Special Section: Introspection
Original Articles and Reviews

Introspection in Psychology

Its Contribution to Theory and Method in Memory Research

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Abstract: Memory is typically conceptualized as a mental space where information is stored until it is retrieved for current processing. This archive account has been undermined by a multitude of findings, however, calling for a theoretical and also a methodological reorientation. In particular, we consider it timely to include an introspective mode of research into the study of memory because such introspective enquiry can provide insights into the recall process that go beyond those of third-person research. The limitations often associated with introspection (e.g., its seemingly subjective quality and its post hoc nature) are well justified – but only as long as the more immature impromptu introspections are concerned. A more systematically developed form of introspection can overcome these limitations. Such a systematic approach is outlined and used here to develop a taxonomy of mental processes involved in recall. Our observations lend support to a reconstruction account and allow for a differentiation of mental activities involved in various types of recall.

Keywords: introspection, memory research, qualitative research, methodology

In a typical memory study, psychologists expose their participants to a certain experimental scenario, then measure the speed or accuracy of recall, perhaps even relevant neurophysiological correlates or the metacognitive awareness that the participants have regarding their own performance. Such overt behavioral (physiological) responses constitute the signature or endproduct of a mental process that is not examined directly but that is theorized about and reconstructed from the data we obtain in these experiments.

This inferential approach has a compelling rigor; but it is also obvious that the respective experimental scenario that is used to allow for such theory-building is in itself a product of a mental process: the researcher had a hypothesis, perhaps even an insight into some aspect of memory – and now seeks to scrutinize it in the realm of third-person observation. The current proposal seeks to complement this experimental approach to the study of mental phenomena (here memory) with an enquiry into the realm where they appear to begin with – namely our thinking. Introspective research is often challenged on the ground that it is vulnerable to a number of confounding factors. Admittedly, the preliminary intuitions and introspective insights that are typically summarized under the introspection umbrella are indeed often of an ad hoc nature and it is hence legitimate to question their validity. But this does not rule out the possibility that introspection can also be conducted in a more systematic and methodological manner – and then lead to more substantial and far-reaching observations that could inform third-person experimentation. This issue is all the more urgent, as fundamental questions about the nature of memory and other cognitive phenomena remain and appear to elude traditional third-person experimentation.

In the following, we will briefly sketch one such quandary of memory research and explore how introspective research can help illuminate it. We will explore why introspection is often viewed with suspicion and seen as an expression of flawed thinking – and also point out that these suspicions about introspection are a product of flawed thinking of their own. We will finally report findings from an introspective research trial that we have conducted and that we consider useful in illuminating the quandary in question.

Quandary of Memory Research: Beyond the Storage Concept

In a recent book entitled "*Beyond the archive*," Brockmeier (2015) traces the conceptions of memory from antiquity to modern times and illustrates how the understanding of memory as an archive has pervaded history – an archive in which memory items are stored immutably and can be

called up at one's deliberate intervention. Today, the notion of an immutable memory trace is rare and traditional archivalist accounts have been replaced by more recent constructionist approaches (for an overview, see Robins, 2016). Nonetheless, there is still the widely held assumption that something is stored, as is evident from the universally postulated trichotomy of "encoding," "storage," and "retrieval" in both popular student textbooks as well as the expert literature (e.g., Jackson et al., 2015; Sweegers et al., 2015). According to this notion, stored items are mental representations (e.g., images) or at least fragments thereof (features) that are retained for subsequent processing. Upon closer examination, however, there is in fact little evidence that ready-made mental representations (or parts thereof) are stored – we will illustrate the relevant data shortly. But if the storage concept is problematic, how can the recall process be more adequately conceptualized? Brockmeier (2015) describes the required reversal in our theoretical understanding of memory as a "paradigm shift" (p. 59). Here we argue that this content-related paradigm shift will also need to be accompanied by a methodological paradigm shift. We are convinced that an introspective approach can help uncover important aspects of the recall process because it allows for an inward understanding of what previously was approached only from outside. Before detailing this approach, we will illustrate why the concept of storage is not consistent with the empirical phenomena.

