting actions that B. can accomplish without further instruction: when the situation before B.’s senses stirs him to action, when the situation apparent before him itself provides instruction.

It is of extreme interest to come up with such instances of action because they show that under the same conditions, B. always reacts the same with mathematical precision.

For example, can B. calculate when he has the task before his eyes? Must one continuously instruct him so that he finishes the task? One sees what one expects: in the second available to him, B. can solve addition, subtraction, multiplication, and division problems when the problems are written on paper. For addition, he writes the tens from each column small underneath, and in this way, B. has the result from the elapsed second in front of him. As soon as one has prepared B. to calculate, he calculates the problem to the end without further instruction. B. always has the unfinished problem before his eyes, and it constantly instructs him to calculate.

He can even calculate large addition problems with many multi-digit numbers stacked on top of one another. Though it takes longer than a single second to add the stacked numbers, he knows the previous sum to which he adds the number sitting above. The succession of each member of the row must follow within one second, just as quickly as the time and rhythm of a song. He must, however, often calculate the same row from the beginning since he often forgets the preceding number when he goes to add the number above it. For this reason, he needs much longer to calculate than do others, even though he calculates quickly. But the following causes him difficulty: if he has calculated the row above and wants to write the result under the line, he often does not make it beyond just starting to write the number before he must recalculate the entire row to write the unit correctly. In order to note the tens digit correctly, he must recalculate it many times before he succeeds. He rarely miscalculates.

In this way, it is possible for B. to calculate a problem for a long time without interruption even though he has only a second at his disposal.

If one interrupts him during his calculations, he will spontaneously resume his calculations as soon as he sees the unfinished problem. He will also begin to calculate an unfinished problem on his own as soon as it comes before him. For this, though, it is necessary that one sits across from him. One can then observe the following: As soon as B. discovers the notepad with the problem sitting in front of his chair, he will invariably become restless and spontaneously grab the pen lying next to it and begin to calculate. Most of the time he will first ask the person sitting across from him, “yes?” or, “yes, shall I?” He apparently assumes that the person sitting across from him has assigned him the problem, and it therefore seems sensible to solve it. If one stands behind his back so that he no longer knows another person is in the room, he will never spontaneously solve the problem; instead, he flips through the pages in front of him. Similarly, when one places a piece of paper on the table in front of him with the heading “résumé,” he understands it as a task that has been presented to him. He can then, without further instruction, complete a résumé of six lines, though he certainly cannot not make it past a succession of biographical dates described in short sentences. B. can complete unfinished drawings, which also present themselves as problems for B. to solve.

From these examples, one sees clearly that B. will act only when (and so long as) the action is sensible in the situation before his senses. This presents itself in a most striking manner when B. makes a straight line and a wavy line while drawing. If one instructs him to draw a straight line, he will do so as long as someone continuously instructs him to do so. He will immediately cease drawing the line and set the chalk down as soon as one interrupts the instruction. It is entirely different when he draws a wavy line, however. If one interrupts the instruction as soon as he has started, he will still draw the wavy line to the end of the board, but only if he has already drawn two full crests of the wave; he must, to a certain extent, have the concept of the wavy line before his eyes in order to continue the action.

Why does he cease drawing the straight line without further instruction while he completes the wavy line even when the instruction is stopped? How can these divergent behaviors be explained?

If one looks closer at this action, one realizes immediately that B. does the most sensible thing that he can with his failure of registration. At every point, a straight line is a completed whole. It is not in the nature or concept of a straight line that it must be carried forward; indeed, there would have to be special reasons to continue it, or else a patient who is so dull and lethargic that he cannot stop in a timely manner. B., however, is a lively and active person.

\textsuperscript{15} [TN: Theodor Lipps coined the term Aufforderungscharakter, which we translate as “stimulating nature.” Again, we use italics to denote that this is a technical term.]

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On the other side, as we all know, the nature of the wavy line is unbounded and endless, and from this it emerges that the wavy line implies a task, specifically a constant call for continuity. While B. must have a specific reason to continue the straight line despite the cessation of the instruction, he must have a reason to stop drawing the wavy line. But due to his one-second consciousness, B. can have no such reasons separate from the situation before him. Therefore, in these cases he does what he must, when one has correctly thought about it in a psychological sense: he stops drawing the straight line immediately once the instruction stops because it must seem senseless in this situation to continue. In contrast, he always continues to draw the wavy line until an external reason is provided for him to stop, in this case the end of the board.

In principle, one can see the same thing when B. is instructed to draw small vertical lines next to each other. If he has drawn one line, he will cease the behavior after the instruction has ended. He does the same after being instructed to draw a second, third, forth, or fifth line next to the first. But from the sixth or seventh line on, the following occurs as if by a miracle: B. will draw lines until he reaches the end of the board.

Is this action not senseless? Might it suggest that he has other disorders besides his absolute registration deficit? Maybe he always draws the lines further because he is passive and he hangs or remains stuck on an activity once he has started it. In psychiatry one refers to such behaviors as perseveration or iteration, which often presents with disorders after organic brain damage.

