

UDC: 31.

LBC: 60.52.; 60.54

MJ № 403

 10.33864/2617-751X.2025.v8.i8.220-241

**IMPORTANCE OF CLASSIFICATION IN SOCIOLOGICAL METHODOLOGY:  
FROM THEORETICAL PERSPECTIVE TO MATHEMATICAL APPLICATION**

**Jahandar Jabarov\***

**Abstract.** From classical sociology to the present, classification has remained one of the essential means of understanding social reality; from Comte, Durkheim, and Weber to contemporary sociologists, it has been employed as a descriptive method. Without successful classification, the systematic analysis of social reality is impossible. Although the positivist application of classification is a central component of sociological methodology, it has largely been neglected in research. In this study, we therefore explicate the significance of classification and its differences from grouping, underscore the importance of criterion selection in the classification process, and demonstrate how it affects the precision of the targeted categories. The article outlines deductive, inductive, and abductive procedures for determining criteria, and ultimately advances a mathematical parameterization of classification. The findings indicate that classification is not ad hoc grouping but a core analytical instrument enabling a systematic grasp of social reality. For identifying social groups and explaining their functional-structural positions, classification provides a reliable framework in both theoretical and empirical work. The proper selection and operationalization of criteria is a condition of reliability; deductive, inductive, and abductive approaches offer complementary routes for deriving them. Within a positivist frame, measurable and replicable indicators secure objectivity and comparability. Mathematical formalization (mutually exclusive and collectively exhaustive partitions) enhances logical consistency, transparency, and reproducibility. A matrix presentation displays multi-criteria intersections visually and systematically, revealing the analyzed social structure and facilitating comparisons across studies. Consequently, classification becomes an empirically robust instrument for theory testing, which, in turn, strengthens cumulative knowledge production.

**Keywords:** Sociological methodology, social groups, classification, classification criterion, mathematical parameterization

---

\* Lecturer at the Department of "Social Sciences" of Baku Slavic University, PhD student at the Institute of "Philosophy and Sociology" of ANAS; Baku, Azerbaijan

E E-mail: [c.cabarov@bsu-uni.edu.az](mailto:c.cabarov@bsu-uni.edu.az)

<https://orcid.org/0000-0002-0075-2398>

**To cite this article:** Jabarov, J. [2025]. IMPORTANCE OF CLASSIFICATION IN SOCIOLOGICAL METHODOLOGY: FROM THEORETICAL PERSPECTIVE TO MATHEMATICAL APPLICATION. *"Metafizika" journal*, 8(8), pp.220-241.

<https://doi.org/10.33864/2617-751X.2025.v8.i8.220-241>

**Article history:**

Received: 25.09.2025

Accepted: 22.10.2025

Published: 01.12.2025



**Copyright:** © 2025 by AcademyGate Publishing. This article is an open access article distributed under the terms and conditions of the CC BY-NC 4.0. For details on this license, please visit

<https://creativecommons.org/licenses/by-nc/4.0/>.

УДК: 31.

ББК: 60.52.; 60.54

МЖ № 403

 10.33864/2617-751X.2025.v8.i8.220-241

## ЗНАЧЕНИЕ КЛАССИФИКАЦИИ В СОЦИОЛОГИЧЕСКОЙ МЕТОДОЛОГИИ: ОТ ТЕОРЕТИЧЕСКОГО ВЗГЛЯДА К МАТЕМАТИЧЕСКОМУ ПРИЛОЖЕНИЮ

Джахандар Джабаров\*

**Абстракт.** От классической социологии до наших дней классификация остается одним из ключевых способов понимания социальной реальности; от Конта, Дюркгейма и Вебера до современных социологов она использовалась как дескриптивный метод. Без успешной классификации систематический анализ социальной реальности невозможен. Несмотря на то что позитивистское применение классификации является центральным компонентом социологической методологии, в исследованиях ему уделялось недостаточно внимания. В настоящем исследовании раскрывается значение классификации и ее отличие от группировки, подчеркивается важность выбора критериев в процессе классификации и демонстрируется их влияние на точность целевых категорий. Статья излагает дедуктивные, индуктивные и абдуктивные процедуры выведения критериев и, в заключение, предлагает математическую параметризацию классификации. Полученные результаты показывают, что классификация – не произвольная группировка, а ключевой аналитический инструмент, обеспечивающий системное постижение социальной реальности. Для идентификации социальных групп и объяснения их функционально-структурных позиций классификация предоставляет надежный каркас как в теоретических, так и в эмпирических работах. Корректный выбор и операционализация критериев являются условием надежности; дедуктивный, индуктивный и абдуктивный подходы предлагают взаимодополняющие пути их выведения. В позитивистской рамке измеримые и воспроизводимые индикаторы обеспечивают объективность и сопоставимость. Математическая формализация (взаимоисключающие и совместно исчерпывающие разбиения) усиливает логическую согласованность, прозрачность и воспроизводимость. Представление в матричной форме наглядно и системно показывает пересечения по нескольким критериям, выявляя анализируемую социальную структуру и облегчая сравнение результатов между исследованиями. В результате классификация становится эмпирически надежным инструментом теоретической проверки, что, в свою очередь, укрепляет кумулятивное производство знания.

**Ключевые слова:** социологическая методология, социальные группы, классификация, классификационный критерий, математическая параметризация

---

\* Преподаватель кафедры «Социальных наук» Бакинского Славянского Университета, докторант Института «Философии и социологии» НАНА; Баку, Азербайджан  
E-mail: [c.cabarov@bsu-uni.edu.az](mailto:c.cabarov@bsu-uni.edu.az)  
<https://orcid.org/0000-0002-0075-2398>

**Цитировать статью:** Джабаров, Дж. [2025]. ЗНАЧЕНИЕ КЛАССИФИКАЦИИ В СОЦИОЛОГИЧЕСКОЙ МЕТОДОЛОГИИ: ОТ ТЕОРЕТИЧЕСКОГО ВЗГЛЯДА К МАТЕМАТИЧЕСКОМУ ПРИЛОЖЕНИЮ. *Журнал «Metafizika»*, 8(8), с.220-241.  
<https://doi.org/10.33864/2617-751X.2025.v8.i8.220-241>

### **История статьи:**

Статья поступила в редакцию: 25.09.2025

Отправлена на доработку: 22.10.2025

Принята для печати: 01.12.2025



UOT: 31.

