

# # Johannes Schmidt: The Zettelkasten as the second brain of Niklas Luhmann

this is a rough translation from German of this presentation:  
<https://vimeo.com/173128404>, brought to you by [Roy Scholten](#).

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Slide:

"Well, I don't think all of this on my own"

The Zettelkasten as the second brain of Niklas Luhmann

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00:19

Many thanks for the invitation and the introduction. I would like to tell you a bit about Niklas Luhmann's Zettelkasten, which we are currently making accessible in context of one of the previously mentioned research projects. Today, in this presentation that I aim to be around 30 minutes long, I don't want to go into the what and how of the research project, but talk about the structural principles of the Zettelkasten itself. In the German history of ideas/intellectual history and in my obviously biased opinion, the Zettelkasten provides a unique answer to the question of how to archive and generate knowledge. I want to provide you an outline of why I think that is the case.

## ## Niklas Luhmann

01:03

Slide: Luhmann in his study in the late 1990's

To understand the principles underlying the structure and function of the Zettelkasten (you can see it in this picture, the two drawers

with a jumble of paper slips) you don't have to know that much about Luhmann himself, nor will I try to introduce you to his theory. A few remarks should suffice.

- born 1927
- briefly served in the army as a soldier in WW2
- studied law in Freiburg, graduated with high marks and worked as trainee lawyer
- worked in administration for national government department in the 1950's
- started his own studies in his spare time; read excessively on topics such as the state, philosophy, management, organisational theory and sociology
- Early 1960's a grant to go to Harvard. He became aware of the grant because it passed through his desk at work and he decided to apply himself. There he met ???, a then leading systems theory sociologist??? This was probably the last nudge that made Luhmann switch from management to science.
- 1962-65 consultant/speaker??? at the research institute of the German University of Administrative Sciences Speyer
- 1966 fast tracked promotion and habilitation at the University of Münster based on books he had already written.
- In 1969-1993 Professor in sociology at the University of Münster

03:45

Quote on slide:

"At my admission to the 1969 established faculty of Sociology of the University of Münster I was confronted with the demand to identify and name the research projects I was going to work on. My project was and from then on remained: Theory of Society. Duration: 30 years. Costs: none. As for the duration, the challenges were estimated realistically." (1997)

Luhmann died on november 6, 1998 in Oerlinghausen.

One can say that at the time of his death he had indeed succeeded in describing modern society based on a general "theory of the social" ???. The preface was translated and only a few finished but not yet published books remained.

## ## Zettelkasten

Luhman was an extraordinary sociologist in many respects, and certainly in terms of the quantity of his publications. All together he wrote 50 books and 600 essays on many different subjects. No copy/paste either, these are all original texts on a wide variety of issues. These were dense, demanding texts.

He was always asked how he managed to write so much. In his answer he always referred to his Zettelkasten:

(quotes on slide:)

"I don't think all of this by myself, but this happens to a large extent in the Zettelkasten."

"The Zettelkasten takes more of my time than the writing of books."

"For me, the time needed to write the books consists mostly of typing out the manuscript."

"My productivity can in essence be explained through my Zettelkasten system."

When we look at the Zettelkasten, it looks quite inconspicuous and small and doesn't give away the secret. The outer appearance is trivial, so what is it then that made Luhmann refer to it as his second brain?

Although you may think so, the essential characteristic is not in its function as an archive. The crucial aspect is that according to Luhmann, this second brain entered in a dialogue with his primary brain. He communicates with his Zettelkasten. Both participants in this process of communication do not know what the other is thinking, both sides can surprise the other.

*Quotes on slide:*

"The problem of productivity must be viewed in terms of a relationship, that is, the relation between Zettelkasten and its user."

"Without the Zettel, so only through thinking, I would never have arrived at these kinds of ideas. Of course, my head is required to write all these thoughts and ideas down, but it can't be made solely responsible for them."

"For the Zettelkasten to become an original interlocutor, it has to be nurtured into independence. That is to say, it has to develop an internal complexity that can't be managed from the outside (by the author!).