The concept of storage was already called into question by memory researcher Frederic Bartlett who in 1932 documented that participants reconstruct information they recall from memory according to spontaneous needs. He found that his participants made frequent normalization errors – errors that solved the logical breaches in the original story (Bartlett, 1932). The findings were an early indication that "stored" information is not stored in an immutable conservation sense but that an active restructuring takes place, along the lines of the individual's level of knowledge or depth of insight. Later on, these findings were extended in Elizabeth Loftus' research on memory errors. Phenomena such as the misinformation effect or implanted memories showed that misleading triggers can prompt a reorganization of retrieved information that is adjusted to current information or altered on the basis of immediate needs, for example, to spare embarrassment or to make sense of a situation (e.g., Loftus & Loftus, 1980). Phenomena such as state- or mood-dependent memory as well as retroactive interference and retrieval-induced forgetting also illustrate that aspects of the recall context influence the information being recalled. Moreover, phenomena such as source- or target confusion, tip-of-the-tongue states, or illusory conjunctions indicate that sometimes only partial knowledge of a memory item is available, likewise disqualifying the concept of an immutable "coherent whole" to be stored in a mental archive. Instead, what we remember appears to be partial (if even that) and prone to alternations resulting from current needs and characteristics of the retrieval context. Moscovitch goes as far as claiming that "memory does not exist until it is recovered" (Moscovitch, 2007, p. 17) – a claim that appears to fit the common observation that recall is often the effortful work of assembling the pieces of a mosaic and that even the more detailed memories, upon closer scrutiny, lack the clarity of a perceptual experience by all means and standards; such a reconstruction account has also been articulated by other scholars (e.g., Schacter, Norman, & Koutstaal, 1998; Steiner, 1921/1986).

The constructivist approaches in general do not argue that nothing is stored – instead, elementary features and general patterns or sketches are retained and information from different contexts and sources is combined, modulated by the rememberer's background or knowledge; details are often swapped to fill in the blanks of the memory trace. A weakness of these constructivist approaches and the way they are currently instantiated lies in the fact that they still draw on a basic archivalist understanding. The implication that features or contents of any type are stored is an assumption that we cannot endorse on the basis of our enquiry. Also, the constructivist approaches – much like the archivalist ones – still leave the "rememberer" largely out of the picture, yielding a number of problems, such as the emergence of abstractions and homunculus accounts or the commitment of category mistakes. To address this issue, we find it important to take the perspective of the rememberer into consideration and explore the processes of recall introspectively, allowing us to address the phenomenology more comprehensively.

Introspection Can Help Illuminate the Recall Process

Introspection has a long history in the science of academic psychology – reaching back to scholars such as Wundt and James, but also including Franz Brentano, the Gestalt Psychologists, and the members of the Würzburg School. In our paper, we refer to the original understanding (see also Schwitzgebel, 2010) and define introspection as a mental activity that directs attention toward its own source. We pose that introspection can be studied as systematically and as thoroughly as the mental activities that are studied in cases where attention is directed to external phenomena in the case of third-person experimentation.

There are different reasons that justify considering introspective enquiry in psychological research – the first three are more general in nature and apply to any psychological phenomenon. The other two, by contrast, are a specific

justification for the use of introspective methods in the context of memory research.

The first reason is of an epistemological nature and applies not only to introspective memory research but to introspection in general. Skeptics of introspection often argue that we cannot scrutinize our own thinking because such a method constitutes a privileged access to our mental processes, is subjective and vulnerable to a number of confounds. One can maintain such a worry only as long as one asserts that mental processes are of an apodictic character and only encompass the *results* of mental processes (their content) as inevitable, ready-made entities – while at the same time disregarding the *process* that yields this content (this is the case because scrutinizing and debating the results/contents of thinking is a universal and indispensable component of any scientific process). However, thoughts do not have an apodictic character, they are results of mental activity of their own as is evident in the state of searching (the activity) for a memory content (the result) that is not yet available (cf. White, 1988). Once we acknowledge that any thought process contains a content- as well as a process-component, we can no longer dismiss the attempt to study this process component because that would be akin to claiming that we deliberately exclude part of the phenomenon from the domain of enquiry.

The second point is also of an epistemological nature. Psychology often regards itself as a natural science (psychology departments are often resident in the natural sciences faculties). The natural sciences operate on the understanding of a strict subject-object-distinction: we can only examine something as long as we are not part of it and instead take an outside observer's point of view (the so-called third-person perspective). In turn, the researcher tries to emancipate herself as much as possible from the target of enquiry – and the gold standard of experimental research, the double-blind, randomized control trial is the most prominent signature of this approach. But the researcher cannot be divorced from her object of enquiry – the two are inexorably related because the object only discloses itself to the subject via the subjects' thinking. Instead of pulling a gap and tearing apart the two sides of an integrated whole, the researcher's thinking – being inexorably involved in the research process – should hence be subjected to the same level of scrutiny as the other objects of research.

