

Quantifying intersectional analysis? Introducing a conceptual tool for identifying methodological challenges, designing intersectional research, and structuring reflexivity

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Abstract: This article examines the dynamics, potential, and challenges of institutionalizing intersectionality within a heterogeneous academic field, encompassing diverse methodological and epistemological approaches. It specifically focuses on the recent rise of quantitative intersectional analyses, which often suffer from under-theorization and oversimplification. To bridge this gap, I propose a conceptual tool that links quantitative methods with the core concepts of intersectionality (based on the framework by Patricia H. Collins and Sirma Bilge), enabling systematic evaluation of their opportunities and limitations. The tool supports the design of future research, theory-driven methodological decisions, and incorporates self-reflexivity to account for intersectional power structures in knowledge production. Overall, it fosters a theoretically grounded, critical, and reflexive approach to quantitative intersectional research.

Keywords: Intersectionality, Institutionalization, Social Inequality, Quantitative Research, Methodology

Submitted: 06 October 2025

Accepted: 25 May 2026

Published: 29 October 2026

DOI: <https://doi.org/10.17169/ogj.2026.410>

Supplemental Material: The corresponding interactive research notebook can be found via <https://hannah-schoenberger.github.io/Intersectional-Analysis-Tool/>.

This article is part of the Special Issue “Institutionalizing gender and diversity: Interdisciplinary perspectives”, edited by Sarah Bellows-Blakely, Pichit Buspavanich, Mirjam Fischer, Aline Oloff, and Celine Vallender. It was edited by Pichit Buspavanich and Kathrin Ganz.

Quantifying intersectional analysis? Introducing a conceptual tool for identifying methodological challenges, designing intersectional research, and structuring reflexivity

Intersectionality as a framework and paradigm has been growing rapidly in visibility and relevance (Biele Mefebue/Bührmann/Grenz 2022, 3pp.; Collins 2019, 21pp.). While definitions of intersectionality are subject to ongoing debate (Collins 2015), in this article, it is understood as a paradigm that guides research processes (Collins 2019, 41pp.) and shapes how data are approached and analyzed.¹

In the context of this Special Issue on the institutionalization of gender and diversity frameworks, the present article examines the dynamics, potential, and challenges of institutionalizing the intersectional paradigm within a heterogeneous field in which intersectionality's resonance across disciplines and research traditions has been reflected, among other things, in the diversity of methodological and epistemological approaches (Cho/Crenshaw/McCall 2013, 789; Davis 2008, 73pp.; Else-Quest/Hyde 2016a, 159pp.). Recently, there has been an increase in the use of quantitative approaches (Bauer et al. 2021, 3; Gross/Goldan 2023, 5). However, these attempts to quantify intersectionality have often been accompanied by challenges of undertheorization and oversimplification (Bauer et al. 2021, 3).

In order to bridge this gap between intersectional theory and quantitative analysis, I present a conceptual tool based on the framework developed by Patricia Hill Collins and Sirma Bilge (Collins/Bilge 2020; Collins 2019). This tool emerged from a theory-informed analysis of the literature on quantitative intersectional research, which was initially prompted by my experience as a scholar trained across medicine and sociology, moving between disciplines within the heterogeneous field of intersectional research and praxis. The points of irritation, tensions, questions, and new perspectives arising from this positioning formed the starting point for the subsequent analysis and the development of the tool presented here.

The tool offers a set of questions that can be used to critically assess existing quantitative intersectional analyses as well as to design future intersectional research projects, especially to support theory-driven methodological decision-

¹ Importantly, in this article, intersectionality is not treated as a falsifiable hypothesis or as a property of data, which is in contrast to some quantitative approaches (Hancock 2019).

making. By incorporating a self-reflexive dimension, it encourages critical reflexivity on intersectional power relations in knowledge production. With this tool, I aim to contribute to a more theoretically grounded, critical, reflexive, and social-justice-oriented approach to quantitative intersectional research.

Institutionalizing intersectionality in a heterogeneous field

Similar to Yalız Akbaba's (2022) approach of *teaching gender under gendered conditions* ("Lehre über Gender unter Bedingungen von Gender"),² I conceptualize the institutionalization of intersectionality as *teaching and researching intersectionality under intersectional conditions*. Based on this framework, I suggest distinguishing two perspectives for approaching the institutionalization of intersectionality:

- [1] The first perspective focuses on the ongoing formation of a *field of intersectional studies and research*. Within these processes, the meaning of intersectionality itself – as an object of inquiry – as well as the approaches to capturing this meaning empirically, are negotiated as the concept travels and adapts to diverse contexts. This process will be outlined briefly in the following section, highlighting how the conceptual tool proposed here can help build bridges within this heterogeneous field.
- [2] The second perspective emphasizes the *intersectional conditions of knowledge production*. It reflects on how intersectional power dynamics shape research and university education and draws attention to the institutional implementation of intersectional praxis within academia through organizational practices and policies. While this perspective is not the main focus of the present article, the framework's self-reflexive questions do engage with the conditions of knowledge production. They encourage critical reflection, which can inform the development of intersectional practices that actively address and influence existing power dynamics in academia (for example, organizational and human-resource development measures within academic institutions).

² In her article, Akbaba (2022) also refers to the more general concept of *difference under conditions of difference* ("Differenz unter Bedingungen von Differenz"), which is discussed in more detail in the eponymous edited volume (Mecheril et al. 2013). A similar distinction between diversity as teaching content and its institutional conditions can also be found in Melanie Bittner's (2025) recent work on the implementation of diversity in higher-education systems of German-speaking countries.