06:45

This theoretical model can also be found in Luhmann's theory, where communication is understood as an interaction between two black boxes that don't know what is going on in the other's head. Only through communication a certain "consensus" is established on what was actually said.

But how can the Zettelkasten surprise its own creator? How can it develop its own creativity that systematically leads to new (not previously added) answers? Answers that were not as such already established as notes in the Zettelkasten.

To answer that, we have to take a closer look at what's inside. First a bit on the contents, then a bit on the structure and the unique numbering system. Then on to how links are handled within the Zettelkasten and finally some attention to the keyword index.

07:58 (*detail pic of 2 open drawers*)

The Zettelkasten consists of six chests each containing four drawers. Each drawer contains between 3000 and 3500 individual slips of paper (Zettel) in A6 size, with handwritten notes. A total of around 90.000 Zettel. The individual slips are often reused pieces of paper (calendar sheets, old invoices, or cut down sheets of paper from the parental brewery). Anything that was thin. Luhmann didn't want the whole thing to get too big. From the start he had known that this would be a life's work and he didn't want to have to walk somewhere else to get what he needed. He only had to turn to the left for access.

The slips are all numbered but not dated, so we don't know exactly when each slip was created. But the contents of the notes can be

linked to the publications that were produced from them. Also the style of handwriting gives some clues to the time of writing.

A closer look tells us these are basically two collections. The first collection is from his pre-university, self-taught years.

09:59

*Slide:*

#### Zettelkasten I

- ca. 1952-1962
- management and political science
- 108 sections
- 7 drawers, ±24.000 Zettel
- Bibliography with ±1.800 entries
- Keyword index with ±1.250 entries

#### Zettelkasten II

- 1963-1996
- primarily on sociology topics
- 11 sections
- 21 drawers, ±66.000 Zettel
- Bibliography with ±16.000 entries (incomplete)
- Keyword index with ±3.200 entries

Luhmann never said why he started a second Zettelkasten, but the start date coincides with his time at the university, so likely he basically created a fresh start now that he knew he'd be working in the sociological domain. The first Zettelkasten is more a record of Luhmann developing, establishing his scientific world view. This is reflected in the themes and sections: there's an established universe of scientific knowledge out there and he systematically works through it.

11:41

The second Zettelkasten is much more structured around sociological research problems, questions. Apparently enough for Luhmann to start with another "Zettel number 1".

There is a slight variation in the semantics of numbering the slips between Zettelkasten 1 and 2 and only very few references to notes across the two collections.

## ## Writing notes

12:09

So what did Luhmann write into these drawers? Primarily of course literature notes, thoughts, questions, notions. But these notes are not direct summaries of what he read.

*Slide showing a note taking example*

He did take notes while reading, this example shows notes on the back of the bibliographic entry for the novel *Lucinde* by Schlegel, an important book for Luhmann. Very minimal notes, this single page is for the complete book. It's obviously not a summary of the book's contents, but a record of Luhmann's thoughts he had while reading it, with his already stated research questions in mind. He didn't read it as a novel but as a scientific source.

This page of notes did not end up in the Zettelkasten. In a second step he elaborated these notes and created Zettel from it. ("verzetteln", "slippify"). There's a clip on YouTube where Luhmann explains this himself.

Clip: <https://youtu.be/qRSCKSPMuDc?t=2245>

16:50

That was clarifying and maybe also somewhat disillusioned in terms of effectivity. One can hardly imagine he kept this up all those years, but obviously he did. You've also seen the important difference between taking excerpts from texts and creating Zettel. It's not the source itself that Luhmann takes extracts from, but these notes are focused on connecting this source to already existing notes in the Zettelkasten. Crucial are those parts that are useful/applicable to the existing Zettel.

17:35

Slide:

*The difference between taking excerpts and creating notes/Zettel*

...

When adding Zettel then, it's not because on that Zettel is the latest well-thought out thinking. The guiding assumption is that what's on the Zettel will only become apparent once it is read back in context of other Zettel at a later time. So the Zettel needs to get contextualised. There is hardly any informational value in the note on its own, it will only prove its informational value when it's connected with other Zettel.