A third point lies in the fact that introspective enquiry is a form of immersion that is an inevitable prerequisite to a full understanding and appreciation of a phenomenon. In the same sense in which it will be impossible to convey to another person the taste of a pineapple when this other person has never tried one, in this same sense it will also be impossible to convey to another person what the respective behavioral or physiological data refer to when this other person has never experienced what the psychological state means that the (physiological) data refer to. We cannot map findings from third-person experiments onto respective psychological states if we do not have an understanding and appreciation of what these psychological states really mean.

Fourth, and now more specific to memory research, it becomes apparent that theories of memory often leave the rememberer out of the picture. This leads to problematic abstractions and generalizations – and often enough, homunculus concepts are used to replace the missing introspective perspective (e.g., entities of "executive control" or "pattern recognition networks"). Using an introspective research approach aims to reintroduce the perspective of the rememberer into the equation.

Fifth, we seek to apply an introspective research approach to the study of memory to enrich the current and somewhat general taxonomies of recall. The existing taxonomies differentiate between a very limited number of types of recall – for example, direct versus generative; voluntary versus involuntary recall (Berntsen, 2010; Conway & Pleydell-Pearce, 2000). A further differentiation is useful in exploring and appreciating the breadth of recall processes, the different types of errors they yield, and strategies that may help cultivate and strengthen recall.

While the arguments in favor of introspection are substantial, there is no denying that a multitude of concerns have been voiced against such inward enquiry. However, these concerns have been likewise criticized at great length, and we refer the interested reader to an in-depth discussion in recent reviews (Bitbol & Petitmengin, 2013; Jack & Roepstorff, 2003; Piccinini, 2003; Weger & Wagemann, 2015a, 2015b).

Conducting Introspective Research

In our earlier work, we have proposed a specific methodological road map in which we distinguish four steps in conducting introspective research (Weger, Meyer, & Wagemann, 2016). The first and most elementary step is setting a theme for a trial; the second step consisted in agreeing on a method, including the "material" used for the trial (e.g., words or images). In many respects it is akin to agreeing on what a classic experimental report would introduce as the procedure section. In the context of the current memory trial, the goal here was to form an intention to recall – and to then fill this with content. The extent to which this is indeed possible seems to depend not only on the researcher's deliberate effort: from our earlier rounds of introspective research, we had noted that two forms of mental activity can be distinguished – both a producing and a receiving one (in the mindfulness literature

sometimes referred to as focused attention and open monitoring). Our goal was to remain aware of these two forms of activity and scrutinize how a memory unfolds out of the interplay between these two processes. While step two is thus an advance exchange on the intended procedure, in step three we report post hoc the processes of mental activity that we actually engaged in; finally, in step four we outline the experiences that resulted from the processes of activity.

Using the Introspective Research Method: Toward a Taxonomy of Processes of Recall

In the current paper, we are limiting our account to researching the processes of recall involved in declarative memory – but deliberately address declarative memory across different domains (episodic, semantic, autobiographical knowledge – for an early overview over different proposed subsystems, especially the distinction between episodic and semantic memory, see for instance Tulving, 1972). We are not the first to propose a taxonomy of the processes involved in recall. In a theory of autobiographical memory, Conway & Pleydell-Pearce (2000) distinguish between processes of direct versus generative retrieval in autobiographical memory (see also Harris, O'Connor, & Sutton, 2015). Direct retrieval, according to this account, is an effortless, incidental form of retrieval whereas generative retrieval is effortful and deliberate. We consider this to be an important distinction of recall processes that marks an elementary and important aspect that we seek to differentiate further in our account below. A related – but not identical – taxonomic distinction is that of voluntary versus involuntary types of memory recall (Berntsen, 2010).

On the more general note of applying introspective research to cognitive phenomena, our work connects to important earlier approaches that have referred to introspective research methodologies in experimental psychology – although not necessarily in the context of memory research (Bitbol & Petitmengin, 2013; Lutz & Thompson, 2003; Pereira, 2014; Varela, 1996). Note that in a sense, accessing memory – in particular subcomponents of memory such as autobiographical or episodic memory – also requires introspection; but in these cases, the research-participant performs a more or less incidental type of introspective enquiry which is then aggregated/interpreted by a researcher. In the current paper, we extend this approach in that the role of the external observer/experimenter/interviewer is taken up by the introspective researcher who systematically explores the processes of memory repeatedly. In other work –initiated perhaps by the early pioneers of memory research, in particular Hermann Ebbinghaus –introspective research was also used; but Ebbinghaus largely focused on the memory *contents* and the number of rehearsals needed; he did not address the mental *processes* directly and instead inferred them from the statistical patterns of his findings (cf. also Hackert & Weger, 2017).

In what follows, we will speak to the four steps that we proposed when conducting introspective research so as to present a methodological road map for our particular test case – here recall – that others can explore and/or scrutinize when seeking to follow up on it.