KBT: 60.52.; 60.54

MJ № 403

 10.33864/2617-751X.2025.v8.i8.220-241

## SOSİOLOJİ METODOLOGİYADA TƏSNİFATIN ƏHƏMİYYƏTİ: NƏZƏRİ BAXIŞDAN RİYAZİ TƏTBİQƏ

**Cahandar Cabarov\***

**Abstrakt.** Təsnifatlaşdırma klassik sosiologiyadan günümüzə qədər sosial reallığı anlamaq üçün vacib üsullardan biri olmuş; Komt, Dürkheym və Veberdən tutmuş müasir sosioloqlara qədər bir çox müəllif tərəfindən deskriptiv bir metod kimi istifadə edilmişdir. Uğurlu təsnifatlaşdırma olmadan sosial reallığın sistemli təhlili mümkün deyildir. Təsnifatlaşdırmanın pozitivist yanaşma ilə tətbiqi sosioloji metodologiyada olduqca mərkəzi bir komponent olmasına baxmayaraq, tədqiqatlarda diqqətdən kənarda qalmışdır. Bu baxımdan, tədqiqatımızda təsnifatlaşdırmanın əhəmiyyəti və qruplaşdırma ilə fərqləri izah olunmaqda, eləcə də təsnifatlaşdırma prosesində meyar seçiminin önəmi vurğulanmaqda və hədəflənən kateqoriyaların dəqiqliyinə təsirləri göstərilməkdədir. Məqalədə deduktiv, induktiv və abduktiv meyar müəyyənləşdirmə üsulları açıqlanmaqda, sonda isə təsnifatlaşdırmanın riyazi parametrizasiyası irəli sürülməkdədir. Tədqiqatın nəticələri göstərir ki, təsnifatlaşdırma təsadüfi qruplaşdırma deyil, sosial reallığın sistemli dərkinə mümkün edən əsas analitik vasitədir. Sosial qrupların müəyyənləşdirilməsi və onların funksional-struktur mövqelərinin izahı üçün təsnifat həm nəzəri, həm də empirik çalışmalarda etibarlı çərçivə yaradır. Meyarların düzgün seçilməsi və operasionallaşdırılması etibarlılığın şərtidir; deduktiv, induktiv və abduktiv yanaşmalar meyarların törədilməsində tamamlayıcı yollar təqdim edir. Pozitivist çərçivədə ölçülə bilən və təkrar yoxlanıla bilən göstəricilər obyektivlik və müqayisəliliyi təmin edir. Riyazi formalizasiya (mütləq və eksklüziv bölmələr) məntiqi tutarlılığı, şəffaflığı və təkrar olunmanı gücləndirir. Matritsa təqdimatı çoxmeyarlı kəsişmələri vizual və sistemli şəkildə göstərərək təhlil edilmiş sosial strukturu üzə çıxarır və tədqiqatlararası müqayisəni asanlaşdırır. Nəticədə, təsnifatlaşdırma nəzəri sınaq üçün empirik cəhətdən möhkəm alətə çevrilir. Bu isə öz növbəsində kumulativ bilik istehsalını gücləndirir.

**Açar sözlər:** Sosioloji metodologiya, sosial qruplar, təsnifatlaşdırma, təsnifatlaşdırma meyarı, riyazi parametrizasiya

\* Bakı Slavyan Universitetinin "İctimai elmlər" kafedrasının müəllimi, AMEA-nın "Fəlsəfə və Sosiologiya" İnstitutunun doktorantı; Bakı, Azərbaycan

E-mail: [c.cabarov@bsu-uni.edu.az](mailto:c.cabarov@bsu-uni.edu.az)

<https://orcid.org/0000-0002-0075-2398>

**Məqaləyə istinad:** Cabarov, C. [2025]. SOSİOLOJİ METODOLOGİYADA TƏSNİFATIN ƏHƏMİYYƏTİ: NƏZƏRİ BAXIŞDAN RİYAZİ TƏTBİQƏ. "Metafizika" jurnalı, 8(8), səh.220-241.

<https://doi.org/10.33864/2617-751X.2025.v8.i8.220-241>

**Məqalənin tarixçəsi:**

Məqalə redaksiyaya daxil olmuşdur: 25.09.2025

Təkrar işlənməyə göndərilmişdir: 22.10.2025

Çapa qəbul edilmişdir: 01.12.2025



**Copyright:** © 2025 by AcademyGate Publishing. This article is an open access article distributed under the terms and conditions of the CC BY-NC 4.0. For details on this license, please visit

<https://creativecommons.org/licenses/by-nc/4.0/>.

## **1.Introduction**

In contemporary sociological methodology, it can be argued that insufficient attention has been devoted to the method of classification. Methodological debates have instead been dominated by statistical models, mathematical analyses, textual and discourse studies, as well as research based on big data [Harrits & Møller, 2011; Vandebroeck & Jappens, 2022]. Yet classification remains of fundamental importance for the systematic identification of social objects and groups, and for dividing them into comparable categories. This, in turn, further strengthens the relevance of our research. Given the necessity of reconsidering the method of classification and reintegrating it into contemporary research, our research subject acquires both theoretical and practical significance.

In classical sociology, classification received greater emphasis. For example, Comte’s positivist method, which he considered essential for all sciences, was limited to the study of observable phenomena, positing that only phenomena which could be observed, classified, and measured possessed scientific validity [Trompf, 2023, p.141]. Durkheim argued that classification did not emerge from individual thought but was instead shaped by the structuring influence of society. Unlike classical epistemology, this perspective stressed that social classification was grounded in an objective and stable foundation. In other words, the source of classification was not the individual’s need to impose order upon nature, but rather the existing social structure itself; social groups and their hierarchies thus constituted the psychological and cognitive basis of classification [Schmaus, 2004, p.3]. Weber, for his part, did not limit the notion of classification to economic income alone but also incorporated criteria of social prestige (*status*) and political power (*party*), thereby developing a broader and more realistic system of classification. He conceptualized each of these criteria as ideal types and modeled how social actors might be positioned within these categories. This approach, consistent with Weber’s methodological principles, emphasized not only the investigation of subjective meanings but also structural differences and power relations [Rosenberg, 2015].

Thus, it becomes evident that both positivists and interpretivists acknowledge the significance of classification. For positivists, classification serves as a tool for organizing observable and measurable indicators, while for interpretivists it provides a framework for understanding social meanings and the positions of actors. Both perspectives regard classification as essential for systematizing social reality and rendering it intelligible.

Nevertheless, in contemporary scientific discourse, it is insufficient merely to replicate the method of classification developed by classical sociologists; rather, it is necessary to further refine this method and extend it into a

multidisciplinary domain. In particular, integration with fields such as mathematics, statistics, and data science can both reinforce the theoretical foundations of classification and enhance the precision and reliability of its empirical applications. Such an approach transforms sociological methodology into a direction not confined solely to the humanities but synthesized with the exact sciences, thereby achieving a more objective and globally recognized scientific framework. In this respect, the aim of the study is to present the mathematical modeling of sociological classification on the example of social groups.