As can be expected from somebody who was interested in the theoretical figure? of self-reference, the Zettelkasten contains a section dedicated to the Zettelkasten. In this section you'll find these notes:

18:08

*Slide:*

*The Zettelkasten as "septic tank/cesspool" and "ruminant"*

Zettelkasten as a septic tank - don't only add clarified notes. Defer on examining, judgement - and a matter of speed.  
(Zettel 9/8a2)

Zettelkasten with the complicated digestive system of a ruminant. All arbitrary ideas, accidents of reading may be added. The internal capabilities for connection will then be the arbiter.  
(Zettel 9/8i)

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The Zettelkasten as cesspool to which everything may be added. Things will stew and then one can see what comes out of it. As a ruminant meaning it needs a certain amount of time. The knowledge has to rest for a while, and only when retrieving it after some time has passed can one really know what one added in the first place.

The Zettelkasten then is not primarily an archive but a tool for thinking, as Luhmann expressed it. And now this is almost a Leibniz quote. I was pleased to notice that Luhmann himself also has said

that without writing one can not think, or at least not in a conceptually challenging way.

## ## Structure of the collection

19:02

Now I will get to the actual structure of the collection. At the beginning of the aforementioned section about the Zettelkasten there's a note that summarizes the programme of the Zettelkasten:

The Zettelkasten is a cybernetic system that through a combination of disorder and order allows for the forming of lumps and unpredictable combinations. The prerequisite for the creativity of the Zettelkasten is the absence of an established order. Search supports in the form of an index of problem statements and ideas replace what otherwise would require an established internal order.

But even if Luhmann emphasizes that there is no systematic structure in the Zettelkasten, it's obviously not one chaotic collection of notes. It contains an aggregation of individual notes on certain topics and themes. And so we can identify a corresponding high level outline of topics:

Slide:

1. Organisation theory
2. Functionalism
3. Decision theory
4. Amt: office, post, job, duty
5. Formal / informal order
6. Sovereignty / State
7. Isolated/individual terms, problems
8. Economy
9. Ad hoc notes
10. Archaic societies
11. High cultures

20:30

Looking at these you quickly see that this does not describe a certain body of knowledge to work through like in the first Zettelkasten. If you know a bit about the development of Luhmann's



theory you quickly recognize this as a historic record of research interests.

Luhmann comes from administrative science, working with government as an organisation. A sociological approach results in a functional analysis of governmental organisation. In a second step the identification of a core concept in this analysis: the decision. Then an essential structural component within the governmental organisation is the office/post. Sociological estrangement follows from the distinction between formal and informal order.

21:19 ...

21:43

And so we can see that these first five sections are the result of the work on the organisation in the 1960's. After that it continues in a less systematic way.

22:11

Of course these 11 high level topics alone do not sufficiently describe the internal structure of the Zettelkasten. These 11 topics document a historic process of note taking, but there's a lot more going on inside these sections. Looking more closely at section 2 "functionalism", we see a second level ordering of topics, all starting with the same leading 2 with a second number added (21, 22, 23, etc.). Here there is only this second level of numbering, other sections go up to four levels deep like this. We can see that the themes on this level have a clear relation with the top level "Functionalism" topic.

22:59

On the third level, the topics are numbered with a preceding "/": 21/3, 21/4, 21/5 etc. On this level too, the topics are still quite clearly thematically related to the parent topic. However, from here on, the ordering principle that Luhmann used for placing notes under these topics does *\*not\** result in clear single-themed sequences. From here on the adding of notes quite deliberately breaks this single-themed ordering.

23:40

When encountering an interesting adjacent idea on a note and he considered the idea worth pursuing, Luhmann would create an additional note and place it after the related note, between this and the note that originally followed it. This could well be an aside that was totally unrelated to the parent topic but it was still added at this position. Of course, the thinking on this "aside note" could be expanded on, or it could be forked from again. This results in (extensive) sub topics that logically speaking don't really belong to the parent topic they are positioned under.