Only a superficial observer can voice this doubt. In reality, B. shows in this behavior that he has no other disorder. For him, it makes no sense to add another line to the three or four B. shows in this behavior that he has no other disorder. For him, it makes no sense to add another line to the three or four he always draws the lines further because he is passive and he hangs or remains stuck on an activity once he has started it. In psychiatry one refers to such behaviors as perseveration or iteration, which often presents with disorders after organic brain damage.

One sees from this and the other mentioned behaviors that B. always has his wits about him, that he always has the entirety of his earlier experiences and concepts at his disposal when acting, and that he will only act so long as the situation before him appears sensible. He functions spontaneously, as we saw, when the situation at hand presents a task to be completed; he acts uninterruptedly and continuously until the task has been completed, despite the second at his disposal. Here it is the context within the task itself that bridges the gap from one second to the next, introducing a continuity in the flow of consciousness. However, B. will stop the activity when the task has been completed and can no longer be experienced as a task in the proper meaning of the word once it has lost its consistently sensible stimulating nature.

An example from everyday life clarifies this explanation. If one instructs B. to grind coffee in the presence of his family, he laughs appropriately, considering it an unreasonable demand; he must think that someone wants to play a joke on him or make fun of him. Above all else, he will think this because I am, and always have been, a stranger to him. However, with continuous persuasion, he will begin to grind. Once he has begun this activity, he will continue to grind without any further instruction until the grinder is empty. With the other hand, he holds the wall-mounted coffee grinder steady. His face takes on a stark expression during this behavior because the comical situation from before—his laughter and his audience, to whom he has turned his back—have disappeared for him. It is worth noting that B. stops grinding as soon as there is no more coffee in the grinder. In the same way, if there is no coffee in the grinder, he stops grinding after two or three turns. A person with fully intact memory might make more empty turns if they were attending to some other thought during this automatic action. As a result of his registration deficit, however, B. lives more in the present situation than we do and therefore stops the action immediately—strangely quickly and abruptly—when the rattling sound and the constant feeling of resistance is no longer present. We understand easily that for B., the rattling noise and the steady feeling of resistance in every subsequent second allow the long lasting action to be judged as sensible. The acoustic and tactile (touch and pressure) stimuli present B. with a constant call to action.

We can then establish the striking fact that despite his single second, B. can accomplish long lasting behaviors. He works his way correctly through long calculations; he independently continues to draw a wavy line further as soon as he has seen two crests and troughs; he completes a row as soon as the concept is presented to him optically; he grinds only so long as there is coffee in the grinder. He can do all of this—as we said—because the situation itself presents him with a task, and therefore provides a constant call to action without words.

Since we have discerned from these few examples the conditions under which B. can complete long lasting actions,
we are now prepared to predict what he can do in his single second and what he cannot. We may now justifiably assume that in his everyday activities—for example, dressing, bathing, combing, shaving, eating, drinking, etc.—B. is actually not as helpless as one might assume for a person with only a second of consciousness.

Let us begin with the act of dressing. Why does B. not immediately undress himself when he has put on his pants and stockings? This is easy to explain: he sees constantly that it is daylight and must realize he is not tired. He requires no registration; he does not need to know that he slept well, that he just rose from bed, and that it is morning. He forgets nothing when dressing himself; when he puts on his pants, he buttons them and ties his tie correctly under his collar. He cannot “forget” because he is steadily prompted to the proper completion. And because all his experiences from his healthy time are available to him in a given moment, he must see that his task is unfinished when he sees he is not entirely dressed.

Just as he dresses himself in the mornings, he undresses himself spontaneously and without interruption at night because it is dark and he is tired. When he finds himself in his bedroom, it must seem sensible to him to undress and get into bed when he feels tired. He diligently picks up his clothes as he knew to do before.

For the stated reasons, B. behaves sensibly when dressing and undressing. On a very hot summer day, he will take off his jacket due to the constant feeling of physical discomfort; but even when he finds himself in a darkened room with a bed, he will never undress further or get into bed, as sometimes happens with the absentminded scholar. Rather, this man without the capacity for registration, to whom only a second is available, will remove only his jacket in these circumstances, and possibly his collar and tie, as he learned from before.

But before he dresses in the morning, he washes himself. This typical morning behavior is suggested to him by the need for cleanliness. More interestingly, however, he will spontaneously shave himself when he sees in the mirror that he is unshaven. Naturally, he can only do this when his razor is within reach, in its usual place on the sink or in the drawer. Once he has lathered himself, the task of shaving is no longer purely optical, but is also given from the corresponding feeling on the skin of his face. He then needs only to look in the mirror to remember his intention. He will then shave himself just as skillfully as he did before, without cutting himself and without leaving spots. When it is necessary, he lathers himself a second time. He cleans his razor without instruction and puts it away. So, B. can flawlessly and correctly handle his morning wash because specific tasks are presented to him in perception.