Intersectionality arose from diverse discourses in activism, political praxis, and scholarship. Similar debates on the interrelation of multiple systems of power emerged in different contexts and locations, partly simultaneously and shaped by transnational circulations of ideas and actors.³ Intersectionality therefore does not have a linear or unambiguous intellectual history (Collins/Bilge 2020, 70).⁴ It builds on diverse contributions by Black feminists, resistant knowledge projects (for example, Critical Legal Studies, Critical Race Studies, Gender Studies, Disability Studies, Postcolonial and Decolonial Studies) and social movements (for example, Black/Chicana feminism, lesbian movements, *Krüppelbewegung*⁵) (Baer/Bittner/Göttsche 2010, 13; Collins/Bilge 2020, 70pp.; Collins 2019, 87pp.; Cole 2009, 170pp.). The pioneers of the intersectional paradigm (such as Sojourner Truth, Anna Julia Cooper, Maria Miller Stewart, Harriet Jacobs, W.E.B. Du Bois, Angela Davis, Audre Lorde, bell hooks, and the Combahee River Collective) highlighted the interconnectedness of multiple power systems in the construction of social inequality, even before intersectionality was formalized (Collins 2019, 122; Hancock 2019, 99pp.; Moradi/Grzanka 2017, 501pp.; Cole 2009, 170).

In the late 1980s, Kimberlé Crenshaw popularized *intersectionality* as a term – marking an important step in its institutionalization: “As a named entity [...], intersectionality was no longer anonymous – it could be seen and increasingly heard.” (Collins 2019, 125) This visibility and legitimacy enabled the concept to travel into new disciplines (centrifugal movement). Whenever it arrives in new academic settings, it is adapted to the respective disciplinary research protocols, terminology, methodological traditions, and epistemological practices (Cho/Crenshaw/McCall 2013, 92pp.). This has led to a wide heterogeneity in how intersectionality is understood (Collins 2015) and addressed empirically (Cho/Crenshaw/McCall 2013, 798; Davis 2008, 73; Else-Quest/Hyde 2016a, 159).

As these approaches feed back into the core of intersectional theory (centripetal movement; Cho/Crenshaw/McCall 2013, 92pp.), they spark definitional debates about what is or should be at the core of intersectionality (Chebout 2012; Bilge 2014) as well as methodological debates about the suitability of various methods for intersectional analysis (McCall 2005; Cho/Crenshaw/McCall 2013;

3 For example, Audre Lorde’s work during her time as a visiting professor in Berlin played an important role in the integration of intersectional perspectives into German academic and activist contexts, including exchanges with scholars such as Dagmar Schultz and with Afro-German feminist activists such as May Ayim and Katharina Oguntoye (Schultz n.d.).

4 Collins and Bilge emphasize that dominant practices of Western historiography often construct intellectual developments as linear narratives tied to fixed geographical locations or clearly bounded theoretical traditions, thereby producing specific epistemic effects. From this perspective, the question of how and by whom the history of intersectionality is told is itself shaped by and negotiated within intersecting relations of power (Collins/Bilge 2020, 70; Collins 2019, 153). See also the section “Context” below for a reflexive discussion of researchers’ situated understanding of intersectionality.

5 A German disability-rights movement.

Bowleg/Bauer 2016; Else-Quest/Hyde 2016a and 2016b). In the case of quantitative approaches to intersectionality, these debates frequently highlight an insufficient theoretical engagement: Quantitative approaches often fail to provide a clear definition of intersectionality or to acknowledge the work of key scholars in this field. Many neglect its roots in social justice and fail to offer intersectionally informed methodological reflections (Bauer et al. 2021, 14; Hoang/Wong 2023; Green et al. 2025). These limitations raise concerns that intersectionality is losing theoretical depth, being reduced to a mere buzzword.

However, Kathy Davis (2008, 67) offers an interesting and productive perspective on this. She argues that the very vagueness of intersectionality – its buzzword character – is actually the key to its success: Its broad appeal allows generalists to engage with the concept, such as researchers who incorporate feminist perspectives into their discipline through quantitative intersectional analysis. At the same time, it provides specialists in feminist theory with new analytical impulses (Davis 2008, 76).⁶ This opens up new opportunities for dialogue between different research traditions. Acknowledging this potential, the conceptual tool proposed in the present contribution aims to bridge quantitative intersectional analyses and intersectional theory.

From literature review to a structured reflection tool

The development of the conceptual tool presented in this article itself reflects the dynamics of intersectionality's institutionalization within a heterogeneous field, including the tensions discussed above between intersectionality as a flexible analytical framework and its potential dilution through increasingly expansive and sometimes undertheorized uses. The tool emerged from my interdisciplinary background in medicine and sociology and from an initial sense of irritation I felt when engaging with quantitative intersectional research: While reviewing quantitative studies in the life sciences addressing diversity and discrimination, I repeatedly encountered the term intersectionality used in ways that did not align with the theoretical foundations I had encountered while studying (Black) feminist theory as a sociology student, nor with the experiential knowledge from activist and social-movement contexts that informed my understanding of intersectionality. In particular, studies employing multivariate regression analyses with multiple inequality-related variables were often labeled as *intersectional* even though they did not engage with key theoretical contributions nor reflect

⁶ Likewise, intersectionality is institutionalized in higher education as a specialized field with dedicated study programs and as a cross-cutting approach across various fields (see also Bittner 2025).

on the methodological implications of such claims – a pattern that I later found to have been empirically documented in recent literature reviews (for example, Bauer et al. 2021).

This observation led me to more fundamental methodological questions: Is every multivariate analysis that includes more than one inequality-relevant variable already intersectional, and if not, what makes an analysis intersectional? What could quantitative analyses and research processes look like if they were explicitly guided by the intersectional paradigm? What methodological and epistemological challenges, as well as what forms of analytical innovation and new theoretical perspectives, might emerge from such an alignment?

These questions formed the starting point for the analytical work underlying this article. The literature review was originally conducted in 2023 as part of my bachelor's thesis at the University of Freiburg.⁷ In this work, I examined how the core concepts of intersectionality are addressed in contemporary quantitative research and what contributions quantitative approaches make to the empirical analysis of interwoven power structures. This involved bringing the mathematical and analytical logics of specific methods into dialogue with theoretical concepts of intersectional scholarship in order to critically reflect on the conditions under which they can be aligned with intersectional theory. Building on this approach, I mapped the strengths and limitations of different methodological approaches as well as their differences and potential complementarities in addressing intersectional research questions. The analytical focus was placed specifically on multivariate statistical methods, particularly regression-based approaches, which constitute one of the dominant methodological strategies in this field (Bauer et al. 2021, 8).