24:22

*Example on slide:*

21 Functionalism

21/3 Reference unit of functional analysis

21/3d System concept

21/3d18 System / World

21/3d27f Areas of application of the theory of social systems:

21/3d27fB Theory of society

21/3d27fB12g Stratification

21/3d27fB12g38 Class society

24:38

The placement of these larger thematic blocks as the position of individual notes is not only a historic result of literature interests but also the outcome of the difficulties of placing a specific issue under one and only one parent theme. Luhmann solves this problem by not regarding it as a problem at all, but as an opportunity. Instead of the idea of following one systematic ordering he opts(?) for a principle that only requires an entry to relate to the entry before it. That's the only rationale for placing a note: there must be a connection with the note it follows up on. Whether it is still related to the top level topic is completely irrelevant.

25:30

This leads to finding notes on one specific theme in multiple different locations. This is far from systematic, and from that perspective would be regarded as a bad and chaotic way of ordering things. Luhmann did not mind, for him that was not relevant (I'll tell you why later on).

In computing there's the similar concept of multiple storage. A concept that Luhmann started using in the 1950's, when computing sciences was still in its infancy, 30 years before personal computers became a thing. Multiple storage is a way to secure data. By storing the same dataset in multiple places, one of those places can become defunct and the data will still be there at the other locations. We should all be making backups, right?

26:50

For Luhmann this multiple storage idea has a different intent. It's not multiple storage of the same data. Instead, the same topic is elaborated on at multiple locations in different ways. This has two advantages:

- The topic can be found at multiple locations, making it easier to find
- Because the topic is stored in multiple contexts, it gains multiple meanings. As we saw earlier, the context is what really constitutes meaning.

A third advantage is that through not conforming to a rigid systematic organisation one is far more open to the new ("future-openness"). One is not locked into a groove (rail) that must be followed.

27:36 - 27:43 ??

Looking at how the Zettelkasten evolved we can identify different levels of density in how far certain topics were elaborated upon over time. There are areas, e.g. this section 21 we looked at earlier, that over the course of the research grew immensely. I think section 21 contains  $\pm 15,000$  - 16,000 notes. And there are areas where by the lack of traces of subsequent work we can see that Luhmann did not interact with them after initial creation, essentially forgetting about them. One could say, these are black holes. So, development of (dense) lumps on one side, black holes on the other side. The Zettelkasten appears to have grown in an uncontrolled, or at least an unplanned manner.

Slide (28:36)

"Much peters out, many notes one will never ever see again. On the other hand there are preferred centers, where lumps grow and areas with which one works more often than others. There are large

projected idea-complexes that were never executed and there are asides that keep enriching and inflating themselves; that, while located at subordinate text passages, more and more tend to dominate the system."

"The order adapts to the development of the thinking."

## ## The numbering system

Each note is numbered at the top left corner. So, how does Luhmann start from number 21 and arrive at a note numbered 21/3d5b11w1z6a? And for which problem is this numbering scheme the solution?

The underlying principle results by necessity from the method of adding items and from forgoing an explicit thematic ordering, that is, the future-openness of the collection. To the problem of placing a note in context of a theme and at a specific location, Luhmann once succinctly said "as long as I can find the note again it doesn't really matter where I put it."

But how does one find a specific note among 90,000 other notes? The solution is very simple in that it combines a fixed and flexible positioning of notes. Every note gets a unique number and from that it gets one fixed position that will not be changed again.

30:28

So, within a top level section, Luhmann plans to simply keep numbering notes within it. First comes the number of the section, then a forward slash, and then the first note:

1/1 A note

You write your note and now, because it's only an A6 size piece of paper, you run out of room. You need a second slip to finish the thought. You create note 1/2:

1/1 A note

**\*\*1/2 Continuation of note 1/1\*\***

Now, it could be that on 1/1 there is some other interesting thought that does not fit in this established sequence, but still worth pursuing. Luhmann writes another paper slip and, now think back to the rule that a note only has to have a connection with the note before it. But there's already a note there, this note 1/2, now what to do?