His instincts\textsuperscript{16} are preserved, indeed refined

\textbf{B. cannot “forget” to go to breakfast or later to have lunch because the feeling of hunger constantly urges him to do so. Indeed, he will spontaneously go to lunch, even when he is far from home, walking in a previously unknown area. Admittedly, he comes a bit later—not until his hunger compels him. Even so, he manages his other needs like every normal person, since the physical feelings and sensations remind him of them. He will go for a walk when he feels an impulse to move. He rests during the day and goes to bed at night when he is tired. In all of these cases, it is not the visually presented situation driving him to action, but rather his instincts that constantly prompt B. to their final resolution.}

If it might appear self-evident that B. can flawlessly perform these instinctually dictated behaviors, we cannot overlook the puzzles that B. presents to us through his proper completion of these simple tasks, and also the puzzles that consideration of his case helps to solve. One must never forget that in science, the greatest discoveries are made by means of the simplest observations: thus the Italian naturalist Galvani discovered the Galvanic current when he noticed how a frog leg begins to twitch when it comes into contact with metal. The famous naturalist and doctor, Robert Mayer, realized the law of conservation for the first time as if by an epiphany when he saw that venous blood is a brighter red in warmer climates than in colder areas.

In our case, however, I do not believe that I can make an earthshaking discovery when I declare that without memory—that is, while being unable to retain anything—B. cannot “forget” to resolve his instinctual needs through the corresponding instinctual behaviors. But in this, I see unshakable and absolutely certain evidence for an assumption made by many psychologists and psychiatrists that inner drive,\textsuperscript{17} just like emotions and feelings, assumes an exceptional position in human psychology.

We have already seen that certain perceptions, ideas, thoughts, and judgments can appear to last a long time thanks to their bodily grounding. Thus we saw that B. was inwardly agitated and anxiously pushed his way out of the building long after he ceased to know the source of his anxiety. He behaves, however, as though he had retained the triggering experience because the anxiety remains lodged in his body. We see something quite similar in these instinctually driven behaviors. Although B. only has a second at his disposal, he will return home from a far-reaching walk when hunger drives him.

And it is not as if B. would forget his intention along the way, interrupt the behavior, and become perplexed; rather he behaves continuously and uninterrupted as if he kept the goal—namely to go home to eat—in mind. How is that possible? The goal to go home is continuously forced into his consciousness by the feeling of hunger. Even so, he does not “retain” these thoughts, since he no longer has any memory of them; he no longer registers them. The thought that he should go home to eat, however, is held firmly in his consciousness, fixated by the feeling of hunger. In such cases, G. Störting\textsuperscript{18} justifiably speaks of a fixation of thought through feeling. It is actually the bodily feeling of hunger that is fixed—that is, held

\textsuperscript{16} [TN: The German Triebleben has also been translated as “instinctive life” (e.g., Kaufman of Nietzsche), but it is better translated in this context as simply “instinct.”]

\textsuperscript{17} [TN: The term “instincts” might work as well as “inner drive.”]

\textsuperscript{18} G. Störting, Psychologie. Leipzig, Wilhelm Engelmann, 1923. One can find the author’s concept of emotional psychology presented in context in his “Methods of the Psychology of Emotion.” In Abderbalden, Handbuch der biologischen Arbeitsmethoden, Abt. VI, Teil B/II.
firmly—in consciousness. By repeatedly entering into B.’s consciousness, these driving feelings arising from the body in a sense replace his missing memory. Thus, although he has only one second available to him, B. can satisfy his driving needs through corresponding and entirely harmonious behavior because the physically grounded instincts bridge the gap from one second to the next. Here one can see with the precision of a pure experiment of nature that instincts in humans assume a relatively autonomous position largely independent of memory. Because of this, one is entirely justified in speaking of a distinct “instinctual level” within the personality, as the Würzburg psychiatrist Reichardt emphasized early on.

One must of course be careful in transferring the concept of a level to the emotions. Even though the level of motivations takes on a relatively autonomous status in one’s personality as a result of its physically contingent status, one can by no means say the same thing of affect and emotions. Even if affect and the emotions provide an important physical grounding for human psychology (as we just demonstrated with B.), they do not play an autonomous role in psychology as the motivations; rather they establish a unity with the mental processes. Only in this sense can affect and the emotions become independent for a while. We find such autonomization of affect only in sick people; there is an anxiety arising from the body—in heart diseases, for example—which arises independently of mental processes and seldom joins with mental content.

The fact that B. can carry out behaviors deriving from the motivation to act is not as important as the fact they are executed in an orderly and correct manner. A psychiatrist would first and foremost ask whether B. exhibits any disorders in motivated behaviors in his single second, since psychiatrists know that there are many psychological diseases in which patients eat without manners. Sometimes they smear food around, refusing to eat or voraciously overeating, and are unclean in every respect. In contrast, B. behaves like a normal person. For example, when I was sitting with B. and his family at their coffee table, he suddenly said “excuse me” to me (I sat next to him and he could not pass otherwise). He then went quite naturally through the room and up the stairs to the bathroom as if he knew exactly what he wanted. He naturally knew the home from his healthy time. He then came back on his own after a few minutes. He must have heard the company in the room on the way. When he opened the door and saw his relatives sitting around the coffee table, a smile crossed his face. When he was on a hike and needed to stop, he did so like any decent person, going off somewhere where he could not easily be seen. One day when he rode in the back seat of my car, he nudged me after a long drive and said, “Stop please, I need to get out here.” He could not forget this quickly uttered sentence since he was constantly reminded of it by a driving need. When the car stopped, he got out, but no longer knew that he needed to get back in the car. He would have walked off had I not called him and had he not seen his wife in the car.

