Private Notes on Albert Einstein's Causality Lecture (Berlin 1930)

Translated with an introduction by Sascha Freyberg and Joost Kircz

Karl Korsch

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Contents

ABSTRACT: The article entails the translation of notes made by Karl Korsch in 1930 at a lecture given by Albert Einstein at the Marxist Workers School in Berlin. The event was announced as a working group discussion. Einstein spoke on the topic of causality which was of particular interest due to the developments in physics at the time as well as the problem of causality in historical materialism. The translation is accompanied by an introduction which provides context and discusses the more implicit problems addressed in Korsch's notes, in particular the council communist idea of workers education and the issue of complexity.

KEYWORDS: Karl Korsch, Albert Einstein, Marxist Workers School, Causality, Complexity, Historical Materialism, Science

I. Introduction[1]

> *We have to create the formula and apply it in such a way that we do justice to what we observe. The lawfulness of events does not fall into our laps if we only look, but we must also create.*
>
> Albert Einstein (Lecture on Causality)

In this issue we publish the first English translation of the notes which Karl Korsch (1886–1961), Marxist philosopher and Communist politician of the Weimar period, took during a lecture by the physicist Albert Einstein (1879–1955) at the *Marxistische Arbeiterschule* Berlin (acronym: MASCH, Marxist workers school) in 1930 (Korsch 1996). By this time Einstein had been in Berlin for 16 years and already was worldfamous. Furthermore, he was not only an important figure in physics but also as a public intellectual. Einstein supported the work of MASCH as a lecturer more than once. He was known for his left-leaning and pacifist opinions since the beginning of WWI, when he was one of the very few signatories of the pacifist appeal "Aufruf an die Europäer" (see Fölsing 1997, 346–350; cf. Dmitrieva 2024, 125–129).

Because of his scientific and political reputation Einstein was in 1918 invited as a mediator to the revolutionary students' council at Berlin University and made his way to the occupied Reichstag building, a mission he completed successfully together with his friends physicist Max Born and the Gestalt psychologist Max Wertheimer.[2]

The interesting aspect of the translated text is first of all the notion that workers need to be informed by the latest discussions in the natural sciences. This is in line with the understanding that Marxism is scientific. After all, against the utopians, Marx and Engels argued that also emancipatory theory must be built on solid investigations; on how we arrived where we are now in society in order to forecast the best way into the future and develop political actions and organisation. In other words: can we define social-economical laws, as analogue to physical laws and act accordingly? And to what extent does progress in the sciences influence our political outlook (as continuation of the discussions Engels started, see Kircz 2012).

[1] With special thanks to Marcel van den Linden and Jarek Ervin for their help.

[2] Einstein appealed to the students concerning academic freedom (Born 1971, 149–151); an issue which was close to his heart, as exemplified by his anger about the fascist attacks on the mathematician E.J. Gumbel, who just in time could escape Germany (Einstein 1954, 28). Gumbel also co-signed the 1932 appeal depicted in figure 5. Gumbel was the first to review the batch of Karl Marx's 'Mathematical manuscripts.'