You place it in between the two notes and number it 1/1a

1/1 A note

**\*\*1/1a Continuation of an idea/thought on 1/1\*\***

1/2 Continuation of note 1/1

Rinse and repeat: Should that thought need more room, create note 1/1b:

1/1 A note

1/1a Connection to an idea/thought on 1/1

**\*\*1/1b Continuation of idea/thought 1/1a\*\***

1/2 Continuation of note 1/1

And once more:

1/1 A note

1/1a Connection to an idea/thought on 1/1

1/1a1 Connection to an idea on 1/1a

**\*\*1/1a2 Continuation of the idea on 1/1a1\*\***

1/1b Continuation of idea/thought 1/1a

1/2 Continuation of note 1/1

As you can see from this example, the initial notes 1/1 and 1/2 are getting further apart the more often this happens. There are places in the Zettelkasten where hundreds of notes have been inserted between two notes that initially were right behind each other.

32:50

The switching between numbers and letters is only to make it easier to recognize this process. That's maybe not entirely convincing in cases like "21/3d27fB12g38", but it appears that these patterns did help Luhmann to better remember/recognize things.

The outcome of this way of working is a Zettelkasten with a high "forking capacity" as Luhmann called it. Also, the contents can not be meaningfully read in a linear way anymore. If you leaf through it, you encounter different kinds of topics, and be surprised to return to the original thought hundreds of notes further along, forcing you to go back to check what that original thought was again, because this second notes continues in the middle of a sentence.

Only through following this numbering system you can orient/reconstruct the original line of thinking. Which brings us to the fourth topic: the index

## ## Linking/referencing

Aside from going without a pre-established order, another essential part that enables the innovation potential of the collection is the way Luhmann links from one note to others.

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Slide 34:22

Not until the notes are networked does the Zettelkasten become a "surprise generator". Instead of linearity, a network like structure in the form of cross-links ("hyperlinks").

- First Zettelkasten: ±20.000 internal links
- Second Zettelkasten: ±30.000 internal lns

The decision what gets put in which location can for a large part be as I will, as long as I connect it to the other possible locations through links.

-> Linking structure a "web-like system", 1987

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The networked notes make the Zettelkasten a generator of surprises. This by now obvious technique of linking makes it less hard to decide where to position a note. As long as the note refers to other

locations where it is relevant too, it doesn't really matter what the actual location is. It's almost arbitrary where it is, as long as I can manage to restore(?) the link. Additionally, this networking through linking removes the limitation of the linearity of note taking. You're still adding to a (physical) linear sequence when inserting notes here or there. That linearity gets disrupted when one jumps through the Zettelkasten by following links on the notes.

The 20k links in Zettelkasten 1, and 30k links in 2 are estimates based on counting actual links on a couple of hundred notes in each.

35:40

### ### Three types of links:

- **\*\*Links in context of an outline structure.\*\*** Looking at example note "17/11e" on slide: there are capital letters added to each bullet point. Here, Luhmann outlines a series of thoughts/points that he wants to elaborate. He numbers them, adds capital letters at the end and then starts to work through each right behind this outline note. After this note 11/17e comes 11/17eA1, 2, 3... and then 11/17eB, etc. The least interesting case of linking notes one could say, resembling a book table of contents
- **\*\*Collected links.\*\*** Often found at the start of a section on a theme. (example on slide: 37:05). This is the starting note of section 17 in the first Zettelkasten on the topic of ideology. Over time, Luhmann added links to sections that relate to this topic. These days in network terminology we would call this a hub. Like when you for example fly to the USA, you will fly to Dallas, a completely uninteresting city, but the cool thing is that from there you can get anywhere in the USA. A distribution point as it were. And that's the advantage of this type of note. From here you can find all other sections that somehow relate to this topic. You only have to find this note to find all other relevant locations.
- **\*\*Individual links.\*\*** Where in the body text of the note the numbers of related notes are added. 38:33 As we can see on this note, these links were not added while writing the actual note. We see a different hand and writing utensil being used. This suggests that he continually groomed, updated the database. Presumably, he added this link at the time he was writing the note it refers to.

