

Schreiben (und Denken) im Forschen

WoFoKo
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Benjamin
Angerer &
Stefanie
Haacke-Werron

```
function binarySearch (key, array) {  
    var low = 0;  
    var high = array.length - 1;  
  
    while (1) {  
  
        var mid = floor((low + high) / 2);  
        var value = array[mid];  
  
        if (value < key) {  
            low = mid + 1;  
        }  
        else if (value > key) {  
            high = mid - 1;  
        }  
        else {  
            return mid;  
        }  
    }  
}
```

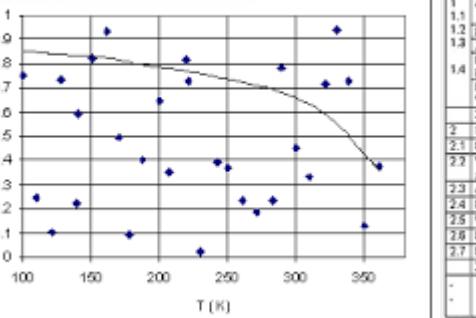
```

key = "d"
array = ["a", "b", "c", "d", "e", "f"]
low = 0
high = 5

low = 0 | 3 | 3
high = 5 | 5 | 3
mid = 2 | 4 | 3
value = 'c' | '@' | 'd'

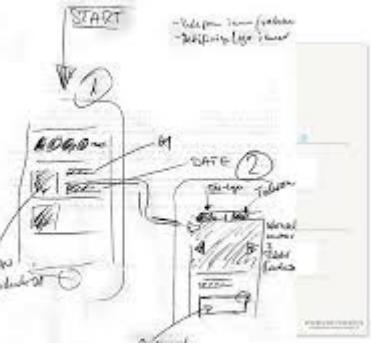
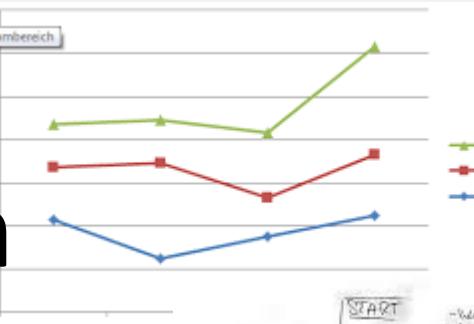
low = 3 | | |
high = | 3 | |
return | | 3

```



anie Haacke-Werron, reiblabor, Zentrum für Lehren Lernen), Benjamin Angerer, Zentrum für Lehren und Lernen)

line is necessarily different from that of all those who put us ignorant of outside world. In answer to question (*) of the interview, the informant said that he was officially making themselves believe what they find most comforting and convenient to believe. Finally we come to the unsolved mystery as to who, if anyone, in the land actually receives accurate and unbiased information about outside world. In atmosphere of total secretiveness and conspiracy which pervades government, possibilities for distorting or falsifying sources and currents of information are infinite. The very disrespect of Russians for objectivity---indeed, their disbelief in its existence---causes them to view all stated facts as instruments of propaganda of one or another purpose or another. The informant said that he used to suspect that this government is