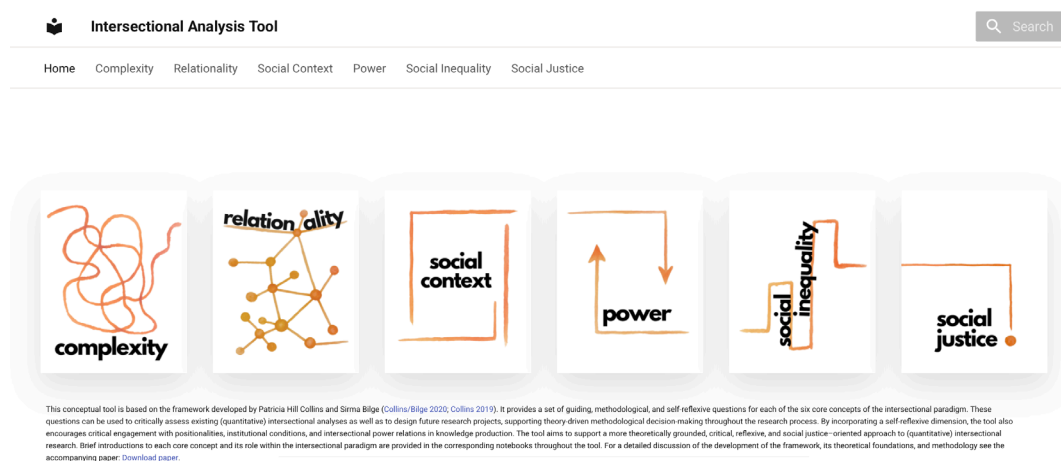
To collect relevant literature, I first conducted an exploratory search to identify key contributions on methodological debates about quantifying intersectional analysis. In this exploratory stage, central texts were identified as key entry points for the next step, a citation-based snowball-sampling strategy that combined backward (reference-tracing) and forward (citation-tracking) approaches. This allowed me to construct a corpus of influential contributions within quantitative intersectionality research.

The analysis of this corpus followed a theory-informed deductive-inductive approach. As an analytical framework, I used the six core concepts of intersection-

⁷ The unpublished thesis "Multivariate Analyseverfahren in der intersektionalen Forschung. Methodologische Überlegungen zur Bedeutung quantitativer Ansätze für die empirische Untersuchung verwobener Machtstrukturen" (Multivariate methods in intersectional research. Methodological reflections on the role of quantitative approaches in the empirical analysis of interwoven power structures) (University of Freiburg, 2023, supervised by Dr. Dominique Schirmer) is available from the author upon request.

nality developed by Patricia Hill Collins and Sirma Bilge, which have been proposed as one attempt to identify and systematize shared principles within the heterogeneous intersectional field: complexity, relationality, social context, power, social inequality, and social justice (Collins 2019, 44; Collins/Bilge 2020, 191).⁸ The framework was complemented by McCall's (2005) dimensions of complexity and Collins' (2019, 226) conceptualization of relationality. These concepts functioned as deductive categories structuring the analysis, while additional subdimensions were developed inductively from recurring patterns in the literature; both the core concepts and their respective subdimensions are outlined below.

Figure 1: Start page of the interactive Intersectional Analysis Tool. The home page provides access to six interactive research notebooks, each dedicated to one core concept of the intersectional framework.



Source: Hannah Schönberger

During the analysis and in exchange with different actors within intersectional scholarship and praxis, this framework proved particularly productive for examining how intersectional concepts are translated into quantitative operationalization, for making explicit the conceptual assumptions embedded in methodological choices, and for identifying which aspects of intersectional power relations become visible – or remain invisible – through different analytical strategies. To share this application of Collins and Bilge's framework, I built upon my analysis to translate it into a structured reflection tool. The interactive online version (<https://hannah-schoenberger.github.io/Intersectional-Analysis-Tool/>) organizes the framework into six interactive research notebooks, enabling users to dynamically explore the guiding, methodological, and self-reflexive questions for each core concept. The website also provides a downloadable Excel work-

⁸ Other scholars studying quantitative approaches have also relied on these core concepts (Bowleg et al. 2023; Agénor 2020; Misra/Curington/Green 2021).

book containing the same questions in a format that facilitates collaborative note-taking, and printing.

The conceptual tool: Analytical dimensions

The tool provides a set of reflection questions for each of the six core concepts mentioned above, as described in more detail below. However, the framework should not be understood as a checklist⁹ for intersectional research that requires the equal or exhaustive representation of all six core concepts (Collins 2019, 47pp.). Rather than striving for a form of intersectional completeness, the aim is to situate research within the theoretical framework of the intersectional paradigm by making explicit how analytical and methodological choices are made – whether they are grounded in theoretical considerations, shaped by practical constraints, or both – and what their respective implications are. Such an approach makes the contingency of knowledge production visible in relation to specific contexts, conditions, and research practices and seeks to engage with this contingency in a productive way (see also Luttenberger/Akgöz 2026 in this Special Issue for a more detailed discussion of epistemic contingency, particularly in relation to participatory research). That is why I have chosen to structure the framework through questions, as questions foreground uncertainty, tensions, and multiple possible interpretations, thus encouraging active engagement with the theoretical and methodological complexities of intersectional research.