Step I. Setting a Theme for the Trial

The theme was straightforward – exploring the recall process, that is, studying the *types of activity* that we engage in during recall as well as the resulting experiences.

Step II. Agreeing on a Method

For a period of about two weeks, we conducted twice a pilot enquiry into the introspective nature of recall to examine the mental processes that are involved. We decided it would be ideal to choose scenarios that would be sufficiently difficult so that recall could actually become observable as a process rather than a product (when happening in an instant). We decided to try and recall what happened exactly a week ago the moment we were doing the exercise each day; and to also experiment with trying to recall what we did on a respective day a year ago. After two weeks, we had a telephone conference to discuss our findings. Out of this first exchange, we distilled a number of guiding questions for the second round of our pilot trial – and had another exchange at the end of that subsequent 2-week period. Finally, we came together for a 2-day retreat, started out with a final recall exercise, and then sought to develop a taxonomy of identifiable processes of recall (not types of memory in the sense of episodic, semantic, etc., as mentioned above). This taxonomy is outlined below (see also Figure 1) – and it is clearly a starting point; further extensions will doubtlessly follow and are needed to sharpen and elaborate this preliminary effort.

Step III: Describing the Processes of Activity That We Observed

To begin with, we made the somewhat elementary observation that recall is triggered by a deliberate intention (and thus stands in contrast to instances of incidental recognition). It requires a clear grasp of what to look for – that is, it requires a concept which initially is pre-individualized

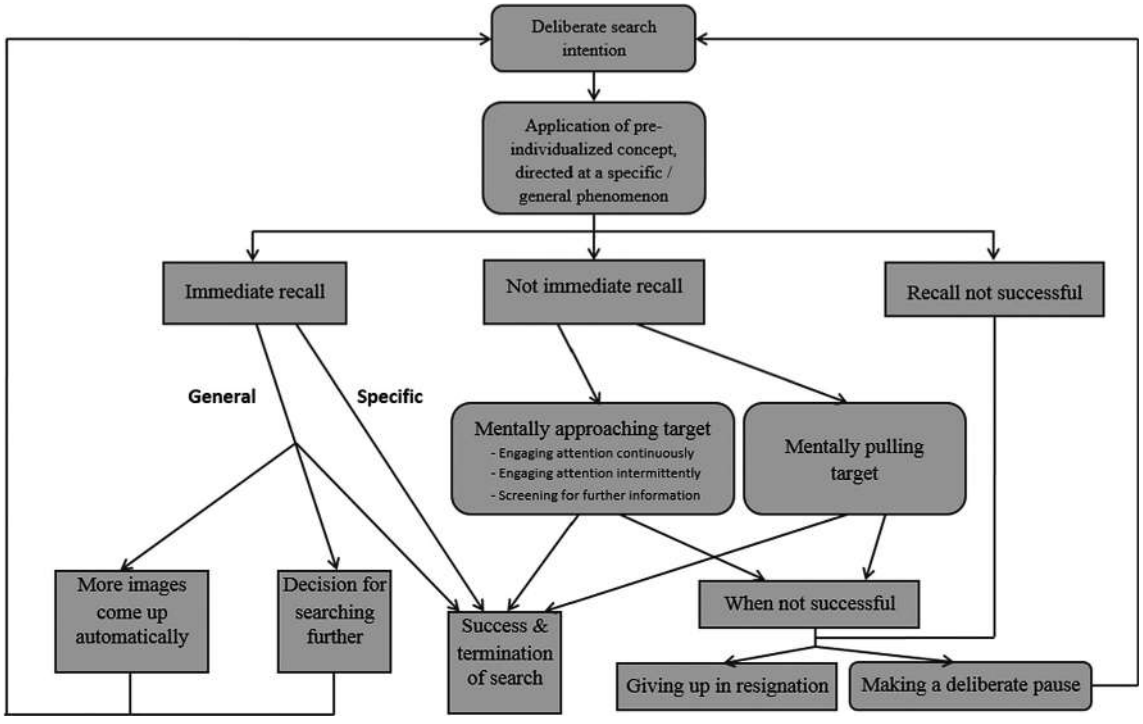

Figure 1. A preliminary taxonomy of recall processes showing the different mental activities in the various types of declarative recall. Mental processes/activities are shown in boxes with rounded corners; results of mental activities are shown in angular corners.

in the sense of holding a general approximation of what to search for but which is not yet completely individualized as a distinct mental representation. These concepts then individualize more and more into specific representations throughout the recall process. They can relate to more specific phenomena (e.g., a name, a person, etc.) or to ones that are more general in nature (e.g., an experience, an encounter, a trip, etc.). For both specific and general concepts we noticed four types of recall that could be clearly differentiated.