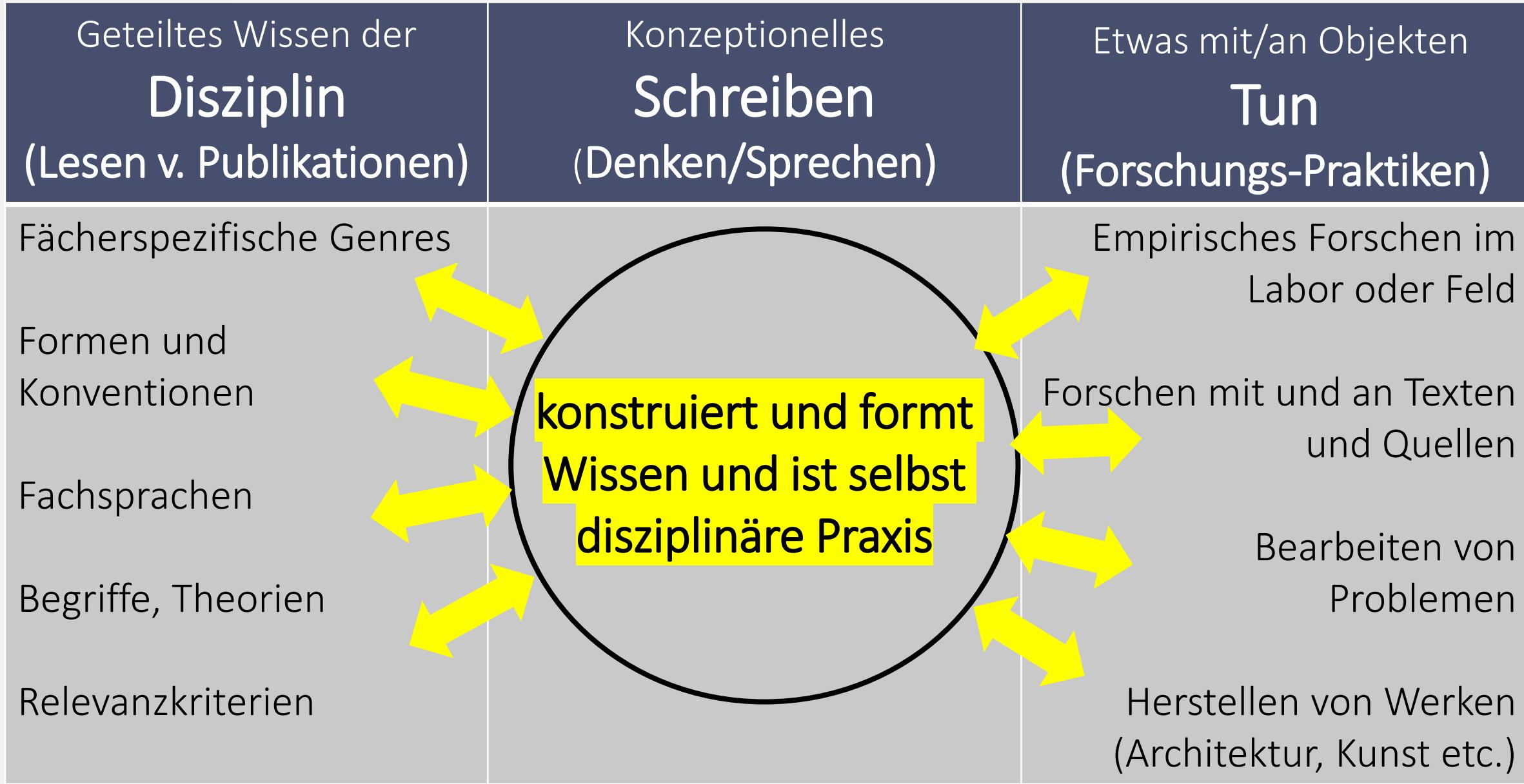
Punkte	Selbstgewichtung	Ist - Gewichtung					
		Variante A		Variante B		Variante C	
		Produkt	Produkt	Produkt	Produkt	Produkt	Produkt
10 Punkte	20%						
Herstellung		5	2	10	3	15	2
Verarbeitung		5	2	15	2	10	3
Montage		5	2	15	3	15	2
mit Nacharbeiten		5	2	10	2	15	1
Fertigung		5	2	10	2	15	5
Summe				50		55	40
Summenpunkte	50%						
Summanden		5	2	10	2	10	2
Bedarf		5	2	8	3	15	8
Auslastung		5	2	10	2	10	2
Entwicklung		20	2	40	3	60	2
Eingang		5	2	10	2	10	1
Ausgang		5	2	10	1	5	2
Ausweisen		5	3	15	2	10	3
Summe				95		120	60