The principal research method employed in the article is theoretical-methodological analysis. The study systematizes the scientific foundations of classification by comparing classical and contemporary approaches, while also employing a conceptual-analytical perspective and elements of mathematical modeling in the interpretation of concepts.

## **2.The Phenomenon of Classification in Sociology**

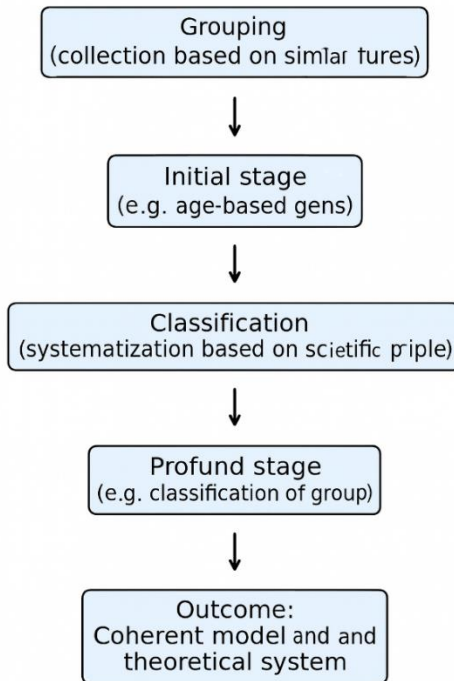
One of the fundamental conditions of systematicity in science is the grouping and classification of data and research subjects. In fact, a systematic approach does not end with the mere collection of facts; it requires dividing them into categories, grouping them according to similarities and differences, and determining general regularities on the basis of this classification. For instance, in sociology, empirical data collected about individuals cannot be transformed into a theoretical framework unless they are classified by social classes, groups, or institutions. Another example comes from the natural sciences, where the classification of living organisms (such as Linnaeus's taxonomy) stands as a classical case of the systematization of knowledge [Gould, 2000]. Thus, grouping and classification form the foundation of systematicity in science, since they structure the chaotic flow of information and render it comprehensible and comparable. In short, what lends science its systematic nature is the "arrangement" of knowledge and its correlation on the basis of general principles.

Every classification is grounded in specific criteria. For example, in determining social class, the main criteria are wealth and income, occupation, education, and prestige, as these constitute the most significant indicators shaping an individual's position in society, lifestyle, and social status [Mondal, 2025]. From this perspective, one of the essential conditions for ensuring the systematicity of sociological knowledge is that the object of study must possess internal structural components. To grasp the essence of any subject systematically, it is necessary to analyze it not as an undifferentiated whole but in terms of its distinct elements. At this stage, separating these elements and identifying their interrelations, both vertical (*hierarchical*) and horizontal (*functional*), becomes crucial. This process does not rely on arbitrary

observations; rather, it is grounded in the scientific grouping of the constituent parts of the subject and the structured ordering of these elements. At precisely this juncture, the method of classification assumes particular significance, as it enables not only the simple differentiation of the various aspects of the subject but also the revelation of their internal logical connections, ultimately allowing the construction of a coherent and ordered model of the research object.

In sociology, classification belongs to the domain of descriptive research. Descriptive research is an approach whose primary aim is to construct a general picture of social reality, whether through words or numbers, by identifying specific profiles, classifying different types, and presenting a sequence of steps that answer the questions of "who, when, where, and how" [Neuman, 2003, p.38]. Grouping and classification are related concepts, yet they are not identical and must not be conflated, as they are fundamentally distinct from a methodological standpoint. Grouping refers to the collection of social facts, events, or objects on the basis of shared characteristics. It constitutes an initial stage in which research material is arranged into groups according to common criteria. For example, individuals may be grouped by age into categories such as "youth," "middle-aged," and "elderly." The aim here is to bring together elements that share similar attributes. Classification, however, is a more systematic and profound process. It not only entails grouping but also arranges these groups into a hierarchical or structured order based on established scientific principles [Banning, 2020]. In this sense, classification as a method encompasses grouping while adding an additional layer of systematization. For instance, in the classification of social groups, grouping by income alone is insufficient; it also requires taking into account multiple criteria such as social status, education, and occupation. The outcome is the construction of a model of the complex social structure.

In other words, grouping is a simpler process, producing generalizations based on observable characteristics. Classification, additionally, transforms these groups into a scientific system, revealing the hierarchy, logical connections, and relationships among them. Why can the two not be considered the same? Because there is a hierarchical relationship between them (Figure 1); while grouping functions merely as a mechanism of aggregation and separation, classification represents a theoretically grounded and systematized outcome. If these two processes were conflated, sociological analysis would remain confined to the preliminary stage of observation and would fail to develop into a broader theoretical model. Therefore, in sociology, they serve distinct functions: the former organizes and differentiates data, while the latter builds a coherent system on the basis of that data.



**Figure I. Grouping vs. Classification**

The reason why social groups stand at the center of sociological dynamics lies in their decisive role in shaping individual behavior, influencing collective identity, and maintaining social order [Sociology Institute, 2022]. The individual enters society not directly, but through the group; values, social roles, a sense of belonging, and mechanisms of interaction are all learned and developed within the group context. For this reason, the driving force of sociological dynamics is not the isolated actions of individuals but rather the interactions, relationships, and conflicts among groups [Scholarly Community Encyclopedia, 2025]. Without groups, it is impossible to provide a comprehensive explanation of social processes, since all spheres, from economic relations to political decision-making, operate on the basis of group interests and group identities.

The significance of the classification method in identifying social groups and introducing new ones into sociological science lies in its ability to organize and systematize social reality. Unlike random aggregates, social groups are distinguished on the basis of specific criteria, which makes it possible to clarify their behavioral patterns, functions, and positions within society. Moreover, the emergence of new social groups, such as digital youth communities or transnational diaspora groups, is an increasingly relevant issue [Rivera-Vargas & Miño-Puigcercós, 2018], and classification enables their incorporation into

a theoretical framework and their introduction into scientific discourse. This constitutes one of the key conditions for both making comparative analyses and systematically understanding new social transformations.

In historical dynamics, the stability of social groups is never absolute; at certain periods, new members join, others leave, group structures are reshaped, and sub-groups emerge. To understand how such transformations alter social order and group identity, it is essential to apply the method of classification. For example, within a nation, the emergence of sub-ethnic groups or political movements at different periods, if left unclassified, can produce a confusing and chaotic picture. However, classifying them according to specific criteria reveals how these sub-groups integrate into the main group, under what conditions they diverge, and how such changes direct overall social dynamics. Without this approach, it would be impossible to systematically analyze the causes and consequences of social transformations. Accordingly, the functionality of classification in sociological methodology can be represented as in Table I.