1) A first scenario is straightforward: upon starting out with an act of recall (e.g., what is someone's name; where did I go on holiday last summer?), the correct response appears immediately. When the response is simple (e.g., his name is Mike), the process of recall discontinues. When it is complex and more general in nature, different scenarios are possible. A first (1a) is that we are satisfied with the initial (and typically fairly general) mental experience (e.g., "I was in Spain"). A second option (1b) is that the item has been recalled successfully and that even more images begin to come up (note that with "recalled successfully" we also assume "recalled accurately" for the current purpose: accuracy was only taken at face value, as it was not a relevant dimension of interest per se). Without exercising deliberate effort, the memories constitute themselves (e.g., "I was in Spain. And it just occurs to me how I felt like when I entered the huge arrival hall; I will never forget the immigration officer – looking at me in astonishment about my passport covered with stickers" – cf. the distinction between a producing and a receiving mode, as noted earlier). A third option (1c) is that upon successful recall of the item in question, the search still continues – but now out of the individual's deliberate effort (e.g., "I was in Spain. Oh, and which was the first place we went to after we landed in Barcelona…?").
2) A second scenario is one where the correct response does NOT appear immediately. It is now a matter of remaining with the task, meandering around, gradually trying to approach the item. We begin to identify relevant dimensions of search. For instance, I may seek to recall what I did on June 13th last year and now try to remember whether it was holiday time; whether it was a weekday or a weekend-day; what I did in June in general to hopefully home in on the 13th sooner or later; and the like. This process of gradually advancing toward the target can take different forms. For instance, I may look out for relevant dimensions (i.e., a weekday; a mood; a significant event around that time). My attention is continually engaged in a particular conceptual direction (initially in the

sense of the pre-individualized concepts described above). It is as though I am sampling places from which to most easily seize the respective item out of the darkness of what is still unconscious. Alternatively, I may engage my deliberate attention on the search item only intermittently; I may realize that the task is not yet successful and is in fact too exhausting for the moment, I deliberately let it rest for a while, walk elsewhere in my mental search, and then return to it. Finally, instead of focusing on a relevant dimension, a different type of advance is characterized by screening around and monitoring one's mental stage more openly; it is often guided by a form of vague inkling of what the target might look like (a precursor to a tip-of-the-tongue state). Not yet knowing where one will arrive, the memory begins to gradually contour itself out of other knowledge that is already manifest.

3) In a third scenario the memory also does NOT come up immediately – but unlike above (2), one does not roam around or deliberately advance toward it step by step. Rather, one keeps standing in the same mental space, remaining focused continuously on an as yet "invisible" target. Ignoring auxiliary yet distracting access routes one remains gazing inward toward the "something" of a memory content that is yet to emerge, trying to siphon it out of a diffuse nothingness. I do not direct my mental eye left or right in an effort to discover traces or concomitant phenomena. Instead, I only home in on the to-be-identified target proper, continuously strengthening the siphoning power of my mind's magnet and thereby seeking to contour the respective memory content into consciousness. The search intention gets more and more intense, preliminary inklings or even partial knowledge may appear (the tip-of-the-tongue phenomenon is even more prominent here than it is in category 2); and in cases of success, the search item finally comes about as a sudden appearance.
4) A fourth and rather obvious scenario is the one where the search process is not successful and the respective target cannot be retrieved – and note that this also implies that we do not use "recall" as a success term but as a concept that implies both aspects. In such a case, one can still distinguish between a deliberate mental break in which we let the search effort rest temporarily; versus an ultimate resignation in which we give up and do not pursue the search further. Note that taking a deliberate mental break also implies that we resume the process later on, thus launching a new cycle (and perhaps even multiple ones).

Step IV: Outlining the States of Experience That Result From the Processes of Activity

Having differentiated between the four categories of activity, it is now possible to examine more closely the types of experience that are involved in the respective types of recall processes. We address these experiential components in quite some detail here because they are traces or footprints of process that can now – with the help of these experiential signatures – be more easily tracked and differentiated (for instance, an experience of increasing anger is a potential pointer to a different category of recall processes than an experience of increasing joy). Note that we will also frequently readdress the type of activity here because the two aspects (activity and experience) are inherently connected.