Within each core concept, three types of questions address different but interconnected dimensions of the research process: (1) the conceptual orientation of a project (guiding questions), (2) its methodological implementation (methodological questions), and (3) the conditions of knowledge production (self-reflexive questions). In the following, I first introduce these three types of questions and outline their respective functions and modes of application. Then, each of the six core concepts is briefly discussed. While the first three (complexity, relationality, and social context) are particularly relevant for methodological considerations (Collins 2019, 48, 250), the latter three (power, social inequality, and social justice) focus more strongly on the theoretical grounding and normative orientation of intersectional analyses. Each section includes a link to the corre-

9 Other frameworks for designing intersectional analyses take a different approach and are explicitly presented as checklists (for example, Public Health Agency of Canada 2022; Schiebinger et al. 2025). This format may carry the risk of translating intersectionality into a set of procedural steps – a checklist that will be worked through – without sustained engagement with its underlying theoretical and epistemological foundations. However, question-based approaches (such as the one proposed here or in Cole 2009), guidelines (for example, Moradi/Grzanka 2017), and checklist-based frameworks all offer different ways of engaging with similar challenges and should therefore be understood as complementary.

sponding interactive research notebook, providing access to the guiding, methodological, and self-reflexive questions for the respective core concept.

Figure 2: Example of an interactive research notebook (Social Context). Each core concept is represented by a structured notebook comprising an introduction, guiding questions, methodological questions, and self-reflexive questions, which can be accessed via tab-based navigation.



Source: Hannah Schönberger

- [1] The *guiding questions* for research design are derived from the core concepts and their subdimensions and operate at a more general and conceptual level. They support researchers in clarifying the analytical direction, focus, and objectives of a research project. While they can draw on insights from the methodological analysis of existing approaches, their primary function is not to evaluate specific methods but to define the conceptual and analytical trajectory with which subsequent methodological choices should align.
- [2] The *methodological reflection questions* emerged from the core of the analytical process described above and can be applied to specific methods and analytical strategies. They provide a framework for critically engaging with existing studies, systematizing methodological debates, and learning from these insights in ways that inform the design of new research projects across different stages of the research process. Specifically, they encourage researchers to explore how the six core concepts and their subdimensions are incorporated into the analysis. This involves identifying which aspects of a concept can be captured by particular methods, which remain unaddressed, and how underlying logics or assumptions align with the intersectional paradigm. In doing so, they enable a systematic mapping of methodological debates, highlighting promising approaches for future research and identifying gaps

that require further development or the integration of complementary methods. Applied to the design of new research projects, these questions support theory-driven and method-critical decision-making across key stages, such as sampling strategies, variable construction, operationalization, and analytical approaches. Furthermore, they provide a basis for transparent reporting by making explicit how methodological choices relate to intersectional theory, including the specific contributions and limitations of the selected methods. The tool also provides selected examples of specific methodological challenges that are currently being discussed in quantitative intersectional analysis, along with approaches that have been proposed in the literature as potential ways of addressing these challenges. The chosen examples are drawn from the literature review outlined above. While not exhaustive, they demonstrate how the framework can be applied to systematically reflect on methodological concerns. Readers are encouraged to use them as starting points for further methodological discussions and to expand the analytical toolkit of quantitative intersectional research.

Figure 3: Example of a methodological question within the Complexity notebook. Each question can be expanded interactively to reveal examples of methodological challenges and potential approaches discussed in the literature, as well as references for further reading.

The screenshot displays the 'COMPLEXITY | METHODOLOGICAL QUESTIONS' section of a digital notebook. A sidebar on the right contains four tabs: 'COMPLEXITY', 'GUIDING QUESTIONS', 'METHODOLOGICAL QUESTIONS', and 'SELF-REFLEXIVE QUESTIONS'. The 'METHODOLOGICAL QUESTIONS' tab is active, showing a question titled 'Which/how many social positions are included in each category?' with a sub-note 'eg. gender identity beyond the binary'. Below the question, there are three sections: 'METHODOLOGICAL CHALLENGES', 'POTENTIAL APPROACHES', and 'FURTHER READINGS'. The challenges section lists limitations of regression approaches and predetermined operationalization. The approaches section lists multidimensional operationalization, best practices from unitary approaches, and fostering intersectionality-sensitive innovation. The readings section lists four references, each with a handwritten note in orange indicating its relevance to non-binary gender variables or challenges in interpretation and data use.

COMPLEXITY | METHODOLOGICAL QUESTIONS

Click on a question to explore examples and further readings.

POSITIONAL COMPLEXITY

Which/how many social positions are included in each category?
eg. gender identity beyond the binary

METHODOLOGICAL CHALLENGES

- Limitations of the scale level in regression approaches prioritize binary operationalization or one-dimensional polarization.^{1,2,3,4}
- Predetermined operationalization in secondary analysis.⁵

POTENTIAL APPROACHES

- Multidimensional operationalization.^{6,7,12}
- Applying best practices from unitary approaches.^{6,8,9,10}
- Fostering intersectionality-sensitive innovation of operationalisation in large databases and official statistics.^{11,12}

FURTHER READINGS

1. Boyd, Alicia E. (2021): Quantitative Intersectional Data (QUINTA): A #metoo Case Study. https://via.library.depaul.edu/cdm_etd/36 (30.09.25)
→ discusses challenges related to non-binary gender variables.
2. Harari, Lexi/Lee, Chioun (2021): Intersectionality in quantitative health disparities research: A systematic review of challenges and limitations in empirical studies. In: Social Science & Medicine 277 (May), 113876. doi: 10.1016/j.socscimed.2021.113876
→ review showing the lack of non-binary operationalization.
3. Bauer, Greta R. (2014): Incorporating Intersectionality Theory into Population Health Research Methodology: Challenges and the Potential to Advance Health Equity. In: Social Science & Medicine 110 (June), 10–17. doi: 10.1016/j.socscimed.2014.03.022
→ identifying challenges in interpretation - linear vs. logistic regression.
4. Bauer, Greta R./Churchill, Siobhan M./Mahendran, Mayuri/Walwyn, Chante/Lizotte, Daniel/Villa-Rueda, Alma Angelica (2021): Intersectionality in Quantitative Research: A Systematic Review of Its Emergence and Applications of Theory and Methods.
→ review showing frequent use of bio datasets (mostly secondary analysis) + lack of complex operationalization