**Table I. Functionality of the Classification Method in Sociology**

| <b>The function</b>                   | <b>The explanation</b>                                                                                                                                                                                                                                              |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Structuring chaotic data              | In sociological research, large amounts of empirical data are collected (surveys, observations, interviews, etc.). Classification organizes these data into specific groups, rendering them intelligible and suitable for analysis.                                 |
| Comparability of social phenomena     | Through classification, patterns of behavior can be compared across various groups (e.g., age, gender, social class, educational level). This enables the sociologist to identify both overarching trends and significant differences.                              |
| Universality in comparative sociology | To compare the results of studies conducted in different countries, common classification frameworks are indispensable. For example, UNESCO, the World Bank, and UN reports facilitate global comparisons by categorizing social groups into comparable categories. |

|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basis for theoretical generalization | Every theory is grounded in the systematization of empirical data. Classification generates categories, and it is on the basis of these categories that theoretical frameworks, such as theories of social stratification, are constructed.                                                                                                                                                                                                                                                                                                            |
| Modeling of social reality           | With the aid of classification, it becomes possible to conceptualize the structure of society in the form of a model. For instance, classifications such as class structure, institutional relations, and cultural groupings demonstrate how the social system operates.                                                                                                                                                                                                                                                                               |
| Identification of social groups      | In the identification of social groups, classification distinguishes their similarities and differences in a systematic way, thereby providing a more precise understanding of social structure. For example, Russophile groups may be divided into ideological (based on communist orientation), economic (based on business ties with Russia), and cultural (based on attachment to the Russian language and literature) categories, which allows for a more nuanced analysis of their influence within the Azerbaijani socio-political environment. |

From the overall logic of the table we have prepared, it follows that classification in sociological research is not merely a technical tool but, alongside the principle of historicity, a fundamental methodological pillar for understanding social reality and embedding it within a theoretical framework.

### **3. Foundations of Classification Criteria**

In sociology, the fact that social groups designated by the same name are characterized differently within distinct theoretical approaches is not coincidental; it is directly related to the classification criteria applied. The criteria selected for the scientific study of groups determine which of their features will be emphasized, and as a result, different meanings may emerge

under the same label. For example, the concept of the “middle class” is defined within the Marxist framework of classification in terms of the relation to the means of production, representing a transitional stratum situated between the bourgeoisie and the proletariat [Kun, 2005]. By contrast, in Weber’s classification, economic factors are considered alongside indicators such as status, influence, and social prestige [Dubrow, 2022]. The differing descriptions of groups formed under the same name thus clearly reveal the methodological significance of the criteria by which classification is conducted.

The influence of criteria selection can also be observed in simpler examples. If the concept of the “youth group” is defined solely on the basis of biological age, then individuals within a given age interval are included in this category. However, if the criterion of classification is instead linked to life stages and social experience, age itself becomes secondary, while factors such as entry into the labor market, participation in education, or the stage of family formation emerge as the primary indicators. Hence, a group designated by the same label can generate a completely different social profile depending on the classification criteria applied. This confirms that, in sociological analysis, classification is not merely a technical procedure but rather a decisive instrument in the theoretical interpretation of social reality.

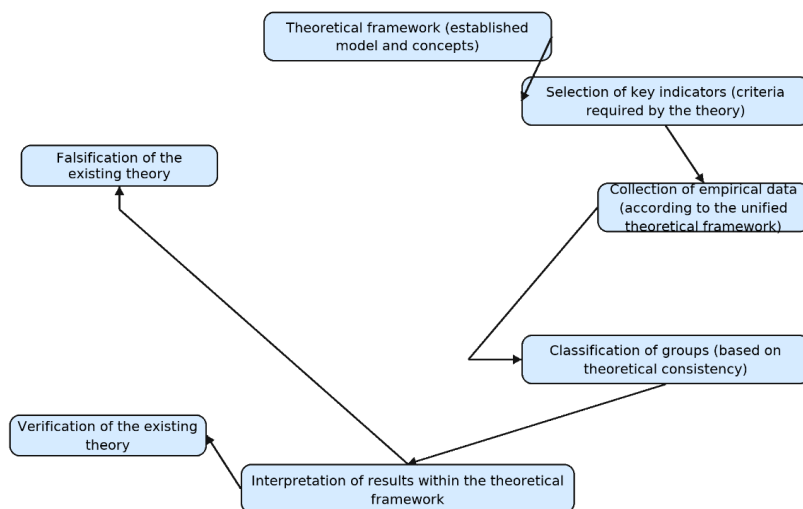
At the same time, the outcomes of classification depend not only on theoretical frameworks but also on contextual conditions. While a “religious group” in the European context is typically classified in terms of cultural identity and personal beliefs, in the Middle East the same group may be classified on the basis of its potential for political mobilization and collective action. In this respect, classification criteria are not merely abstract theoretical choices but are shaped by specific historical, political, and cultural realities. Moreover, the dynamic nature of social groups makes their classification subject to change over time. A group defined in one period by economic or institutional attributes may in another period be characterized by entirely different symbolic or cultural indicators. For this reason, the fact that social groups formed under the same label may possess different features reflects the shifting and dynamic character of sociological methodology.

The successful application of classification in sociology primarily depends on the criteria selected. Social reality is multifaceted and complex; therefore, the indicators chosen for organizing different groups, events, and processes determine the quality of scientific outcomes [Alaimo, 2023]. The appropriate selection of criteria allows for the precise differentiation of social groups consistent with the purpose of classification, enabling the identification of their functions and behavioral characteristics. Conversely, poorly chosen criteria distort social reality and render sociological analysis inaccurate. In this sense,

the significance of criteria in classification constitutes one of the fundamental factors ensuring the reliability of sociological knowledge. Accordingly, the choice of criteria depends first and foremost on the research objective and theoretical framework. If the research is directed at understanding class relations, then economic and political indicators such as income, ownership of the means of production, and social status may be selected as primary criteria. If the focus is on cultural groups, however, cultural criteria such as language, religious beliefs, and symbolic identity come to the fore. Furthermore, the choice of criteria is also influenced by empirical conditions, for example, the availability of particular types of data in surveys or observations. For this reason, the selection of criteria is not arbitrary but must be undertaken in accordance with scientific objectives and the possibilities provided by the existing empirical base.