1) When a memory appears without a deliberate search process (1a), an experience of satisfaction and lightness, perhaps even a mild joy, sets in: we have found something that is at least somewhat important to us and that also proves that we are still in command of our mental capacities. The experience is very elusive and more intricate introspection is hardly possible because the process is too fast to partition it further. In the second case (1b) the search does not terminate upon successful recall, more memories surface without my own deliberate effort. This also results in an experience of mild surprise and joy – and note that this joy has a process- and a content-specific component: when a memory becomes available, it is an enjoyable reality (the process-specific component) even though the memory itself may not be particularly enjoyable (the content-specific component); the latter component is typically much more prominent and easily dominates the process-specific part. Different memories may come – and we now recognize some as relating to the respective event, while others are identified as belonging elsewhere. This distinction is often effortless (although by no means always – see, for instance, the example of source confusion, i.e., the phenomenon where we are able to recall a message but are unable – at least initially – to recall who conveyed the message to us) – and the fact that we can so competently decide *what belongs where* and thus employ an inner scale of judgment is a satisfaction in itself. When fully appreciated, this insight lends a whole new level of firmness and trust in our mental capacities – we realize that a mental action holds itself in itself. This allows for an experience of inner firmness that is more powerful than the externally triggered experiences of self-efficacy. Other mental processes and experiences come in – for instance, we can establish a temporal

order in the course of things (the episode with the immigration officer happened early on, i.e., upon arrival in Spain, not when I left the country). It is thus obvious that this case is by no means an experience of only passively receiving new memories but one where processes of directed intention and of more open receiving alternate. The third scenario – in which we engage in further deliberate recall (1c) – is akin to launching a new search process. The experience of joy and satisfaction is intensified compared to the other cases where no deliberate effort is made.

2) In the second scenario, the target does not appear immediately, we deliberately advance toward it, screening the landscape of our consciousness for potentially relevant information. In many cases we are not able to walk in a straightforward manner toward it but may take sidewalks and even detours, circling around the center, trying to get closer and closer. It is a fine line between, on the one hand, moving forward, walking on increasingly firm territory, and experiencing a growing relief and even joy when ultimately successful; and, on the other hand, not finding the ingredients to assemble the memory – an experience of remaining in limbo, of frustration or even anger that can lead to self-reproaching behavior and even physical agitation (for instance when we do not find something – e.g., a key – that we know we safely stored away). In many cases, a metacognitive awareness may set in – for instance we know that we will not be able to remember the respective item now and that we have to let it go for the time being.

   In either case we circle around, try to advance toward the target via alternate access routes because the main entrance is temporarily blocked. Where successful, this success typically announces itself in the form of an inkling ("it is almost there"), yielding partial knowledge about the target.

3) In the third scenario the target once again does not appear immediately – we deliberately search for it, but instead of roaming around, we remain more or less immobile and gaze into a fuzzy emptiness. It is an intensely effortful form of inner activity with the constant challenge of oneself not being able to maintain this activity any longer and getting distracted. Instead of meandering around and gradually advancing toward the memory, we continuously seek to pull it toward us. Typically, it does not appear unexpectedly but rather announces itself, sometimes even partial information is available (the tip-of-the-tongue phenomenon is most prominently noticeable in this scenario). Our own activity encounters the forthcoming memory, a process that requires patience and is initially accompanied by an experience of anxiety because we do not know yet whether we will ultimately succeed. Later on, when successful, this coming together of one's own activity on the one hand and the unfolding of the memory on the other makes for a special joy and relief and even an element of gratitude. We can thus clearly distinguish between the process and the content of recall.

4) In the fourth scenario the item is not remembered and a sense of frustration, anger, and the ultimate despair sets in, an utterly unpleasant and also extremely effortful and exhausting state to be in. Note, however, that we typically avoid the more extreme version of this scenario, distracting ourselves or otherwise abandoning the search. When not abandoning it, we have to be prepared to face even somatic consequences (e.g., restlessness) and the ultimate scenario is perhaps the daunting experience of realizing that a certain piece of knowledge is unavailable (e.g., a person with beginning Alzheimer's disease realizes for the first time in panic that she cannot remember how to get back home). The dichotomy between deliberately putting a memory to rest on the one hand versus having to give it up in resignation on the other can likewise be applied to the other scenarios where the search is not successful. The details of the different scenarios are outlined in Figure 1.

Implications of the Trial Regarding the Question About Reconstruction

In the context of our introspective trial we made a number of observations that are relevant regarding the question about memory reconstruction and the types of activity involved in it. The first is that categories 2 and 3 are the most suitable ones to study the recall process because they largely avoid the ceiling and floor effects of categories 1 and 4, respectively: When a memory is immediately available (category 1) it appears complete and unfragmented, apparently supporting the initial intuition about an archive in which something is stored in a ready-made fashion and from which it can be uncovered; when the memory never appears, the observation remains incomplete (category 4). It is the intervening categories where the process is sufficiently decelerated and where the experiential reality is in fact more one of reproducing or reconstructing something, compared to taking a ready-made memory out of a storage container.