$$\begin{aligned} \sin t &= I_1(x) - y'(x)dx + (x' + y')dy = 0 \\ (x, y)dx &= \int y'dx = y(x) \quad k_1 = hf(x_{i-1} + \frac{h}{2}, y_{i-1} + \frac{k_1}{2}) \\ &= y \cdot h \quad \Delta y_i = \int y'dx \\ &+ \frac{k_1^{(i-1)}}{2} \quad D = A\alpha = \begin{bmatrix} \alpha & a_{11} & \alpha & a_{12} & \alpha & a_{1n} \\ \alpha & a_{21} & \alpha & a_{22} & \alpha & a_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \alpha & a_{n1} & \alpha & a_{n2} & \alpha & a_{nn} \end{bmatrix} \\ \int y'dx &= f(x, y_i) \cdot x_i = f(x, y_i)(x_i - x_0) = y_i \cdot h \\ y_{i+\frac{1}{2}} &= y_i + \frac{h}{2} f(x_i, y_i), \quad x^{(i+1)} = \beta_{i+1} + \frac{h}{2} f(x_i, y_i) \\ b_i - \left(\sum_{j=0}^{i-1} \overrightarrow{a_{ij}x_j^{(1)}} + \left(\sum_{j=0}^{i-1} a_{ij}x_j^{(1)} \right) \right) &= a_{ii} \end{aligned}$$

Wissenschaftliche Disziplinen reproduzieren und definieren sich durch Publikationen

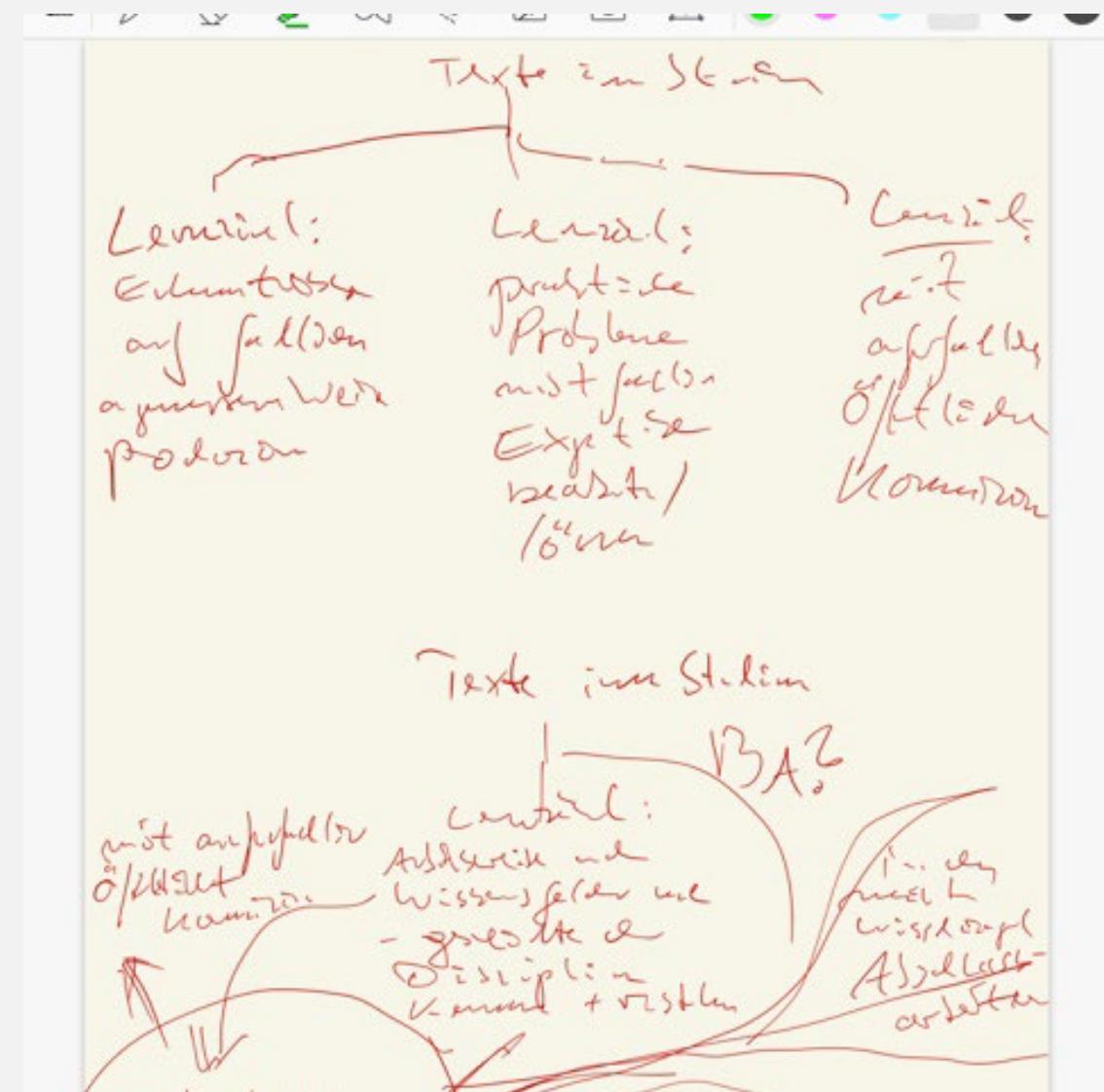
„In kognitiver Hinsicht sind [Disziplinen] eine selbstreproduzierende Population von Begriffen, Theorien und Methoden. In sozialer Hinsicht handelt es sich bei ihnen um Gemeinschaften von Spezialisten. Kommunikativ ruhen Disziplinen auf Populationen von Publikationen, die mittels Zitationen auf frühere Publikationen referieren und mittels prinzipiell kontingenter Akte des Referierens die Grenzen des Sozialsystems Disziplin laufend neu definieren.“