But he knows how to care for himself even in totally foreign settings. If he finds himself in a strange restaurant, he finds the restroom like any normal person would. The misfortune is that he is always lost when he leaves the restroom; he sees he is in a restaurant, but he does not know his wife is sitting outside waiting for him. He would leave without paying if one let him because he does not know he has eaten there. For these reasons, his wife, who knows of his disorder, always remains nearby.

Everyone will likely now ask how B. would behave if exposed to a completely foreign environment. Would he not necessarily be completely helpless and starve pitifully? He need not do any such thing; when a feeling of hunger pushes him to orient himself, he asks anyone he comes across, or goes into a nearby house to ask for directions to Gelsenkirchen. If he were not prevented, he would no doubt quickly be brought to the police. If he is on a hike and becomes hungry, he spontaneously tells his wife. He could no more forget such questions or utterances than he could forget the behaviors he performs under the influence of a driving feeling.

Such examples should convince everyone that B. does not follow his instincts “blindly,” but rather behaves in such situations like a totally normal person. In every moment he can make use of all the experiences from his healthy time. This extends even to his intimate relationships. As I mentioned at the outset, he behaves in relation to his wife, who he considers to be his fiancé, exactly as he did during their engagement. He retains the same basic principles he did in his healthy time, he knows his fiancé, and he knows to respect her as he did before. It would therefore be amiss to assume that as a result of his registration deficit—as a result of the fact that he has only a single second available to him—he has somehow descended to a lower tier of humanity.

No, on the contrary, B.’s instinctual reliability is actually admirable. Since he lost his capacity for registration, B. has never over-eaten, as often occurs in people who have intact memories. If he is sated, he declines even the most delicious dish even though he has forgotten he has just eaten. He will simply say, with a courteous gesture, “I am not hungry...,” or, if he sees the used plate on the table in front of him, he will say, “I am full.” He apparently pays more attention than most normal people to his bodily needs, which is understandable when one considers that as a result of his registration deficit, he is more a man of the present than a healthy person and lives more intensively in the world before his senses, to which of course his own body and physical needs belong.

More impressive, however, is the reliability with which B. instinctively knows what he wants to enjoy. For example, on a hot day, he ordered two glasses of beer and drank them. He insisted on beer even though his wife suggested lemonade. He enjoyed drinking beer before too, but he was always moderate. When I offered him another glass, he declined courteously, even when I repeated my request many times. The same thing occurred at another restaurant when we stopped for coffee. When we stopped for a bite to eat in the evening, he ordered a bottle of water from the waiter and would not let me order him a beer. Before the water came, I again suggested beer, and he again insisted that he wanted water. He acted as
if he still knew he had plenty of beer for lunch and had already ordered himself water. After all we have heard about B., he certainly could not have known these facts, yet his body apparently did. In a sense, his body has its own memory.

Even more impressive was his behavior after the encephalography. While he did not want to remain in bed beforehand (for he felt quite healthy, and we could not explain to him why the procedure was necessary), afterwards he remained in bed of his own accord and accepted ice packs to tend the ensuing headaches. He would spontaneously hand the ice pack to his wife when it became warm and accept a new one. When a patient has something to eat in the first few days after such an encephalography, they will vomit, even when they have only had something to drink. In contrast, B. was so instinctive that on the first day he declined all food and liquids. Only after the second day did he spontaneously request seltzer water, and on the third day he requested milk, tea, and later zwieback. This prevented him from vomiting. During the first three days, B. made no move to stand, not even to wash. On the fourth day, however, he rose very early in the morning, washed and shaved himself, and had breakfast as if nothing had happened. Asked if he had a headache, he looked astonished and shook his head. In the previous three days, he answered yes to the same question and never looked astonished. In the following days, he ate a little less than usual and tired more easily. When he walked with his wife, he suggested that they should take a seat on a bench more often than usual.

B.’s body prescribes what he is to do; his bodily feelings and sensations tell him that he slept in this morning and just woke up; they ensure that he goes to eat, what and how much he eats, that he goes on his walk, and that he should lie down in bed at night.

He can still pursue many of his former interests

Even though B.’s body dictates his needs, and even though his time is arranged according to his bodily clock, his needs are not simply fulfilled. He is not condemned as a result of his disorder to a purely vegetative form of being, living only through his instincts.

The opposite is the case! In fact, he is less occupied with these things than is a person with intact memory because he can think about food only when he is hungry, about drink when he is thirsty or when he finds himself in a restaurant where one commonly drinks even without great thirst, and about going to sleep only when is tired at night, etc.

He enjoys sensory pleasures only while they are present. Unlike us, he cannot look forward to a good meal and cannot draw pleasure from the memory afterwards. Certain pleasures of life surely pass him by as a result.

Yet perhaps his time is better filled by sensory pleasures than it would be with thoughts of sensory pleasures. Most hours in the day, he lives out his joy of nature, making fine perceptions and observations. If one were ignorant of his disorder, one would never think that the man before him on this hike has a second-long consciousness.

The “unfortunate” B. is still devoted to the enjoyment of nature, observing life and its activities in the wild. He is even delighted by marshes, spontaneously whistling and singing his songs: for example, “Muss i denn, muss i denn zum Städtelchen hinaus...,” or “Ich hätt’ einen Kameraden”. He can still sing these because he can find the beat within the second available to him, and the rhythm and melody bridge the gap from one second to the next.