Another observation is that the search process can be upheld while the content is not available; this lends support to the hypothesis that a memory at least sometimes constitutes itself through sustained effort. While such an account

could also be consistent with an archive account, it is in fact just as consistent with a reconstruction account.

Moreover, of central importance was the observation that during recall of the categories 2 and 3, the content of a memory was never as precise as the respective content of perception: we may have known that a brownish-colored wooden table was standing in the room where we were just having our meeting; but what exactly was the shade of the brown or the texture of the wood? What was the size or height of the table, etc.? Some information becomes available with more effort, but most of it remained unavailable. Recall thus seems to be continuing work-in-progress and the fact that partial knowledge remains unavailable while other information emerges later on is also in conflict with an account in which an item – or a component thereof – is stored somewhere in its entirety.

Another pointer toward a reconstruction account is the continuing activity and effort that is required to instantiate and maintain a memory – it is as though each feature or pixel has to be conquered and newly instantiated individually, an experience that is clearly in conflict with the idea of a ready-made item being unlocked from a storage entity. In our phenomenological awareness, there was no evidence that even a feature or any mental content would be available in a ready-made (stored) fashion, as even the most elementary component (e.g., the color of a table) would virtually dissolve when probed for its exact constitution in our mental imagination.

On a more general note, we argue that focusing on the content aspect of mental activity ultimately leads to an archival account of memory contents (be they in the form of ready-made pictures or features) because these mental contents appear as ready-made or given (apodictic) entities without an awareness of the process that yielded them. It is only when attending to and appreciating the pre-reflective activity or process aspect of mental phenomena that one can move beyond such an archival concept of either features or entire ready-made images.

Of note is also the general observation of different activities underlying the recall process and the finding of different equifinal pathways that yield the same outcome. For instance, we observed both a centrifugal and a centripetal movement in searching for a memory content (cf. Figure 1); likewise, in case of a successful recall of a general content, more images would sometimes come up inadvertently – or be brought up deliberately (scenarios Ib and Ic), illustrating how the recovery of associated memories may also be due to different processes. The observation that a similar outcome of a memory search may be mediated by different processes/activities in different contexts illuminates the complex and elusive nature of the recall process; it is an important aspect to take into consideration in accounting for individual differences and also for contextual variabilities in memory performance. A solely or primarily outcome-focused approach remains too close to a black-box conception of memory that we consider to be one-sided. A process/activity orientation that complements the outcome view is needed to fully appreciate and link the phenomenon of human recall more closely to the recaller and integrate him/her into the picture rather than emancipate him from it. This we see as a fruitful and important area of follow-up work – also in a clinical/neuropsychological context.

If a memory is indeed a new instantiation of an image, what then is it that remains? According to our understanding, both a conceptual and a somatic readiness or disposition remain: The *conceptual readiness* is the individual's strengthened ability of applying a concept to a perceptual occurrence. It is a mental activity that focuses on a specific semantic or conceptual content and may be – and in fact often is – accompanied by momentary affective correlates (cf. our reports of frustration, relief, etc.). When having formed and applied such a concept successfully and repeatedly in different contexts it remains as a mental disposition (i.e., as an ability – a readiness toward a mental activity, not a content or a feature per se) – and can be applied more easily on subsequent occasions. Using the terminology introduced above, the concept has now been pre-individualized and the act of bringing order into the perceptual input (or in the case of memories: into the mental experiences) is facilitated. The conceptual readiness differs from a general association in the way it is linked to the individual learner: In the case of associations the focus is on (abstract) knowledge per se; in the case of conceptual readiness the focus is on the recaller's individual ease (or as we call it: readiness) of reproducing such an association. The *somatic readiness*, on the other hand, constitutes an altered threshold of physical activation which was primed by the encounter with the earlier (perceptual) experience (e.g., in the form of long-term potentiation, i.e., the increased readiness of a neuron to fire in response to repeated activation). In overcoming the as yet unstructured, erratic (fragmented) perceptual input via the formation and application of a concept, the synaptic connectivity of neurons is altered. The altered synaptic state relates to a coherent mental experience and is a necessary (not a sufficient) basis for recall. Both types of disposition allow the individual to more quickly and easily engage in the same mental and physical activity that was initially used during the physical encounter and that now facilitates the new assembly of an image in the form of a content of memory.