The selection of criteria can be based on different methodological approaches. One approach is the deductive method: a theoretical framework is first established, and then the indicators required by this theory are chosen as criteria. Another approach is inductive: empirical data are collected, and criteria are determined on the basis of common features observed within these data [Crossman, 2019]. A third, mixed approach is abductive. In this case, the sociologist relies on both theoretical knowledge and empirical observations in selecting criteria.

The deductive method operates primarily on the logic of moving *from the general to the particular*: first, a theoretical model explaining social reality is constructed, and subsequently, the indicators required by this model are adopted as classification criteria. Thus, the deductive approach ensures theoretical consistency and logical coherence, since strong theoretical foundations underpin the classification. The purpose of this approach is not merely to describe empirical facts but to systematize them in accordance with existing theories. The strength of the deductive method lies in its ability to explain social phenomena not arbitrarily but within a specific theoretical paradigm (Figure II). For example, Durkheim, in line with the deductive approach, first constructed a theoretical framework and then selected criteria corresponding to it. In his study on suicide, the key criteria were the degree of social integration and normative regulation, on the basis of which he classified types of suicide (egoistic, altruistic, anomic, fatalistic). In this way, Durkheim adapted empirical facts to his theoretical model, producing a classical example of deductive classification. This example demonstrates that the deductive approach explains social groups and relations by grounding itself in the criteria required by a theoretical framework, with each theoretical orientation generating its own classification model.

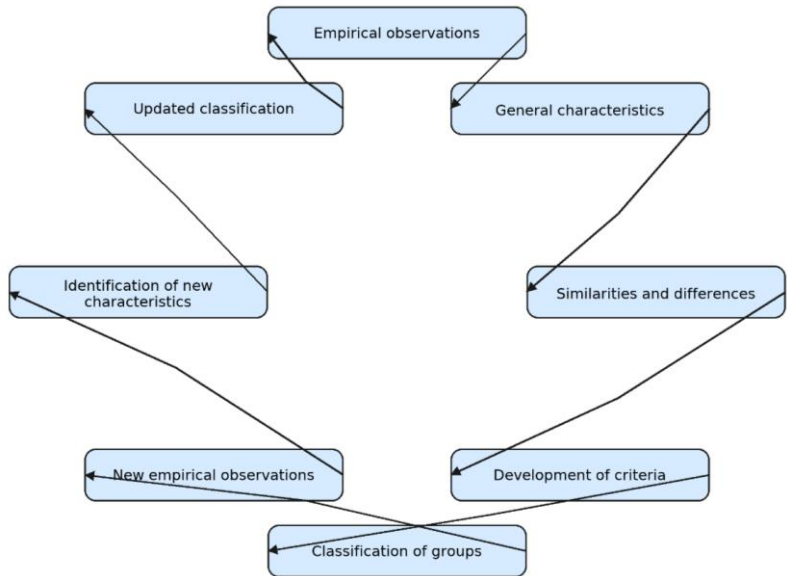


**Figure II. The Process of Deductive Criteria Determination**

As illustrated in the schematic of the deductive approach, the process begins with constructing a theoretical framework; that is, an overarching concept or model is first developed to explain social reality. The key indicators required by this framework are then selected, because every theory relies on specific parameters to justify itself. Subsequently, empirical data are collected; not randomly, but chosen and systematized in accordance with the pre-established theoretical framework. On the basis of these data, groups are classified and categories are delineated in line with theoretical consistency; this stage represents the practical implementation of the theoretical model. The next stage involves interpreting the results within the theoretical framework, meaning that empirical findings are explained according to the theory's internal logic. From this point, two trajectories are possible: on the one hand, the results may support the theory, in which case verification occurs. Verification denotes the corroboration of the theoretical framework by empirical evidence and the consolidation of its scientific credibility; in such cases, the theory not only becomes stronger but also provides a stable foundation for future research. On the other hand, the results may diverge from the theory, in which case falsification occurs. Falsification not only exposes the inadequacy of the theory but also generates an important impetus for scientific progress: the researcher must either discard the existing theory or revise it to accommodate the new facts. This process strengthens critical thinking in science, since every theory is only provisionally valid and is continually tested against new empirical evidence. Thus, the deductive approach not only examines the concordance of theoretical knowledge with empirical reality but, through verification and falsification, also ensures the

ongoing refinement of sociological theories, imparting to science both dynamism and a capacity for self-renewal.

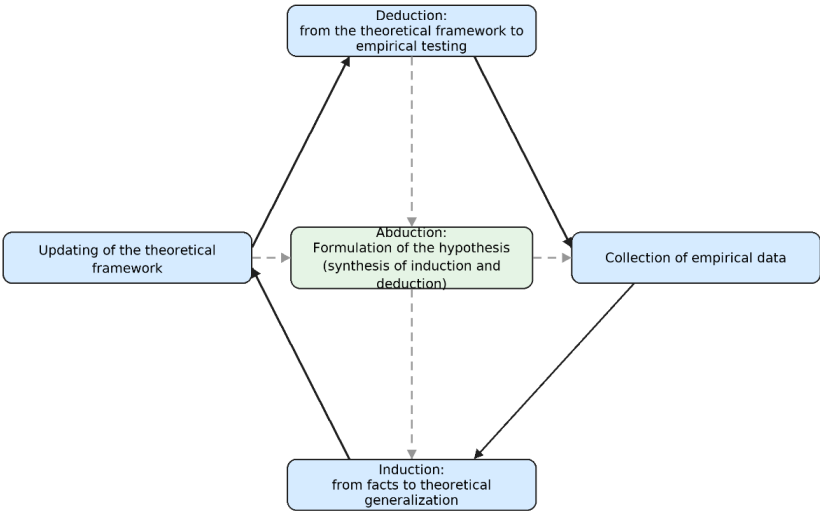
In the inductive approach, criteria are derived from empirical observations and collected data. The underlying logic moves *from the particular to the general*: first, facts observed in real life are gathered, their similarities and differences are identified, and then classification criteria are established on the basis of these features. The principal advantage of the inductive approach lies in the fact that criteria emerge from social reality itself, meaning that they are grounded in facts prior to theory. This enables social groups and phenomena to be understood more objectively, independently of pre-existing theoretical frameworks. Induction proves especially valuable in the study of new social phenomena whose theoretical foundations have not yet been fully developed. For example, when investigating digital youth culture, researchers begin by recording their everyday practices, use of social media, modes of communication, and collective forms of activity. From these observations, criteria such as the intensity of technology use, patterns of online and offline interaction, and consumption habits are formulated. Thus, the classification of youth groups through the inductive approach originates not from theory but directly from observable reality (Figure III). This method is also widely applied in introducing emerging social groups, such as diaspora associations or migrant communities, into sociological scholarship. For instance, within the sociological study of xenophilia, Russophile social groups that are only recently being examined are first identified through empirical observations and factual evidence. Researchers collect data on individuals' behaviors, values, cultural preferences, and political attitudes associated with their orientation toward Russia, and similarities across these features are identified. As a result, Russophile groups are classified according to observed criteria such as ideological commitment, economic interests, or cultural motivations.