Rudolf Stichweh (2013):
Die Unhintergehrbarkeit von Interdisziplinarität: Strukturen des Wissenschaftssystems der Moderne. In: S. 1/2.



„Letztlich (...) sollte man einmal schauen, ob nicht das Schreiben für die Geisteswissenschaftler so etwas wie ein Experimental- system darstellt.“

Hans-Jörg Rheinberger (2011); Vom Schreiben, ohne zu wissen, wie es endet. (Interview) In: Alexander Kraus, Birte Kohtz (Hrsg.): Geschichte als Passion. S. 279.



“Manche Kollegen benutzen ihre Laborbücher darüber hinaus als Planungsinstrument, ja als Arbeitstagebuch. Hier notieren sie spontane Ideen, eine wichtige Einzelheit aus dem soeben geführten Ferngespräch oder eine Anregung aus der Literatur ...”

Ebel/Bliefert (2006): Kap. 1.3.3.

The collage consists of three images:

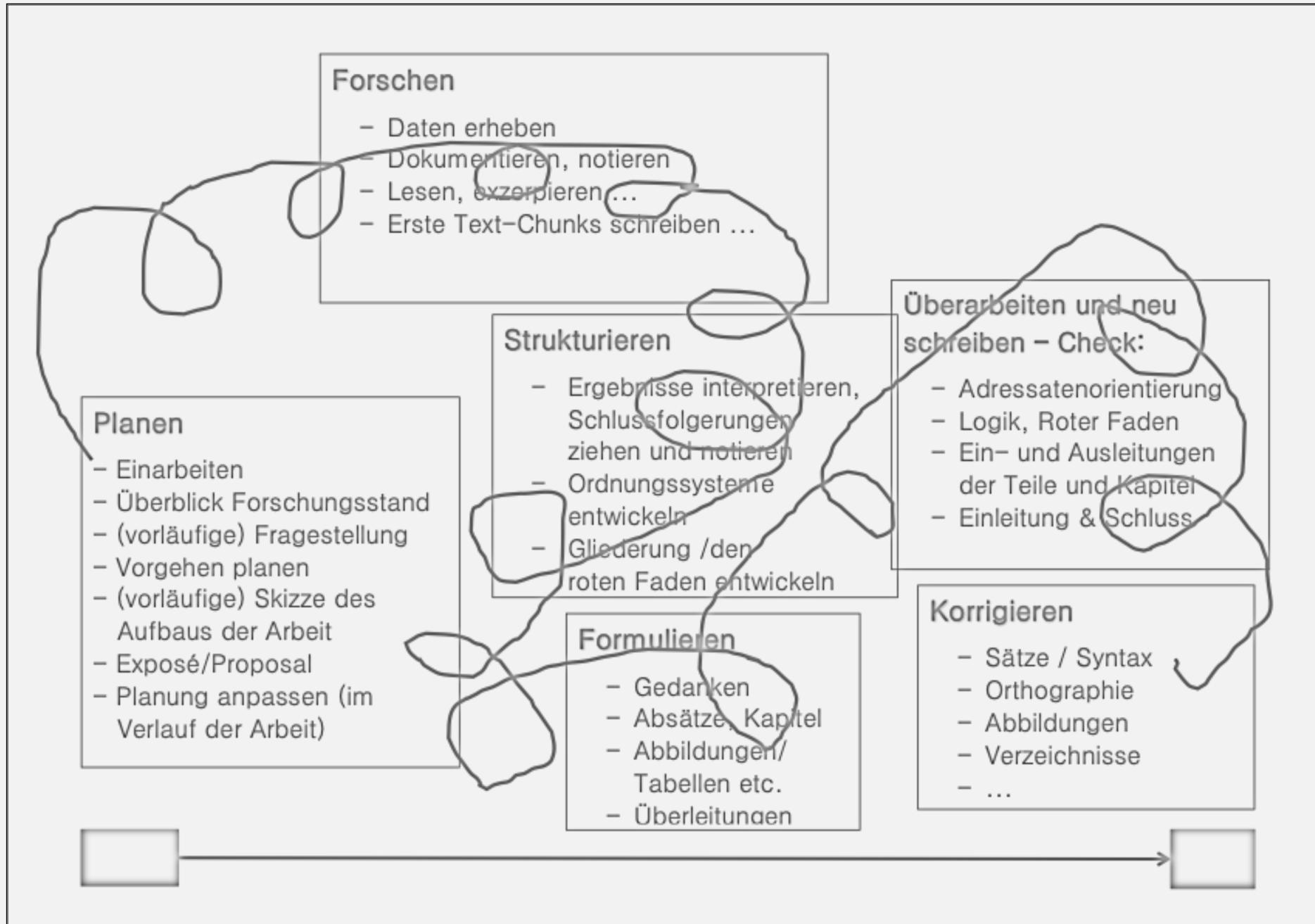
- Top Left:** A photograph of a handwritten laboratory notebook page. The page contains a hand-drawn diagram of a gas flow system with glass tubing and a T-junction. Below the diagram, handwritten text includes: "20.1.20 H2-Verdampfung 19 °C in II 470 mL $1,0126 \times 1000 = 2,126 \text{ g}$ ". Further down, there is a list of measurements: 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9, 11.10, 11.11, 11.12, 11.13, 11.14, 11.15, 11.16, 11.17, 11.18, 11.19, 11.20, 11.21, 11.22, 11.23, 11.24, 11.25, 11.26, 11.27, 11.28, 11.29, 11.30, 11.31, 11.32, 11.33, 11.34, 11.35, 11.36, 11.37, 11.38, 11.39, 11.40, 11.41, 11.42, 11.43, 11.44, 11.45, 11.46, 11.47, 11.48, 11.49, 11.50, 11.51, 11.52, 11.53, 11.54, 11.55, 11.56, 11.57, 11.58, 11.59, 11.60, 11.61, 11.62, 11.63, 11.64, 11.65, 11.66, 11.67, 11.68, 11.69, 11.70, 11.71, 11.72, 11.73, 11.74, 11.75, 11.76, 11.77, 11.78, 11.79, 11.80, 11.81, 11.82, 11.83, 11.84, 11.85, 11.86, 11.87, 11.88, 11.89, 11.90, 11.91, 11.92, 11.93, 11.94, 11.95, 11.96, 11.97, 11.98, 11.99, 11.100, 11.101, 11.102, 11.103, 11.104, 11.105, 