After a long while with him, the attentive observer will note that he seldom speaks. But precisely because he cannot converse in his single second or take part in other peoples’ conversations, he lives much more intensively in the situation before him. He lives completely in nature.

While others converse, he makes his observations about his surroundings, attending to whatever seems most noteworthy at that time. A squirrel that scrambles around on a tree immediately draws his attention. If one hears a woodpecker or some other bird, one can be sure that he is already listening attentively, provided he is not already occupied with something more noteworthy. Nothing escapes him because he can do nothing else in his single second other than listen in on nature; he is not distracted by any foreign thoughts or musings that do not fit the present situation; he is all eyes and ears, much like a hunter lying in wait who likewise misses nothing around him. If one observes B. inconspicuously, one can see precisely where he looks and listens; one realizes that he is not only a great nature enthusiast but also a connoisseur.

He also displays his earlier hiking skills. If one climbs with him to the top of a steep mountain with no proper trail, he does not follow slavishly in the footsteps of the others, but rather searches for his own way—he often chooses the better path. He adapts himself to the situation at hand.

As we said, he speaks very little. Now, he was admittedly always a little quiet and is not one who likes to talk just to talk. Now, however, he is even quieter. If he is with me or with someone else foreign to him, he seldom if ever speaks. That is also understandable given that a reserved person will not share observations on nature with a complete stranger who just happens to be walking near him.

It is entirely different when his wife, relatives, or acquaintances who he knows from his healthy time go with him. Then he speaks much more frequently and calls his wife's attention to whatever fascinates him in the moment.

But how—one must ask oneself—is it possible for B. to speak in such situations? Why does he not forget what he wants to say before he has vocalized it?

So far, we know only that he can act when the situation before his senses prompts him to do so, when it provides him with a task in the broadest sense of the word. Later we saw that he can act and make relevant utterances under the force of his instinctual drives because his bodily feelings continuously prompt him to do so.

What prompts him to speak and spontaneously act in nature? What powers enable a man to speak and act despite having only a single second of memory? There must be something special in the few instances when he speaks spontaneously; otherwise, one would expect him to speak either much more or not at all.
In order to resolve this question, I have often observed B. on these walks and noted what he says or does and in what circumstances he says it. Let us look at a few examples.

If he is walking hand in hand with his wife and catches sight of a squirrel, he will break away, spring a couple steps forward, and yell excitedly, “There, a squirrel!” Near the end of this exclamation, he becomes somewhat perplexed, apparently because he left his wife behind him in the rush of his observation and no longer knows why he loudly called attention to the squirrel. Or if he is underway on the forest trail and sees a small spruce, he will bend over spontaneously, pluck it, and beamingly give it to his wife who he sees anew.

When he saw ferns on a walk through the woods, he said, laughing, “This looks like the botanical garden.” The scene was in fact similar to a botanical garden. When asked, B. answers that he has frequently been to botanical gardens.

In the forest he suddenly stands still, points into the woods, and says to his wife, “One could look for mushrooms here.” Another time he said, “It looks like there are mushrooms here.”

When once I accidentally sat down for a rest on top of some ants and jumped up off the ground, B. spontaneously showed me the tree stump where the ant colony was located. He poked into it with the tip of his umbrella and proceeded systematically. While everyone looked at him, he explained, “Those are the winged ants.” Upon further sifting, he revealed a mass of eggs and said, “Those are the eggs.” He made the further observation while turned to his niece and said, smiling: “Give canary bird seed to canaries and they sing beautifully.” When his wife said that she was scared to pick up the ants, he bent over, picked up an ant, noticed anew that his wife anxiously backed away, held it before her eyes and calmly said, “They don’t bite.” Here he makes systematic observations about the object of his perception by making rational inferences, and with every new perception (eggs, winged ants) he makes a new comment. In particular, these sequential behaviors and linguistic comments confirm the fact that his intelligence is fully intact.

These few examples should be sufficient for the time being. What about these situations in particular brought B. to these spontaneous behaviors and short comments?

When B. becomes excited upon catching sight of a squirrel and immediately calls attention to it, we understand his reaction readily, as anyone would do the same thing in such a situation. B. also has no reason at all in the next moment to direct his gaze away from the squirrel so that he could forget to call attention to it. This scene somehow moves him inwardly as it would every normally disposed person. The scene produces an emotional state of excitement, and this fixes his attention on the object and inwardly binds him to it. And we know that bodily repercussions that accompany such an emotional state (one will therefore also speak of an emotional movement) persist in B. because of their bodily anchoring, attracting his gaze to the object that matches his emotional state. This gives him enough time to express his inner joy about the lasting perception. Admittedly, he would not make the comment if he did not know he was directing it to someone (his wife). Therefore, he will also become perplexed after his exclamation, when he has sprung two steps ahead, because he no longer knows that he is directing his comment to her. From this, we already see that it is much more difficult for B. to make a simple comment like those above than it is to carry out some behavior because he must continuously see the person to whom he is speaking when he wants to make that person aware of something.