**Figure III. The Process of Inductive Criterion Determination Cycle**

When the circular process of inductive criterion formation is explained through the lens of social groups, it becomes clear that this method is not a one-off linear sequence but a recurrent, cycle-like mechanism that adapts to the dynamics of social reality. The process begins with empirical observation: the researcher observes specific attributes such as the behaviors, values, and modes of activity of particular social groups. By generalizing these attributes, the salient features that characterize the groups are identified and formalized as criteria. On the basis of these criteria, similarities and differences are then delineated, that is, the traits that distinguish one group from another, while simultaneously uniting group members, are brought to light. Social groups are subsequently classified and organized into categories in accordance with these criteria. Yet the process does not end here, because social life is not static. Even after groups have been classified, observation continues, new empirical data are gathered, and over time new characteristics of social groups emerge; for example, digital transformation may reveal Russophiles’ growing attachment to online cultural consumption. These newly observed features render the existing classification inadequate and necessitate its re-examination. Consequently, new empirical observations lead to the formation of new criteria, on the basis of which a revised classification is constructed. This cycle repeats, and each iteration contributes to the creation of more precise, up-to-date, and comprehensive models of social groups. In other words, within the inductive approach, classification is a living mechanism: it adapts to a changing social reality, continually reconstructs the essence of social groups, and presents it to scholarship.

The abductive approach, in turn, functions as a synthesis of deductive and inductive methods. In this approach, the sociologist determines criteria by drawing on both theoretical knowledge and empirical observation. Abduction operates according to the logic of *inference to the best explanation*: the researcher takes existing theoretical insights into account but does not apply them wholesale; instead, observations derived from empirical material are aligned with, and adjusted to, the theoretical framework [Thagard & Shelley, 1997]. In this way, theoretical coherence is preserved while facts arising from reality itself are also incorporated. The method is marked by flexibility and secures a theory-practice balance, since it relies neither solely on the description of facts nor exclusively on the primacy of theory. For example, in a study of migration, the researcher may initially refer to established theoretical frameworks (such as economic theories of migration or secular-cultural integration theories). At the same time, however, empirical observations, such as migrants' position in the labor market, their relations with the local population, and their cultural identities, are considered. The abductive approach integrates these two sources to select more fitting criteria, constructing a classification that incorporates both economic factors and dimensions of cultural and social integration. In this way, abduction offers a broader and more adaptive framework for sociological analysis, grounded in both theoretical and empirical foundations (Figure IV).



**Figure IV. Abductive Criteria Determination**

In the research process, it is insufficient either to move solely from theory down to facts or solely from facts up to theory; gaps frequently arise between the existing theory and the reality observed. Filling precisely these gaps is the function of abduction. The essence of the abductive approach is that the

researcher, simultaneously considering the theoretical principles flowing from deduction and the empirical observations flowing from induction, advances the *most adequate hypothesis* that addresses both. This hypothesis is neither a mechanical generalization of facts nor merely a test of theory; rather, it is a creative explanation that builds a bridge between facts and theory. In other words, abduction can serve not only as a continuation of an existing theory but also as the starting point of a new theoretical framework. The schematic shows that, methodologically, the abductive approach is not a fixed pathway; it is a flexible mechanism operating mid-process, responsive to the changing demands of both empirical reality and theoretical construction.

Here, a positivist approach to criteria warrants particular attention. For positivists, the principal condition of sociological classification is the use of observable, measurable, and replicable indicators. In their view, only objectively measurable criteria allow social groups to be distinguished with precision. Quantitative indicators such as age, income, level of education, and household size, for example, form the basis of positivist classification. The advantage of this approach is that classification outcomes can be empirically verified and compared across contexts. In selecting criteria, positivists do not rely solely on quantitative variables; certain qualitative attributes are also rendered measurable by expressing them numerically. This is especially important in surveys and other empirical methods: for instance, people's attitudes toward cultural values or their lifestyle preferences, while not inherently quantitative, can be quantified via scales and scoring systems and incorporated into statistical analysis. Accordingly, a core principle of positivist methodology is to convert all criteria into objective, measurable, and replicable indicators; this makes classification results both more precise and more comparable across diverse contexts. Yet this approach has limitations: indicators such as symbolic signification and subjective experience often resist measurement, leaving portions of social reality outside the scope of analysis.

#### **4.Mathematical Parameterization of Classification**

Expressing sociological classification in mathematical terms means partitioning all individuals or objects in a society into subgroups according to specified criteria, with each individual unambiguously assigned to a group. The aim is to render a random and chaotic multiplicity systematic by aligning it with explicit rules. Research in this area remains sparse, bordering on nonexistent. Two principal works may be noted: first, although not directly tied to sociology, Parrochia's mathematical theory of classification (2018) provides a basis for our inquiry. His work emphasizes that while many existing classifications still rely on empirical measures of similarity, more stable and systematic classification models can be constructed through mathematical approaches. In this respect, approaches such as classification algorithms and

meta-category structures can strengthen the scientific foundations of classification. Nevertheless, despite existing mathematical models, there is a need to establish a unified theoretical basis, a *classification algebra*, to explain classification processes more clearly and coherently. Second, the study by Saltelli and Puy (2023) shows that mathematical models are shaped not only by scientific neutrality but also by social interests and positions; as a result, their outcomes may reflect the perspectives of particular groups and strata rather than objective reality. Therefore, the legitimacy of models should be evaluated not only in terms of technical accuracy but also with respect to fairness, participation, and the production of facts that the public can collectively accept.