Source: Hannah Schönberger

[3] The *self-reflexive questions* apply the core concepts to the conditions of knowledge production. This dimension is grounded in feminist epistemologies, in particular feminist standpoint theory, which emphasizes that all knowledge

emerges from partial and socially situated positions (Haraway 1988; Harding 1998). Where, when, by whom, and within which institutional and disciplinary structures research is conducted shapes the production of knowledge itself (Collins 2019, 47). From this epistemological perspective, reflexivity becomes a necessary analytical practice – or, how Collins (2019, 153) puts it: “For intersectionality to deepen its critical theoretical dimensions, it needs to cast a self-reflexive, critical eye on its own constructs, premises, and practices.” The self-reflexive questions build on epistemological challenges discussed in the literature on quantifying intersectionality¹⁰ as well as on my own reflexive engagement with these issues, including my positionality as a multiply privileged researcher situated within intersectional research and praxis. They can be used for structuring reflexivity throughout the research process and encourage researchers to critically consider how intersectional conditions shape knowledge production within their projects. This perspective supports the development of intersectional practices not only at the level of project-specific research design but also within organizational, institutional, and disciplinary contexts.

Complexity

“Complex questions may require equally complex strategies for investigation”

– Collins (2019, 47)

To capture the complex dynamics of power and inequality, intersectional research embraces multiperspectivity. Collins describes the combination of different methodological approaches as using different “lenses” (2019, 47), each sharpening some aspects of complexity while leaving others blurred. Intersectional methodological reflection should therefore not aim to seek a single method that can capture all dimensions of complexity at once (Cole 2009, 176), nor should it attempt to establish a normative hierarchy among them (Collins 2019, 250). For this reason, the *guiding and methodological questions* on complexity encourage researchers to reflect systematically on the specific focus of a project.

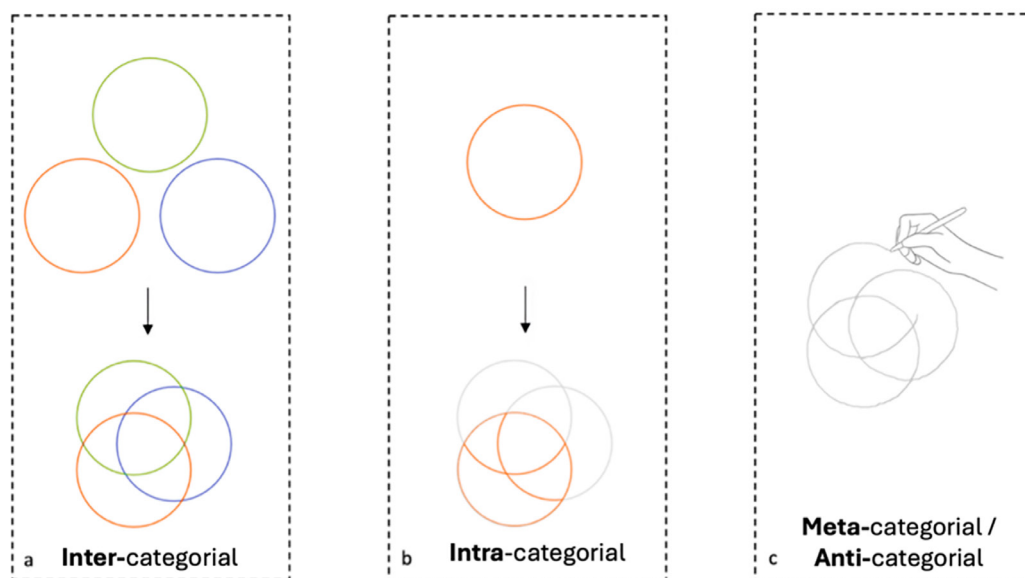
I propose a distinction of five interdependent dimensions of complexity. The first three draw on Leslie McCall’s (2005) influential typology:¹¹

10 See, for example, Else-Quest and Hyde (2016a) for a more in-depth discussion of epistemological challenges in introducing intersectionality into historically quantitatively oriented fields such as psychology.

11 McCall (2005, 1784) originally assigns typical methodological approaches to the dimensions of complexity, with quantitative methods being conceptualized as following an intercategory-

- [1] The *intercategorical* approach increases complexity by adding more categories and their intersections. It offers a bird's-eye view that reveals overarching patterns (McCall 2005, 1786pp.).
- [2] The *inracategorical* approach focuses on the heterogeneity within a social position (for example, women) that emerges from intersections with other categories (for example, race). It opposes homogenization and specifically draws attention to marginalized constellations of social positions that are often overlooked (for example, Black women) (McCall 2005, 1773, 1781).
- [3] *Anticategorical* approaches emphasize the fluidity and social construction of categories (McCall 2005, 1773; Else-Quest/Hyde 2016b, 328). They are closely connected to the idea of *metacategorical complexity*, which adopts a processual approach to categorization (Emmerich/Hormel 2013, 217).

Figure 4: Inter- (a), intra- (b), and anti-/metacategorical (c) approaches each focus on different dimensions of the complexity of intertwined power structures. Illustration by the author.



Source: Hannah Schönberger

These three dimensions can be expanded by two additional aspects.