It is much easier for him to pluck the small spruce along the way without making a comment. It is clear that he was in turn pushed to this behavior by some emotionally laden perception because he has always, as we heard, had a great interest in flora. And when he calls his wife’s attention to an area that looks as if it would have mushrooms, it is the happy memory of searching for mushrooms that compels him to this comment, since he had earlier ardently enjoyed collecting mushrooms. When he systematically poked around in the ant colony and made his clarifying observations, it was because he is interested in the comings and goings of nature and likes to explain them. He must always be somehow affected by the situation before his senses in order to make linguistic comments and be compelled to spontaneous action.

Thus his wife rightly noted that since his memory loss, her husband has been unable to say something indifferently. When he admires the beauty of nature and remarks, “Nice lay of the land there,” or when he stops by a bar and describes the music as pretty, one sees that he is really delighted by it and that his judgments of worth are based on actual experienced feelings. As we have already said, his character is easier to discern than that of a normal person, for B. lives more intensively in the situation before him, and his emotional reactions show themselves more naturally and directly through his behavior because he can only present himself as he really is. It is therefore quite easy to learn his deepest interests when we observe the specific circumstances in which B. makes spontaneous emotional comments.

He acts and speaks with great regularity when the situation at hand touches his most deeply rooted interests. For example, if he comes across a creek, he occupies himself with the question of whether one can fish there. Once he said, “You can fish there,” and another time he smiled and asked rhetorically whether there are fish there. One can see his eyes light up at the sight of the creek, and one can tell how much he enjoys asking the question. And why does he always think about fish, specifically when he comes across a creek? We only need to know something about his earlier personality. As a boy, he loved to fish. Or if one goes walking with him along the stony banks of the Ufer from Saßnitz to Stubbenkammer, one can collect the stones, and he fills his pockets with great excitement.

For example, if I were to lose my capacity for registration and to possess only a single second of consciousness, I would certainly neither think about creeks or fish nor collect stones on the way from Saßnitz to Stubbenkammer. For I have never collected stones, and I do not consider whether the stream has fish; I have never had the patience for fishing and would at most make a comment about the scenery. B.’s interests and value judgments lie in other areas, and because of this, he considers the world through different eyes than I and some other people, and he spontaneously makes his comments under the conditions that make him warm inside.

And these conditions naturally correspond to the personal, emotionally charged experiences in his life. He was vaccinated
by fishing in his youth, and this thought is awake in him and affects him when he sees a creek.

If we want to express these facts more precisely in psychological terms, we would have to say that the concept of fishing, specifically the idea, has become such a strong emotional thought because so many fine experiences have been attached to it in the course of his life and are brought forward by the thought of fishing. This idea has become for B. a so-called “center of summation,” or more specifically a “nucleus of crystallization” for his emotions.

I hope I may be allowed to go into more detail about this eminently important concept for human emotions because they help us to understand more easily B.’s spontaneous emotion exclamations. This concept was introduced into psychology by the psychologist and philosopher G. Störring in 1900. He had the following to say about it:

A special case of transference of emotional states is present when I speak of centers of summation for emotional states. By this I mean intellectual processes (perceptions, concepts, and judgments) to which a large number of emotional states have attached in the course of an individual's life such that emotional states from the most diverse periods of life come to linger in the mind. For normal people, the thought of parents, a friend, or a loved one can assume this character, and for religious people, the thought of God plays the role of a center of summation for emotional states. In the course of life for religious people, an abundance of emotional states attach themselves to the thought of God, building a large number of emotional experiences in close relation to one another similar to the case of thoughts about parents, friends, and loved ones. Not only perceptions and thoughts, but also judgments can become centers of summation for feelings; thus in higher moral development, the judgment ‘this and that are now ethically required of me’, and thereafter ‘this and that are now ethically forbidden,’ will become centers of summation for moral emotional states.

... Generally, this can be said: when emotional states from diverse periods of life come to linger in the mind through the designated intellectual processes, it is based on the fact that in relation to parents, a friend, loved ones, God and so on, the experienced emotional states have found transference through the concept of parents, of a friend, etc.

The formation of such centers of summation of emotional states is of great importance to the development of the individual; they display the emotional psychophysical energies of extraordinary intensity with which they are bound, which can have a decisive effect in the struggle of motivations.22

It is clear that we know the main features of a person when we know his particular centers of summation and nuclei of crystallization. Certainly, B.’s thoughts about fishing do not involve a lofty and noble center of summation of emotions as presented by thoughts of parents and friends, a career, and so forth. But this thought is doubtlessly a nucleus of crystallization for emotions that has arisen in the course of his life. Therefore, B. always makes his comments about fish and fishing when he comes upon a creek. We need now only watch for those circumstances under which B. is regularly compelled to make spontaneous comments despite his single second of consciousness in order to immediately know where his nuclei of crystallization lie and to comprehend him at heart.

Since he was always very attached to his job, he delights in making comments about objects that he remembers from his job. When I was on a long trip with B., his wife, and his niece, I stopped in front of a glass polishing factory. B. spontaneously remarked, “That is a polishing factory.” Since he saw that everyone was still watching intently, he explained further: “Those are the polishing machines that go back and forth.” (We could see the frame of the polishing machine through the window.) He said no to the question of whether he had seen these before, but spontaneously added, “The machines are made in Weihenhammer.” This was the Bavarian factory in which B. held his apprenticeship. To my question of whether it was definitely a polishing factory, he said, “You can see that from the outside.” To the repeated question, he said, “Yes, the color too, the red.” When asked afterwards if the polishing machines would be driven by steam, he said, “With water” and spontaneously made the further remark, “You can see the wheel below too.” With that he pointed below where one could see a slot of the water wheel, which one has to look at carefully to recognize.