Building on the foregoing, and with the aim of addressing the gap in the literature, we propose a mathematical model of classification over social groups within sociological methodology. In mathematical terms, the process can be described as follows: consider a set that represents society, and specify, for each element of that set (e.g., each individual) the group to which it belongs according to certain attributes. The selected criteria (age, income, education, occupation, etc.) constitute the basis of a function that determines the subgroup membership of individuals. Thus, classification is not merely a general observation; it is a precise mechanism that requires each element to be unambiguously assigned to a specific group. The resulting groups are mutually disjoint and jointly exhaustive, thereby yielding a structured, intelligible, and analytically tractable model of social reality. A simplest formal statement is as follows. Let  $X = \{x_1, x_2, \dots, x_n\}$  denote the set of social units (individuals, households, organizations, etc.), and let  $M = \{m_1, m_2, \dots, m_k\}$  denote the set of classification criteria (age, income, education, occupation, etc.). For each criterion  $m_i$ , the set  $X$  is partitioned into subsets:  $X = \bigcup_j G_j$ , where  $G_j \cap G_k = \emptyset$  (i.e., each individual belongs to exactly one group, and groups do not overlap). For example, by the age criterion, one may classify as follows:

$$G_1 = \{x \mid \text{age}(x) < 18\} \text{ (children and adolescents)}$$

$$G_2 = \{x \mid 18 \leq \text{age}(x) < 60\} \text{ (adults)}$$

$$G_3 = \{x \mid \text{age}(x) \geq 60\} \text{ (older adults)}$$

If a multi-criteria classification is conducted (e.g., age + income), one obtains combinations of intersecting sets. For example,  $G_{11} = \{x \mid \text{age}(x) < 18 \wedge \text{income}(x) = 0\}$ ;  $G_{22} = \{x \mid 18 \leq \text{age}(x) < 60 \wedge \text{income}(x) \text{ is high}\}$ , and so forth. In general, the classification function can be written as follows:

$$f: X \rightarrow C$$

Here,  $C = \{c_1, c_2, \dots, c_r\}$  is the set of groups/categories, and for every individual  $x \in X$  we have  $f(x) = c_i$ . In other words, the mathematical expression of classification is presented as a function that assigns individuals to a given category according to the selected criteria.

The mathematical formalization of sociological classification is, in effect, a *language of structure* that orders seemingly tangled social diversity and binds outcomes to rules that can be reproduced. The symbol  $X$  denotes the entire domain comprising the units of analysis (individuals, households, organizations, etc.); that is, what is to be classified is delimited in advance with clear boundaries. The set  $M$  ("meyar" in Azerbaijani) of criteria specifies the attributes along which this domain will be partitioned: concepts are rendered operative not merely by name but through observable indicators (operationalization). At this stage, it is essential to provide a scientific justification for the criteria (why precisely these criteria are chosen), to render them measurable (reliability and validity), and to ensure their consistency with the analytic level of the unit (individual, group, organization). The formal requirement is the partition of  $X$  into subgroups: the domain is divided so that each unit falls into exactly one cell and, taken together, the cells cover the entire domain. This encodes the principles of *exhaustiveness* (everyone is included) and *mutual exclusivity* (no overlap); accordingly, the outcome is not an arbitrary decision dependent on the researcher but the result of a pre-specified rule. In a multi-criteria structure, the logic does not change: the intersections of different criteria yield cells that represent combinations; in mathematical terms, categories of distinct criteria combine to produce new, finer-grained *cells*. The entire construction is succinctly represented by the mapping  $f: X \rightarrow C$ : each unit is assigned to a category according to the selected rules. This, in turn, ensures that classification is indeed a function (the same input yields the same output), thereby guaranteeing the transparency, replicability, and comparability of the research.

The necessity of this formalization becomes evident here: first, explicitly specifying the criteria and decision rules renders results reproducible (methodological transparency); second, it enables flexible comparison across studies (comparability); third, it prevents analytical errors such as assigning the same unit to multiple groups or leaving some units unassigned (logical consistency). This framework also strengthens the theory-fact nexus: criteria are not mere *labels*, but empirical carriers of the theoretical argument; thus, classification becomes not a descriptive list but an instrument for theory testing. If the research objective requires it, the exclusivity condition may be deliberately relaxed (multiple membership or probabilistic assignment), but in that case the rule itself must be explicitly stated and applied consistently. Likewise, when sharp boundaries (thresholds) are discretized, the rationale for their selection (normative, empirical, or mixed) must be documented separately, because as the boundary shifts, the value of the function  $f$  also changes, which in turn affects the interpretation of the results.

As a practical implication of this framework, a researcher who seeks to construct a sociological classification first specifies the domain (the boundaries of  $X$  and the unit of analysis), then selects the criteria ( $M$ ) together with their theoretical justifications and measurement possibilities, and thereafter codifies the rules: the definition of each criterion's categories, thresholds, the handling of exceptions, and the mechanism for combining criteria (hierarchical, parallel, weighted). In the next step, the set of categories ( $C$ ) is presented with formal definitions, and the mapping is constructed: "unit with these attributes  $\rightarrow$  this category." The effect of each decision rule on outcomes (sensitivity analysis) is examined separately; reliability (the same unit yields the same result under the same rule) and validity (the criteria truly capture the intended construct) are then assessed. Finally, all choices are transparently documented so that another researcher applying the same function  $f$  to the same  $X$  will obtain the same  $C$ . This is less about mathematical-looking symbols than about organizing sociological work, binding decisions to a consistent sequence, and making knowledge production collectively verifiable.

As a next step, the principal advantage of presenting sociological classification in matrix form is that the groups arising from the intersection of multiple criteria are displayed visually and in an immediately comprehensible manner. If the classification is expressed only as a list, it becomes difficult to track how numerous criteria are combined. The matrix, by contrast, shows the precise location of each group and its relation to others. This approach clarifies both inter-criterion relationships and the position of groups within the overall structure, facilitating comparison of classification results. Moreover, a matrix-based presentation makes the research process more transparent: it is clear under which conditions each group is defined and from which criteria it arises. This, in turn, enables replication and use across diverse research contexts. It also allows one to see, at a glance, the groups generated by the intersection of different indicators, thereby ensuring both the systematic character and the visual clarity of the classification. Through the matrix, the researcher can observe the separate influence of each criterion as well as the new social units generated by their combinations. Thus, this is among the most suitable formats for organizing the multi-dimensional structure of sociological data. For example, the matrix provided in Table II serves as a convenient illustration.

**Table II. A Sample for Classification Matrix**

|                  | <b>Low<br/>Income</b> | <b>Middle<br/>Income</b> | <b>High<br/>Income</b> |
|------------------|-----------------------|--------------------------|------------------------|
| Low Education    | Q <sub>1</sub>        | Q <sub>2</sub>           | Q <sub>3</sub>         |
| Middle Education | Q <sub>4</sub>        | Q <sub>5</sub>           | Q <sub>6</sub>         |

|                | Low<br>Income  | Middle<br>Income | High<br>Income |
|----------------|----------------|------------------|----------------|
| High Education | Q <sub>7</sub> | Q <sub>8</sub>   | Q <sub>9</sub> |

As an illustrative sample, the matrix shows how social groups are formed at the intersection of education (low, medium, high) and income (low, medium, high). Each cell represents a specific combination: for instance, individuals with both low education and low income fall into group Q<sub>1</sub>, whereas those with medium education and high income belong to group Q<sub>6</sub>. Accordingly, each individual occupies exactly one cell, ensuring that the classification is both collectively exhaustive and mutually exclusive. The importance of this approach lies in the fact that the researcher does not stop at “high education” or “low income” in isolation; rather, by considering both indicators jointly, a more realistic, multidimensional social landscape is obtained. Social reality is rarely explicable by a single criterion; in most cases, multiple indicators combine to shape the positions of distinct groups.