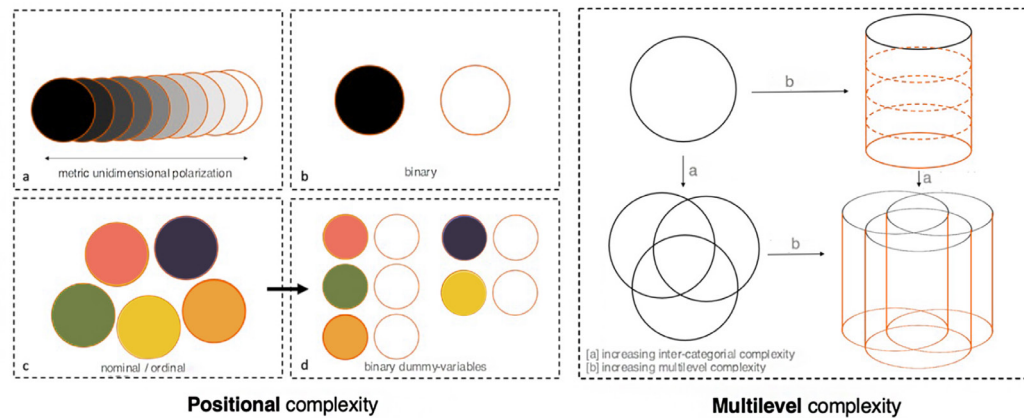
- [4] *Positional complexity*, focusing on the diversity and differentiation of social positions within one category (for example, gender identity beyond the binary).¹²

rical approach. In contrast, the present paper uses McCall's distinction as a heuristic tool to examine how all the different dimensions of complexity can be focused within quantitative intersectional approaches.

¹² The associated methodological challenges are not unique to intersectional research as they are already known from what Hancock (2007, 64) calls "unitary approaches". However, they remain relevant and are amplified as complexity increases within intersectional analysis.

- [5] *Multilevel complexity*, acknowledging that intersecting processes operate across different societal levels.¹³

Figure 5: McCall's (2005) typology can be expanded to include aspects of positional and multilevel complexity. Illustration by the author.



Source: Hannah Schönberger

A research project guided by the intersectional paradigm not only faces the complexity of its object of study and its analysis (as outlined above) but also the complexity of implementing intersectional praxis throughout the research process. Such an approach involves complex processes and designs (for example, participatory elements, self-reflection, complex operationalization or sampling strategies). These demands are frequently identified as one of the key challenges in institutionalizing intersectional research, because “[intersectionality’s] level of complexity is difficult for anyone to handle. It complicates things and can frustrate scholars, practitioners and activists alike”, as Collins and Bilge (2020, 37) put it succinctly.

Addressing these challenges requires substantial financial, emotional, and temporal investments to create spaces for intersectional praxis. However, under the current conditions of knowledge production, such approaches are often deprioritized due to institutional constraints of time and resources (see, for example, Petermann/Bührmann/Marx 2020, 242 for the case of participatory approaches) but also because reflexive and social-justice-oriented practices require researchers and institutions to confront uncomfortable implications regarding their own roles within unequal power relations (Dhamoon 2011).

¹³ This dimension draws on theoretical work on intersectional multilevel analysis (for example, Winker/Degele 2009) and is also consistent with Crenshaw's (1991, 1245) division into structural, political, and representational intersectionality or the domains of power (Collins/Bilge 2020, 248).

Given this background, the *self-reflexive questions* on complexity in knowledge production support critical reflection on individual and institutional responsibilities for enabling complexity within intersectional research processes, taking into account how resources are shaped by intersectional power dynamics. They draw attention to the conditions and practices that may enable or hinder the integration and institutionalization of intersectionally informed approaches.

Explore the guiding, methodological, and self-reflexive questions on **complexity** in intersectional analysis in the corresponding **interactive research notebook**:

<https://hannah-schoenberger.github.io/Intersectional-Analysis-Tool/Complexity/cover/>

Relationality

Intersectional analysis examines how different systems of power are constructed and maintained through *relational*, interdependent processes and how these interactions shape complex, interwoven structures of inequality (Collins 2019, 45pp.). The core concept of relationality is therefore fundamental to the intersectional paradigm (Collins 2019, 48). Crenshaw emphasizes that the relations between different categories, and the inequalities produced by the ways they interact, can vary:

“Black women can experience discrimination in ways that are both *similar to and different from* those experienced by white women and Black men. Black women sometimes experience discrimination in ways similar to white women’s experiences; sometimes they share very similar experiences with Black men. Yet often they experience *double*-discrimination – the combined effects of practices which discriminate on the basis of race, and on the basis of sex. And sometimes, they experience discrimination as Black women – *not the sum* of race and sex discrimination, but as Black women.” Crenshaw (1989, 149, emphasis added)

This raises questions about how to empirically capture, differentiate, and analyze the various¹⁴ forms and qualities of relational processes. To systematize how relationality is represented in quantitative approaches, I draw on Collins’ (2019, 226pp.) three modes of relational thinking: “addition”,¹⁵ articulation, and co-formation:

¹⁴ Other than quantitative analyses that follow an “intersectionality as testable hypothesis” approach (Hancock 2019), this article does not differentiate between intersectional or “not-intersectional” (for example, purely additive) relational processes. Instead, I understand intersectionality as a framework that guides analysis with the aim to make the heterogeneity of relations (for example, additive, multiplicative, mitigating) visible (see also Evans et al. 2024, 5 for a similar understanding).

¹⁵ “Addition” should not be understood in a strictly mathematical sense; rather, it describes

- [1] *"Addition"* involves incorporating new elements to explain social inequalities. This follows the core premise of relationality: "entities that historically have been conceptualized as separate and oppositional are interconnected and interrelated" (Collins/Bilge 2020, 198). This leads to a shift from an either/or logic to a both/and perspective (Collins 2019, 227pp.; Collins/Bilge 2020, 198). This mode of relational thinking is often put into practice by "adding" predictors to regression models, starting with main effects and extending to interaction terms (Bowleg/Bauer 2016). The goal is to model the distribution of social inequalities more precisely by accounting for multiple systems of power and their joint influence.
- [2] *Articulation* focuses on how analyzed elements are dynamically connected to each other – just as a joint (*articulatio*) links skeletal parts in a way that allows their relationship to change depending on the forces applied (Collins 2019, 232pp., 241). Incorporating articulation into intersectional analysis opens the "black box" of mechanisms by directly examining *how* intersecting power structures interact to reproduce and shape inequalities, focusing on the internal dynamics of these interactions.
- [3] *Co-formation* describes the idea that categories and their underlying systems of power are *mutually constructed* in their very meaning and structure (Collins 2019, 241pp.). This mode of relational thinking emphasizes that boundaries between categories blur, as they exist in interdependent and constitutive relations.¹⁶

The *guiding and methodological questions* on relationality systematize how different relational processes and their qualities are empirically captured, depending on the adopted mode of relational thinking. This helps to understand how they can complement one another in a multi-perspective approach (Collins 2019, 250).