11.106, 11.107, 11.108, 11.109, 11.110, 11.111, 11.112, 11.113, 11.114, 11.115, 11.116, 11.117, 11.118, 11.119, 11.120, 11.121, 11.122, 11.123, 11.124, 11.125, 11.126, 11.127, 11.128, 11.129, 11.130, 11.131, 11.132, 11.133, 11.134, 11.135, 11.136, 11.137, 11.138, 11.139, 11.140, 11.141, 11.142, 11.143, 11.144, 11.145, 11.146, 11.147, 11.148, 11.149, 11.150, 11.151, 11.152, 11.153, 11.154, 11.155, 11.156, 11.157, 11.158, 11.159, 11.160, 11.161, 11.162, 11.163, 11.164, 11.165, 11.166, 11.167, 11.168, 11.169, 11.170, 11.171, 11.172, 11.173, 11.174, 11.175, 11.176, 11.177, 11.178, 11.179, 11.180, 11.181, 11.182, 11.183, 11.184, 11.185, 11.186, 11.187, 11.188, 11.189, 11.190, 11.191, 11.192, 11.193, 11.194, 11.195, 11.196, 11.197, 11.198, 11.199, 11.200, 11.201, 11.202, 11.203, 11.204, 11.205, 11.206, 11.207, 11.208, 11.209, 11.210, 11.211, 11.212, 11.213, 11.214, 11.215, 11.216, 11.217, 11.218, 11.219, 11.220, 11.221, 11.222, 11.223, 11.224, 11.225, 11.226, 11.227, 11.228, 11.229, 11.230, 11.231, 11.232, 11.233, 11.234, 11.235, 11.236, 11.237, 11.238, 11.239, 11.240, 11.241, 11.242, 11.243, 11.244, 11.245, 11.246, 11.247, 11.248, 11.249, 11.250, 11.251, 11.252, 11.253, 11.254, 11.255, 11.256, 11.257, 11.258, 11.259, 11.260, 11.261, 11.262, 11.263, 11.264, 11.265, 11.266, 11.267, 11.268, 11.269, 11.270, 11.271, 11.272, 11.273, 11.274, 11.275, 11.276, 11.277, 11.278, 11.279, 11.280, 11.281, 11.282, 11.283, 11.284, 11.285, 11.286, 11.287, 11.288, 11.289, 11.290, 11.291, 11.292, 11.293, 11.294, 11.295, 11.296, 11.297, 11.298, 11.299, 11.300, 11.301, 11.302, 11.303, 11.304, 11.305, 11.306, 11.307, 11.308, 11.309, 11.310, 11.311, 11.312, 11.313, 11.314, 11.315, 11.316, 11.317, 11.318, 11.319, 11.320, 11.321, 11.322, 11.323, 11.324, 11.325, 11.326, 11.327, 11.328, 11.329, 11.330, 11.331, 11.332, 11.333, 11.334, 11.335, 11.336, 11.337, 11.338, 11.339, 11.340, 11.341, 