When his wife happened to greet an acquaintance in front of a turbine building, B. spontaneously held his hand on the exhaust pipe of the motor, which could be heard from outside the warehouse, for about twenty seconds and was thrilled like a child by the shocks his hand received. He then spontaneously went into the machine room and studied the motor with an expert’s eye. He was in the best of moods. As we left the warehouse, B. said spontaneously to me while smiling and pointing out a tiny wire on the machine, “If I pull the cord out, the machine will stop.” One notices from his entire demeanor carefully to recognize.

Sometimes B. will even participate in conversations when they touch upon his circle of interests. On a walk, I explained to B.’s niece that one could compare B. with the Monk from Heisterbach, for whom 1000 years was like a day, except that for B. a single day does not exist; B. quickly said, “Saint Augustine doubts that 1000 years are like a day.” At the end of this long sentence, he spoke only hesitantly and softly. He clearly no longer knew why he had said this. Presumably, he made this comment about the Monk from Heisterbach because it was emotionally significant to him. The awakened religious feelings facilitated the long lasting, spontaneous comment.

**His temperament and his character express themselves in corresponding situations as they did in healthy days**

If one observes B. in the most diverse situations, one can see that not only his previous interests, but also his temperament and character manifest themselves in...
spontaneous exclamations within the scope of his second-long consciousness.

The temperament of a person—that is, his emotional activity, his mental vigor, and the backdrop of his mood—depends largely (as the psychiatrist G. Ewald\textsuperscript{23} justifiably emphasized) on bodily health, vigor, and resilience, the so-called Biotonus. As everyone knows from his own experience, one feels especially mentally fit at times, feeling more determined and better able to concentrate; the intensity and tempo of every mental and emotional process is increased; the entire awareness of life and the general mood are raised. In contrast, in times of bodily weakness when the Biotonus sags, one feels mentally dull and slow, has difficulty with everything, and is in a worse mood.

B. has always possessed a cheerful disposition which corresponds to his bodily vigor and sprightliness. His bright temperament manifests itself in his good humor and his positive attitude towards the world and life. Since his bodily functions, as we have shown above, did not suffer from the gas poisoning, and since he still possesses his old bodily resilience and old superior vital turgor and Biotonus, his own temperament is also entirely intact.

As a result of his second-long consciousness, he has admittedly become calmer. Yet, as we have already seen while on a walk with him, he makes his perceptions and observations with the same old vigor, joy, and liveliness. One can see in his contemplation of his surroundings that he has retained his elevated, balanced temperament. He knows how to take pleasure the beautiful environment around him, and his perceptions and observations of these things always push him further spontaneous exclamations and behaviors because they are marked by emotions.

I present a few more examples to that end:

After climbing to the top of a church steeple, we came back down the stairs. When B. had exited the steeple, he paused in the nave when he saw a carving of two old monks about ten meters from the stairs. He spontaneously went over to them and laughed about the imperfect figures, which were, in fact, rather strange. He was especially fascinated by the wooden monk’s hood. We understand that he enjoys occupying himself with these things because he has always had a great sense of humor. We need only think back to the pleasure that he showed about the Mickey Mouse film.

He expressed his good mood on the way home as well when, as we descended into the valley, he raised his hands in front of his mouth and loudly shouted “Hello!”

Shortly before reaching the small town, one could see a house in the distance, about 100 m away. It was receiving a new coat of paint. B. spontaneously said, “There is a painter inside who was testing out colors.” With that he laughed happily as if would anyone in such a funny situation. He scarcely took his gaze away from the house as we approached, grinning almost constantly.

He is also predisposed to humor in other situations. When he saw that his niece, sitting across from him, had left half a cutlet on her plate after eating, he grabbed the plate and asked, “Aren’t you going to eat it?” When she said no, he acted like he was going to throw it to a dog. Afterwards, he put the dish back in its place, laughing as he did. After dinner, B. said laughingly, “after eating, one should never forget to rest.” Then in a lovely evening mood, when he heard the monotonous noise of a train, B. said “Ein Zug, wie der tut, ich komm’ schon noch, ich komm’ schon noch.”

In the right situations, one sees that his character has remained the same as it was before his poisoning. Thus, for example, he is just as polite and attentive to his wife as he was before. If she wants to put on her coat, he will jump up and help her into it before searching for his own coat and hat. If she is carrying a basket or trunk, he will take it from her without being instructed to do so. While hiking in the mountains with her, he will help pull her at the steep parts because he knows from before that her heart cannot handle mountain climbing well.

His love for his wife (who he still thinks to be his fiancée) remains unchanged. When at my request she holds a handkerchief in front of her eyes and acts like she is crying, he sees it from the side and becomes increasingly restless. Eventually, he leaves his chair, goes to her, anxiously pulls on her arm and moves her hand from her eyes, looking anxiously into her face. Another time, his wife actually cried when thinking about her family’s approaches concerning her marriage. Upon seeing this, B. who had never seen his wife cry, became deeply saddened and asked, “What is wrong, Anni?” And whenever he saw her reddened eyes afterwards, he asked her what was wrong. He was inwardly anxious and depressed for a long time without knowing why. Such emotional states have longer effects on B. than on normal people because he cannot willfully distract himself like we can. His wife was thus right to note that he feels things more deeply than before.