To the extent that the remaining disposition is understood as a stored entity, our account actually comprises elements of both the storage and the reconstruction account. But we wish to highlight that this disposition is not seen as a stored content or representation. This is also a reason for why we

consider an introspective approach to be of importance in complementing a third-person approach. If we address the storage concept from a third-person point of view, we typically think of stored items or entities or physiological changes. But from an introspective perspective we need to move beyond such concepts because what is saved is not saved in a representational sense (in that items or features are saved). What is saved is an ability or potential (a disposition) that is not yet realized.

Introspection: A Mental Activity and Its Relation to Somatic Processes

Throughout the paper we have described the process of recall in mostly introspective – and that means: in mostly mental – coordinates, but the recall process, as just mentioned, also implies a somatic dimension. In closing, we wish to highlight that, according to our understanding, this somatic dimension is important – and that it stands in fact in complementary prominence aside the mental domain. Note, however, that the somatic component comes into play not only at the point of recall but already during the original encounter with a situation that is now remembered. For a memory to occur, a sensory event has typically (but not inevitably) taken place beforehand. The sensory stimulus as such carries no mental coherence or meaning. It triggers both a somatic response (e.g., a neuronal firing pattern) as well as a mental response. The mental part of this response can be understood as the formation of an as yet hypothetical concept that is applied to the erratic or fragmented (incoherent) stimulus. The resulting neuronal activity pattern is a signature or expression of the mental response, that is, the pattern of neuronal activity is "plasticized" according to the specific mental content and leads to an alteration of the neuronal connectivity (Wagemann, 2011). Both types of responses appear categorically distinct to begin with and yet they are inherently connected – the somatic response is necessary (not sufficient) to stimulate the mental response; the mental response is necessary (not sufficient) to make sense of the somatic (and more generally: of the material) realm and to be sharpened along the stringency of its lawfulness; the two have fallen into apparent opposition in the process of human thinking placing itself in juxtaposition to its (material) environment; they can unite again – on a more conscious level – in the process of human thinking engaging the lawfulness of this (material) realm. In fact, the close interconnection between the two finds a constant reminder in both psychosomatic and somatopsychic reactions (e.g., a blushing response; illogical thinking during states of physical deprivation, etc.). An intentional act of recall appears to re-instantiate this relationship by instantiating a specific (pre-individualized) concept, serving as a "searchlight" in the "darkness" of possible neuronal patterns and thereby also triggering the companion pattern of bodily activity (the physical engram in the form of altered synaptic connectivity, long-term potentiation, and the like). It is as though with our deliberately searching concepts we convene, on the one hand, mental fragments from a diffuse background and assemble them into coherent mental events (images); and along with these, the respective bodily engrams are also called into activation because they have been established in tandem with their mental counterparts when the respective physical object/person, and so forth, was perceived and identified by a human beholder. In other words, the bodily engrams serve as physical, pre-universalized dispositions in the sense that they still "await" meaning through a concept; in their as yet particularistic nature these bodily dispositions inform mental activity and confine, as a substitute of the original stimulus, the mental searching movement (Witzenmann, 1983). In memory processes, either aspect is necessary for the other to occur but not sufficient to explain it, at least not as long as the two are understood as being categorically and completely distinct. This categorical distinction appears to be an act of the separating rather than the integrating capacity of human thinking to begin with. Our description here is an effort to move beyond this juxtaposition without ignoring the different levels of description. The role of an introspective, introspective mode of enquiry is indispensible in this context: seeking to bridge first-person phenomenology and third-person experimentation (i.e., the psychic and the somatic) only with a methodology based on third-person experimentation will ultimately remain one-sided. A balanced approach is needed to overcome this divide.

Concluding Remark

In the present paper, we have introduced a method of introspective enquiry that we consider an important and useful tool in complementing third-person research with regard to the study of memory. The starting point of our enquiry was the observation that archivalist models of memory cannot account for a host of empirical phenomena – and that it may be more appropriate to conceive memory more as a process of re-instantiation. To the outsider this may appear to be a mostly academic debate but we consider it to be much more than this for an important reason: The capacity to recall is of core importance to an understanding of the self – and has thus significant implications for the way we perceive and conceive ourselves and others. An understanding of memory as a process of storage implies that the self can be archived in mental representations that may lie dormant for a while but that ultimately provide a rather

static architecture to our sense of self. An understanding of memory in terms of the reconstruction account, by contrast, implies a continuing need for redefining and in fact for reinventing oneself. That which remains is not an image or a memory but the potential to acknowledge, for instance, these images or memories as being authentic or not authentic, and so forth: a scale of judgment which nonetheless also changes and develops along what it acquires from this activity. It is because of this fundamental implication that we have highlighted the need to focus on a more dynamic understanding of memory: it allows in turn for a more alive understanding of the self that is in constant readiness – and need – to be redefined and redeveloped.

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