11.342, 11.343, 11.344, 11.345, 11.346, 11.347, 11.348, 11.349, 11.350, 11.351, 11.352, 11.353, 11.354, 11.355, 11.356, 11.357, 11.358, 11.359, 11.360, 11.361, 11.362, 11.363, 11.364, 11.365, 11.366, 11.367, 11.368, 11.369, 11.370, 11.371, 11.372, 11.373, 11.374, 11.375, 11.376, 11.377, 11.378, 11.379, 11.380, 11.381, 11.382, 11.383, 11.384, 11.385, 11.386, 11.387, 11.388, 11.389, 11.390, 11.391, 11.392, 11.393, 11.394, 11.395, 11.396, 11.397, 11.398, 11.399, 11.400, 11.401, 11.402, 11.403, 11.404, 11.405, 11.406, 11.407, 11.408, 11.409, 11.410, 11.411, 11.412, 11.413, 11.414, 11.415, 11.416, 11.417, 11.418, 11.419, 11.420, 11.421, 11.422, 11.423, 11.424, 11.425, 11.426, 11.427, 11.428, 11.429, 11.430, 11.431, 11.432, 11.433, 11.434, 11.435, 11.436, 11.437, 11.438, 11.439, 11.440, 11.441, 11.442, 11.443, 11.444, 11.445, 11.446, 11.447, 11.448, 11.449, 11.450, 11.451, 11.452, 11.453, 11.454, 11.455, 11.456, 11.457, 11.458, 11.459, 11.460, 11.461, 11.462, 11.463, 11.464, 11.465, 11.466, 11.467, 11.468, 11.469, 11.470, 11.471, 11.472, 11.473, 11.474, 11.475, 11.476, 11.477, 11.478, 11.479, 11.480, 11.481, 11.482, 11.483, 11.484, 11.485, 11.486, 11.487, 11.488, 11.489, 11.490, 11.491, 11.492, 11.493, 11.494, 11.495, 11.496, 11.497, 11.498, 11.499, 11.500, 11.501, 11.502, 11.503, 11.504, 11.505, 11.506, 11.507, 11.508, 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„Wenn man das [Schreiben, bzw. die „Arbeit auf Papier“] aus der Perspektive des Labors betrachtet, hat man es mit einer Zwischenwelt zu tun, genauer gesagt: mit einem intermediären Feld von Aktivitäten, das sich zwischen dem Labortisch und der gedruckten Version eines wissenschaftlichen Aufsatzes erstreckt. Zu diesem intermediären Feld gehören das Notieren, das Skizzieren und alle Arten von Praktiken, die es ermöglichen, Ideen zu fixieren oder – andersherum – Ideen überhaupt erst hervorzubringen.“