In another striking situation, it became apparent that his sense of duty also remained intact. B. often checks his watch mechanically throughout the day. On one occasion, when he saw it was six o’clock in the evening, he was momentarily startled and prepared himself for a quick departure. He said anxiously, “I have to go to work” or “work starts at six o’clock.” This situation can also be seen in the audio-film. When I ask him what time it is (shortly before six o’clock), he gives the same response, as he does with absolute regularity.

It is a great fortune for B. that he suffered his gas poisoning on the night shift. If he had been working the day shift at the time, the poor man would have always become unsettled and frightened when he saw his watch.

Why B. does not continuously repeat his exclamations in the same situations

We know now under what conditions B. can make linguistic exclamations even though he has but a second at his disposal. He always makes them in situations that bring his emotions to the fore, and, with exceptional regularity when strong emotions are recalled in him or as soon as the situation touches on his basic circle of interests.

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However, one will ask: Why doesn’t B. continuously repeat his exclamations? When he stands on a bridge over a creek, why doesn’t he say continuously and uninterruptedly, “You can fish there”? For after one exclamation, he no longer knows that he has made one at all.

We must next remember that with B., linguistic exclamations occur under specific conditions: he must see the object of his perception as well as his partner. He has to be oriented so that he can see both in the same moment. Since these situations do not occur very often, he makes very few exclamations.

But the following is much more important: a precise observer will immediately realize that B. makes all of his exclamations at his first glimpse of a situation—he called attention to the squirrel the exact moment that he saw it; he made his remark about fishing the same moment that he came across the creek.

And a good observer likewise sees that his joy is much more strongly pronounced at the beginning of such a perception than at the end. Afterwards, the joy is quieter. Upon the first glimpse of such an emotionally exciting situation, the emotional movement apparently binds itself to his excitement; the mind is more shaken in the first moment than later. The excitement that exists in the beginning gradually fades and calm sets in. A joyful mood then develops from the happy emotional movement provoked by the excitement in the first glimpse.

And in the first phase of the emotional state, during the phase of excitement, B. makes his spontaneous exclamations! For in these first phases, the emotions are much stronger and evidently contain a motor component, and the conditions for linguistic exclamations are the most favorable during this time. After the exclamation, the excitement has also faded; it is abrated, as the psychologist would say.

Those who can observe themselves well will also find that the majority of their exclamations about specific situations are made upon the first glimpse. Then one gains the feeling of genuineness. But as soon as the emotional state has lost intensity, as soon as the excitement has faded, the same exclamation appears unnecessary and unimportant even when it is already on the tongue, and one will often not say it at all.

B. will make a comment about a situation more than once when he has turned away from the situation in between. It will then be a new situation for him, which will again move him emotionally, that is, excite him. However, the conditions are not as favorable because the contrasting effect is not as heavy; the intense emotional movement runs into an already similar emotional mood.

Through the fading of the excitement from a long lasting perception, however, B. must gain the impression of a duration despite his second-long consciousness.

Despite his second-long consciousness, B. has the impression of the continuity of his life

And so we have seen time and again that the flow of consciousness of this man, who has only a single second, is in no way divided up into individual seconds; rather, B. has the experience of duration through his spontaneous behavior in the most diverse areas, in his simple outlook, in his observation of nature, and in his observations of his surrounding environment.

Although B. has become a man of the present, he is not a man of the moment. As a rational being, B. imbues the situation before his senses with meaning. And it is this context that reaches from one second to the next and creates a flowing transition.

A sensible, reasonable task is harmoniously carried to its completion, regardless of how long it lasts, because as we saw, the sensible stimulating nature bridges the gap from one second to the next. The rational whole is known and recognized in the situation as a goal that is then fulfilled.

And the driving instincts anchored in the body, which possess their own “memory,” likewise push their corresponding, long lasting, and always sensibly-executed behavior to completion.

Emotion, which likewise has a long-lasting effect in the body, enables the flow of consciousness to be bound into a unified entity.

This binding is also made possible by rhythm and melody. When B. whistles and sings his songs with his former merriness, or even when he hears music somewhere, his experience is not choppy. Rather his experience consists of flowing transitions from one second to the next.

And his observations of the perceptual world, which he experiences more intensely as a man of the present than a normal person with intact memory, are directed to what is most notable and interesting to him so long as it moves him inwardly. Although, as we saw, his initial excitement gradually fades, the emotional resonance lasts afterwards so that the object itself will no longer be considered with the same intensity and attention; a new stimulus or a new situation can assert itself, enter into his consciousness, and distract him from the old. This transition, however, does not occur abruptly. The new perceptual stimuli that enter his field of perception are experienced meaningfully due to this inwardly experienced resonance.

We are here confronted with the incredible fact that this person with his single second—if left to his own resources—must experience the impression of lasting duration and harmonious flow. He need not always be re-excited from second to second because he experiences no gap between one second and the next; this person with a second-long consciousness nevertheless has an awareness of the continuity of his experience.