*\*So the big secret then is, how did he know that this note here exists?\** How could he remember that this existing note was relevant to the new one he was writing? A mystery we haven't solved yet.

This also explains why he said he spent so much time on the Zettelkasten. This kind of continuous database maintenance is extremely time consuming to do.

39:24

Luhmann calls this way of linking a spider-shaped system. Today we would say a network, in which the entries get linked with each other. One can see that already in the 1950's, and despite the analog storage technology, Luhmann simulated a modern database oriented computer system with a decentralized distribution structure. Obviously limited in practice, as you saw in the video how time consuming and failure prone the handling of notes could be. Now that we're digitizing the Zettelkasten we often find dated notes that say things like "note 60,7B3 is missing". This note replaces the original note at this position. We often find that the original note is maybe only 20, 30 notes away, put back in the wrong position. But Luhmann did not start looking, because where should he look? How far would he have to go to *\*maybe\** find it again? So, instead he adds the "note is missing"-note. Should he bump into the original note by chance, then he could put it back in its original position. Or else, not.

## **## Working with the Zettelkasten**

40:50

And finally, let's look at how Luhmann actually worked with the Zettelkasten. For that, we have to look at the index.

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*Slide:*

Keyword index: entry points into the collection

Going without an unambiguous content structure for the notes requires a technique for retrieval that allows for thematically relevant points of entry into the network: keyword index



-> idea: for each keyword, mentions to only a few locations suffice, because the other relevant notes will be disclosed through the (internal) links

-> only the **\*\*combination\*\*** of keyword index and the linking system opens up the Zettelkasten

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Luhmann continuously updated the keyword index. We find four versions of the index for Zettelkasten 2. The last version contains 3200 keywords. The index is essential for operating the Zettelkasten. Remember: there is no table of contents. I created one as part of my research, at around 80 pages A4 for Zettelkasten 2. Luhmann did not have this kind of overview, only the keyword index. The index is essential because otherwise you would never be able to find notes related to a certain topic.

41:56 (example on slide)

Compared to the keyword indices in research literature this looks like sloppy work: very few entries for a given concept. For Luhmann this was on purpose. The idea was to acknowledge that he could never take into consideration all possible locations that relate to a given topic. This would result in too many points of entry to be listed in the index, making it unusable. Compare it to a full-text search that gives way too many results of which 95% are not helpful. So Luhmann only noted the really important locations/entries, (max 4) from where he would be able to find all other related entries through the internal linking system. So, only points of entry instead of completeness. There *is* completeness in the registration of all relevant topics/themes. As mentioned, 3200 keywords is quite a large amount.

43:30

A quick demonstration, following the third topic from the bottom: Risk, (in) general. When you take that note, you'll find a note with collected links right behind it. It links to topics like uncertainty, legislation, certainty, death as risk, economy and more. For each of those topics, if you go there, then after only a few notes you'll find another note with set of links, etcetera. As you can see, you are quickly referred to many different topics. As a

result, the original question from which you started at a certain note will change and evolve as you follow these chains of links. You'll encounter surprising ideas, turns, arguments that you would not have found otherwise. At the same time this shows that there are no internal limits, "stopping-rules" for these link chains. You could hop around without end. Of course, some of the linked topics will not be relevant to the original question. And at a certain point you just have to decide for yourself to only go this far and break the chain.

And that's it for now, I hope you have a clearer picture of what this is all about. Should you now think of Luhmann as primarily a note taking pedant, then I want to show you one last typical note from the section that reflects on the Zettelkasten itself:

"In the Zettelkasten, there is a note that contains the argument that disproves all assertions on all other notes. But this note disappears once you open the Zettelkasten. That is, it changes its number and relocates itself, making it impossible to find.

A joker."

Thank you.