Hans Jörg Rheinberger (2017): Papierpraktiken im Labor.
In: Experimentalität. S. 14.



Phasen und Schritte vom Start zum Ziel



Forschen heißt Unsicherheit aushalten und Entscheidungen treffen ...



(Illustration aus: Kornelia Engert & Björn Krey 2013:)

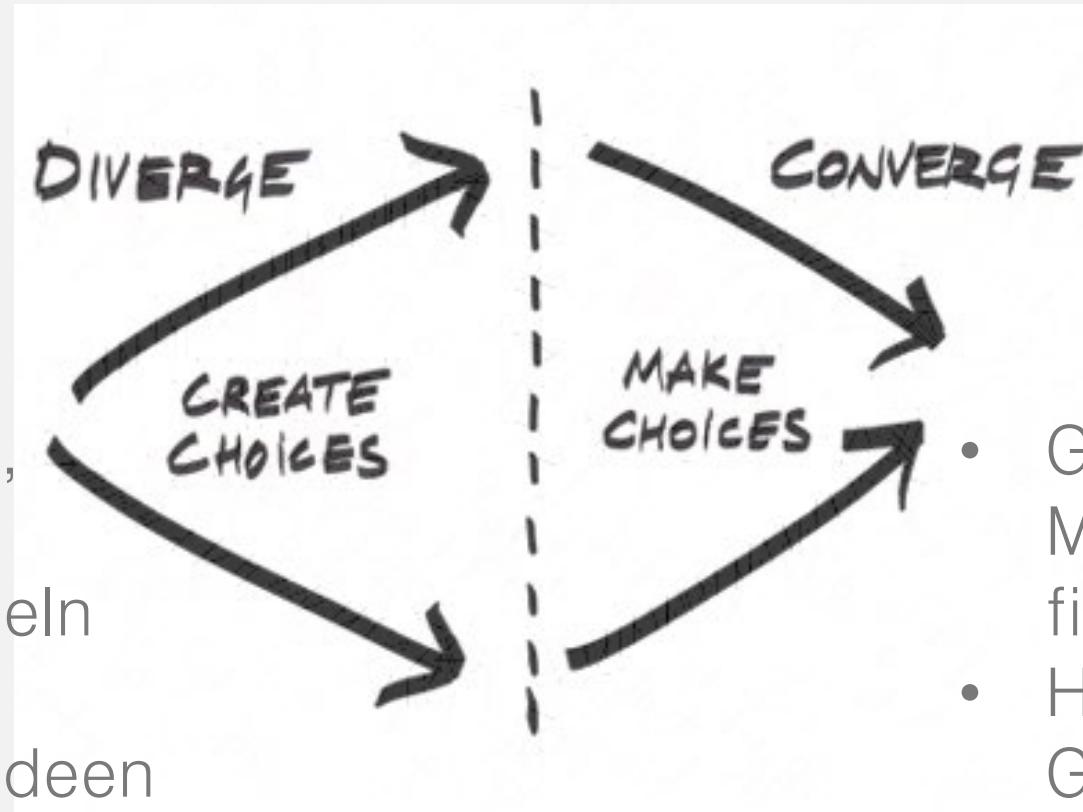
Kontingenzen in Forschungsprozessen

- Ergebnisse werden erst im Prozess klar, und sie kommen nicht auf Knopfdruck.
- Auf der Mikro-, Meso-, Makroebene müssen permanent Entscheidungen getroffen werden.
- Jede einzelne Handlung gewinnt ihren Sinn aus der Gesamtkoordination des Prozesses, dessen Gelingen wiederum von jeder einzelnen Handlung abhängt.
- Je intensiver die Beschäftigung mit dem Material, desto zahlreicher sind alternative Möglichkeiten, es zu verarbeiten.
- Richtung und Endpunkt müssen immer wieder neu justiert und gehalten werden.