Turning to the relations between these perspectives, reflection also considers how they are related to one another (for example, through comparison, integration, synthesis, iterative co-construction) and how tensions, contradictions, and inconsistencies are interpreted and addressed.

When applied reflexively, the concept of relationality highlights the relationships between the various actors, institutions, and structures that influence the

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<https://hannah-schoenberger.github.io/Intersectional-Analysis-Tool/Relationality/cover/>

an insertion into the analysis without making any statements about mathematical consequences (Collins 2019, 229). To reduce terminological misunderstandings, I put the term in quotation marks.

16 See also Walgenbach's (2007) critique of Crenshaw's metaphors of the intersection.

research process and knowledge production. This may include considerations of inter- or transdisciplinary collaboration (relations between disciplines), participatory research (relations between researchers and participants; see, for example, Moradi/Grzanka 2017, 508–509), theory-practice transfer and science communication and research dissemination (relations between academia and practice; for best practice, see, for example, Aikins et al. 2021), or mixed-methods approaches (relations between qualitative and quantitative methods). The *self-reflexive questions* on relationality in knowledge production allow stakeholders to intentionally reflect upon, shape, and negotiate such relational processes as part of intersectional research practice.

Social context

“This theme [...] informs differences within intersectionality itself [...] thinking about social inequalities and power relations [...] not in abstract generalizations but in their specific contexts”
– Collins/Bilge (2020, 196, 200)

The intersectional paradigm acknowledges that power structures, inequalities, and their complex relations are context-dependent (Collins/Bilge 2020, 196pp.). The same intersection may exhibit different distributions of social inequality,¹⁷ different relations between elements of power, and different relevant categories.¹⁸

The *guiding and methodological questions* on social context therefore encourage researchers to examine context effects within datasets (internal contextualization) (Bowleg/Bauer 2016, 338pp.) as well as to situate the data within the context of the research (external contextualization) (Else-Quest/Hyde 2016a, 164). However, analyses should consider both differences and similarities across contexts in order to avoid naturalizing distinctions – particularly between nation states – and to remain attentive to overarching processes (for example, transnational dynamics) (Collins/Bilge 2020, 195pp.).

Explore the guiding, methodological, and self-reflexive questions on **social context** in intersectional analysis in the corresponding **interactive research notebook**:

<https://hannah-schoenberger.github.io/Intersectional-Analysis-Tool/Context/cover/>

¹⁷ For an empirical example, see McCall's (2001) study of wage inequality, which compares different economic contexts in US cities.

¹⁸ In its overview of the reclassification of racialized variables in the US Census, the Pew Research Center (2020) provides a graphic example of how metacategorical and positional complexity depend on the temporal context.

From the standpoint-theory perspective outlined above, applying the core concept of social context reflexively can be understood as locating the standpoint of knowledge production within the field of intersectionality itself as well as within broader social contexts. The *self-reflexive questions* on social context in knowledge production therefore address the disciplinary contexts that influence the analysis (for example, epistemology, terminology, research protocols, conception of theory) as well as the contexts that shape the researchers' understanding(s) of intersectionality. This includes, for example, academic training, the bodies of literature that inform the research process, and experiential knowledge that emerges from political engagement, activism, or intersectional praxis (Collins/Bilge 2020, 197; Moradi/Grzanka 2017, 500pp.).

While the three core concepts discussed thus far (complexity, relationality, and social context) are most relevant for methodological considerations (Collins 2019, 48, 250), quantitative intersectional research requires more than attention to complexity, relationality, and context. "Numbers don't speak for themselves" (Covarrubias/Vélez 2013, 270); they require theoretical framing.

While this is a fundamental principle of empirical research (Schirmer 2009, 57) and not unique to intersectional analysis, it is particularly crucial here for two reasons: First, attempts to quantify intersectionality often lack theoretical engagement (Bauer et al. 2021, 5). Second, many widely used datasets and statistical tools were originally developed without an intersectional perspective (Bowleg 2008) and have sometimes been used to produce the very social inequalities that intersectionality seeks to address (Rouhani 2014, 8; Collins 2019, 254pp., 271; Zuberi/Bonilla-Silva 2008, 5, 118). The proposed conceptual tool anchors quantitative intersectional research in a theoretically informed, social-justice-oriented framework by systematically linking empirical analysis to the core concepts of *power*, *social inequality*, and *social justice* (Cole 2009; Else-Quest/Hyde 2016a and 2016b; Moradi/Grzanka 2017).

Power and social inequality¹⁹

Intersectional research examines interlocking systems of power and their co-production of social inequalities (Collins 2019, 46; Collins/Bilge 2020, 35, 191pp.). These interwoven structures operate across multiple levels of society, forming a multidimensional matrix of domination. Within this matrix, power is continually negotiated and reconfigured through processes of oppression and resis-

19 Although the tool contains separate sets of reflection questions for *power* and *social inequality*, here, the two concepts are discussed together because they are closely interconnected in intersectional analyses.

tance (Collins/Bilge 2020, 36, 192pp.). By making the contingent and dynamic production of inequality visible, intersectional analysis resists its normalization and naturalization (Collins 2019, 46), challenging narratives that explain social inequality without reference to power dynamics.

However, translating this understanding into quantitative methodologies poses significant challenges. Socio-demographic and administrative variables are frequently naturalized and treated as self-explanatory (Supik 2017, 203), while complex, power-sensitive operationalizations are rarely available. Moreover, descriptive approaches tend to leave the mechanisms of inequality in a “black box”, opening space for alternative explanations that neglect power relations (Bauer/Scheim 2019, 237) (for example, biologization or meritocratic logics; see Collins/Bilge 2020, 38, 203).