Thus, with two criteria, each taking three values, nine distinct groups can be classified. Each group corresponds to a concrete combination, and by considering criteria and their values together, one determines the cell to which each individual belongs. This demonstrates that as the number of criteria and the range of values within them increase, the number of emergent groups also grows, allowing social reality to be analyzed with finer granularity.

**5.Conclusion**

The study demonstrates that classification in sociological methodology is not merely an arbitrary grouping but a core analytical instrument that enables the systematic comprehension of social reality. As noted throughout the article, classification is an essential scientific tool for identifying social groups and explaining their functions and positions in society. Employed in both theoretical and empirical research, this method makes possible the ordering, comparability, and scientific generalization of social facts. In this regard, the principal findings of the study can be summarized as follows:

- Classification is more complex than simple grouping; it not only assembles similar facts but also arranges them in a systematic order and uncovers their internal relations.
- Classifying social groups enables a more precise analysis of their behavioral regularities, functional characteristics, and structural positions.
- The choice of criteria is decisive for the reliability of classification; poorly chosen criteria can distort social reality and diminish the scholarly value of the results.

- Deductive, inductive, and abductive approaches offer distinct possibilities for determining criteria; each has its own advantages with respect to theoretical coherence, empirical reality, and their synthesis.
- In a positivist approach, classification rests on observable, measurable, and replicable indicators, which ensures the objectivity and comparability of results.
- Within a positivist framework, mathematical formalization secures the logical consistency, transparency, and replicability of classification and facilitates comparison across studies.
- A matrix presentation grounded in mathematical formalization is among the most suitable methods for multi-criteria classification; by displaying, visually and systematically, the groups arising from combinations of criteria, it renders the social structure more clearly.

## 6. REFERENCES

1. Alaimo, L. S. (2023). The complexity of social phenomena and the construction of indicators. In E. di Bella, S. Fachelli, P. López-Roldán, & C. Suter (Eds.), *Measuring gender equality* (Social Indicators Research Series, Vol. 87). Springer. [https://doi.org/10.1007/978-3-031-41486-2\\_2](https://doi.org/10.1007/978-3-031-41486-2_2) (in English)
2. Banning, E. B. (2020). Systematics: Classification and grouping. In *The archaeologist's laboratory* (Interdisciplinary Contributions to Archaeology). Springer. [https://doi.org/10.1007/978-3-030-47992-3\\_3](https://doi.org/10.1007/978-3-030-47992-3_3) (in English)
3. Crossman, A. (2019). Deductive versus inductive reasoning: Two different approaches to scientific research. <https://shorturl.at/gjrTN> (in English)
4. Dubrow, J. K. (2022, October 1). Max Weber's theory of class, status, and power. *The Sociology Place*. <https://thesociology.place/2022/10/01/max-webers-theory-of-class-status-and-power/> (in English)
5. Gould, S. J. (2000). Linnaeus's luck? *Natural History*, 109, 48-76. (in English)
6. Harrits, G. S., & Møller, M. Ø. (2011). Categories and categorization: Towards a comprehensive sociological framework. *Distinktion: Journal of Social Theory*, 12(2), 229-247. <https://doi.org/10.1080/1600910X.2011.579450> (in English)
7. Kun, B. (2005). Marx and the middle classes. *Marxists Internet Archive*. <https://www.marxists.org/archive/kun-bela/1918/05/04.htm> (in English)
8. Mondal, P. (2025). 4 main criteria used in the determination of social class. *Your Article Library*. <https://www.yourarticlelibrary.com/sociology/4-main-criteria-used-in-the-determination-of-social-class/35102> (in English)

9. Neuman, W. L. (2003). *Social research methods: Qualitative and quantitative approaches*. Allyn & Bacon. (in English)
10. Parrochia, D. (2018). Mathematical theory of classification. In B. Hjørland & C. Gnoli (Eds.), *Encyclopedia of knowledge organization*. International Society for Knowledge Organization. [https://www.isko.org/cyclo/mathematical\\_theory\\_of\\_classification](https://www.isko.org/cyclo/mathematical_theory_of_classification) (in English)
11. Rivera-Vargas, P., & Miño-Puigcercós, R. (2018). Young people and virtual communities: New ways of learning and of social participation in the digital society. *Páginas de Educación*, 11(1), 67-82. <https://doi.org/10.22235/pe.v11i1.1554> (in English)
12. Rosenberg, M. M. (2015). The conceptual articulation of the reality of life: Max Weber’s theoretical constitution of sociological ideal types. *Journal of Classical Sociology*, 16(1), 84-101. <https://doi.org/10.1177/1468795X15574414> (in English)
13. Saltelli, A., & Puy, A. (2023). What can mathematical modelling contribute to a sociology of quantification? *Humanities and Social Sciences Communications*, 10, 213. <https://doi.org/10.1057/s41599-023-01704-z> (in English)
14. Schmaus, W. (2004). *Rethinking Durkheim and his tradition*. Cambridge University Press. (in English)
15. Scholarly Community Encyclopedia. (2025). Social group. <https://encyclopedia.pub/entry/54088> (in English)
16. Sociology Institute. (2022). How sociologists classify social groups: Criteria and examples. <https://sociology.institute/introduction-to-sociology/sociologists-classify-social-groups-criteria-examples/> (in English)
17. Thagard, P., & Shelley, C. (1997). Abductive reasoning: Logic, visual thinking, and coherence. Philosophy Department, University of Waterloo. <http://cogsci.uwaterloo.ca/Articles/Pages/%7FAbductive.html> (in English)
18. Trompf, G. W. (2023). Auguste Comte’s classification of the sciences. *Knowledge Organization*, 50(2), 128-152. <https://doi.org/10.5771/0943-7444-2023-2-128> (in English)
19. Vandebroeck, D., & Jappens, M. (2022). Some other ‘primitive forms of classification’: Contribution to the study of children’s collective representations. *Poetics*, 91, 101667. <https://doi.org/10.1016/j.poetic.2022.101667> (in English)