Grundbewegungen in kreativen Prozessen

Create Choices

- Beobachtungen, Wissen, Ideen Hinweise sammeln und notieren
- Gedanken und Ideen aufschreiben
- Unordnung entsteht



Make Choices

- Gesammeltes sichten, Muster und Struktur finden
- Hauptideen und Gliederungsentwürfe
- Gesammeltes ein- und aussortieren

Arbeitsphase

Was sind Ordnungssysteme und –Technologien, die Ihr nutzt?

Was tut Ihr, um Entscheidungen vorzubereiten?

Sind dabei Menschen oder soziale Situationen involviert?

Welche Funktion übernehmen (digitale) Werkzeuge für das Denken?

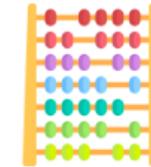
- Werkzeuge können kognitive Prozesse unterstützen, ersetzen oder gar verdrängen
- Die meisten gen. KI-basierten Werkzeuge sind aufgaben-unspezifisch und daher schwierig im Allgemeinen zu bewerten
- Ihre Nutzung im Sinne guter wiss. Praxis erfordert dementsprechend größere Disziplin und Wachsamkeit (Entgegen anderer Anreize und Affordances Beschränkung der Einsatzzwecke auf Sinnvolles & Legales, stete Prüfung des Outputs, ...)

*artefact
versus
cognitive labour*

ABACUS
VERSUS
MENTAL ARITHMETIC

CALCULATOR
VERSUS
HUMAN

DIGITAL COMPUTER
VERSUS
HUMAN COMPUTER



<i>a) label</i>	enhancement	replacement	displacement
<i>b) valence</i>	beneficial	neutral	harmful
<i>c) effect on cognition</i>	reskilling	unaffected	deskilling
<i>d) labour obfuscation</i>	none	moderate	high
<i>e) human equivalence</i>	same	better	quantity, not quality
<i>f) human-in-the-loop</i>	abacist	none	programmer
<i>g) human input</i>	full-blown cognition	function, numbers	code, input to code
<i>h) desired output</i>	result of calculation	result of calculation	result of calculation

Digitale Schreibwerkzeuge

Eine sehr unvollständige Liste:

- Textverarbeitung / Textsatzsystem (Word, TeX, Overleaf, Google Docs, ...)
- Literaturmanagement (Zotero, Citavi, BibTeX, ...)
- Notiz-Management (OneNote, Obsidian, Joplin, Notepad(!), ...)
- Literaturrecherche-Tools (Web of Science, Google Scholar, semanticscholar, BASE, ...)
- Schreib-Unterstützungstools (DeepL Write, LanguageTool, ...)
- Zweck-ungebunden (!): LLM-Chatbots (BIKI, ...)

... im Forschungskontext

- Gerade bei Cloud Services / web-basierten Tools zu beachten:
 - Datenschutz (z.B. pers. Daten von Studienteilnehmenden?)
 - Urheberrecht (Upload geschützter Artikel, Verwertung eigener, unveröffentlichter Arbeit?)
- Möglichkeiten offener / universitär angebundener Tools nutzen (sciebo, academiccloud, etc)

Unterstützungsangebote

- Schulungen der Unibibliothek zu u.a. Literaturmanagement: https://www.uni-bielefeld.de/ub/learn/tuitions/#comp_00005f0e6326_0000000ce1_39cf
- Allg. Workshop-Programm für Lehrende und Forschende: <https://www.uni-bielefeld.de/uni/einrichtungen-organisation/grace/pep/fortbildung/index.xml>
- Schreiblabor am Zentrum für Lehren und Lernen: <https://www.uni-bielefeld.de/einrichtungen/schreiblabor/index.xml>
- Moodle-Selbstlernkurs „generative KI in Studium und Lehre“: <https://moodle.uni-bielefeld.de/course/view.php?id=7663>

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