The *guiding and methodological questions* on power and inequality support a stronger theoretical grounding of quantitative intersectional analyses in theories of power and inequality. Moreover, the tool's *reflexive questions* on power and inequality in knowledge production acknowledge that research itself is embedded in the very hierarchies it seeks to analyze (Collins/Bilge 2020, 194), both at the individual level and within institutional structures. Critical reflection on how these power relations shape knowledge production is grounded in Black feminist epistemology, which emphasizes that standpoints are systematically structured through intersectional relations of power and that marginalized positions can generate distinctive analytical insights (Collins 2000). Reflexively engaging with and critically challenging these dynamics is therefore situated at the very heart of the intersectional paradigm. The *reflexive questions* on inequality also address how dominant narratives of inequality (for example, meritocratic, biologizing, culturalist explanations) may shape researchers' own assumptions, disciplinary traditions, and the ways results are perceived by the audience.

Explore the guiding, methodological, and self-reflexive questions on **power** in intersectional analysis in the corresponding **interactive research notebook**:

<https://hannah-schoenberger.github.io/Intersectional-Analysis-Tool/power/cover/>

Explore the guiding, methodological, and self-reflexive questions on **social inequality** in intersectional analysis in the corresponding **interactive research notebook**:

<https://hannah-schoenberger.github.io/Intersectional-Analysis-Tool/inequality/cover/>

Social justice

"Intersectionality's *raison d'être* is not simply to provide more complex and comprehensive explanations of how and why social inequalities persist, [...] leaving someone else to fix them [but] *entails turning critical analyses into critical praxis*."

– Collins/Bilge (2020, 38, 202, emphasis added)

Intersectional theory and praxis are inherently linked to a commitment to social justice. This normative dimension challenges the traditional boundaries between academic inquiry, activism, and social movements (Collins/Bilge 2020, 47, 202). However, the core concept of social justice has become increasingly contested within the intersectional field (Collins/Bilge 2020, 202pp.), risking the loss of intersectionality's transformative potential. In quantitative approaches, the commitment to social justice is particularly challenged by the dominance of positivist epistemologies and the associated understanding of objectivity (Else-Quest/Hyde 2016a, 159pp.).

The *guiding and methodological questions* therefore encourage researchers to clarify how concepts such as justice, equality, or equity are theoretically conceptualized, including their underlying epistemological premises. Furthermore, they encourage reflection on how research is positioned in relation to social-justice praxis and how these commitments are translated into concrete research practices. The *self-reflexive questions* on social justice in knowledge production focus on the ethical and political implications of intersectional research and support the development of social-justice-oriented research ethics (for best practice examples, see, for example, Ahyoud et al. 2018, 33, 38; Aikins et al. 2021, 33–34).

Explore the guiding, methodological, and self-reflexive questions on **social justice** in intersectional analysis in the corresponding **interactive research notebook**:

<https://hannah-schoenberger.github.io/Intersectional-Analysis-Tool/justice/cover/>

Conclusion: Toward institutionalizing critical quantitative intersectional research

This paper offers a conceptual tool for navigating the methodological and epistemological challenges of intersectional analyses, aiming to contribute to the ongoing interdisciplinary discourse on the institutionalization and quantification of intersectionality. It shows how intersectional theory can guide decision-

making regarding the selection and suitability of empirical methods as well as the theoretical framing and interpretation of results. Likewise, the core concepts on which the tool is based provide a framework for intersectional self-reflection on the (quantitative) research process, including the conditions, roles, and positionalities of all involved individuals and institutions. In doing so, the tool fosters a more theoretically grounded, critical, and reflexive approach to quantitative intersectional research, supporting the development of practices and institutional frameworks that embed intersectional principles into academic knowledge production.

Although the discussion and examples presented in this article primarily focus on quantitative approaches, an analogous application of the framework to qualitative research may also prove fruitful. Furthermore, the framework could facilitate relating and translating findings across qualitative and quantitative studies by making their underlying conceptual assumptions more explicit. This may also support a theoretically informed selection and alignment of complementary methods within mixed-methods designs as well as contribute to the development of more integrated methodological approaches. By raising and deepening awareness of the possibilities and limitations of different methodological approaches, the framework supports collaboration between researchers with diverse methodological expertise within the broader intersectional field.

Beyond academia, the tool may also be relevant in the context of diversity policy, where the role of intersectionality in the collection and use of data is increasingly debated. In this context, the tool offers a useful framework for critically reflecting on such practices and for supporting more theoretically grounded and reflexive approaches to intersectional data collection and analysis.

Data availability statement

No datasets were generated or analyzed for the development of the conceptual tool; therefore, data sharing is not applicable to this article.

The examples of methodological challenges and potential approaches, as well as further readings/references provided in the tool are based on an unpublished methodological analysis conducted as part of the bachelor's thesis "Multivariate Analyseverfahren in der intersektionalen Forschung. Methodologische Überlegungen zur Bedeutung quantitativer Ansätze für die empirische Untersuchung verwobener Machtstrukturen" [Multivariate methods in intersectional research. Methodological reflections on the role of quantitative approaches in the empirical analysis of interwoven power structures] (University of Freiburg,

2023, supervised by Dr. Dominique Schirmer). The thesis is available from the author upon request.

AI statement

During the writing process, the following AI tools were used:

- *DeepL* was employed as a writing assistant for proofreading, grammar correction, paraphrasing, and translation.
- *ChatGPT* was used as a reflective tool and discussion partner, primarily supporting language refinement and text shortening. It was also used to assist in generating and refining HTML and Markdown code for the implementation of the interactive research tool.

All content generated or suggested by AI was carefully reviewed and edited by the human author. The author takes full responsibility for the final content.

AI was not used for substantive theoretical, analytical, or interpretive decisions.

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