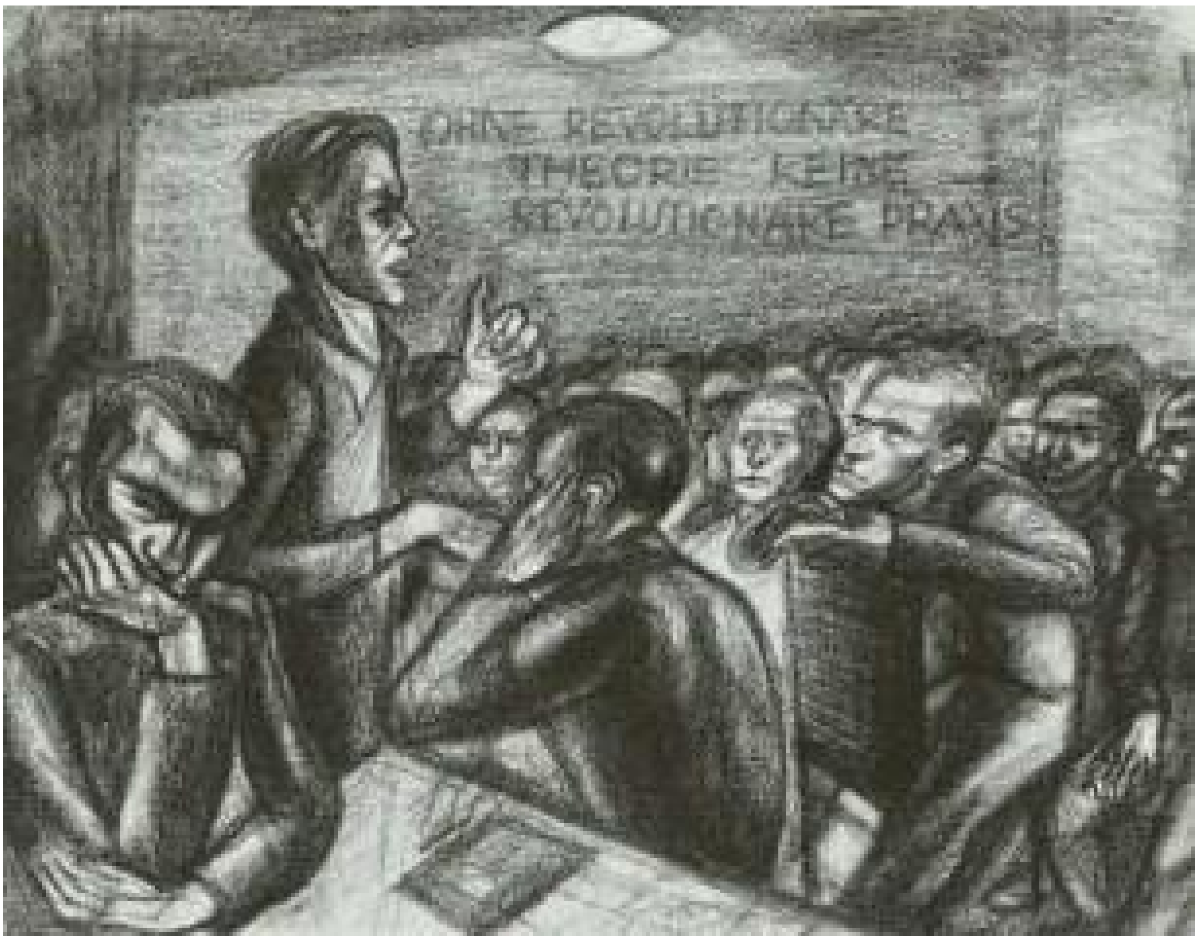


Fig. 1. Scene from a Workers School with a Lenin quote in the back. (Anonymous)

This background shows clearly in the discussion part of the text. Causality and the notion of historical necessity are linked here. Since developments in modern physics questioned the traditional understanding of natural law and causality Marxists were interested in the consequences for their understanding of science and if a way opened up to go beyond the impasse of fatalism versus voluntarism (with historical determinism on the one side and vanguardism on the other). Council communism, which also was closer to Korsch's political views, tried to avoid both fatalism and vanguardism. Instead of a party elite the emphasis was on *education* to make the emergence of political subjectivity and its agency possible. It thus may not be fortuitous that Korsch was interested in this particular lecture and it may explain why he reported the lecture almost verbatim.

In the following we will shortly discuss: 1. The Marxist workers school, 2. Karl Korsch, 3. Albert Einstein at the MASCH, 4. Korsch's report, and finally 5. some implications are made explicit.

1. Marxist workers school (Marxistische Arbeiterschule — MASCH)

Germany knew a long tradition of workers education (Olbrich and Siebert 2001); in particular in the social democratic tradition, which for a long time included socialist and communist strains. The question of the support for the war in 1914 was the reason for splits in that tradition, which until then was represented politically by the German Social Democratic Party (SPD). After the Russian revolution the Communist Party of Germany (KPD) was founded at the turn of the year 1918/1919 (in continuation of the *Spartakusbund*). After the two leading party officials Karl Liebknecht and Rosa Luxemburg were murdered in 1919 and the ensuing "*Spartakusaufstand*" as well as other revolutionary attempts throughout Germany (*Novemberrevolution*, Bavarian Soviet republic etc.) were violently put down, the party merged with split-offs from SPD (USPD) and was known for some time as United Communist Party (VKPD) until the pro-Soviet fraction renamed the party back to KPD in 1925. Shortly after, the party began organising courses in their offices. The interest was so enormous that political active academics and party cadres decided to found "a school for the working people," the Marxist workers school (MASCH)

> ...to create a generally accessible educational institution in which the working population of Berlin should be given the opportunity to learn the basic teachings of unadulterated Marxism and their application to all areas of proletarian life and struggle.[3]

[3] "...eine allgemein zugängliche Lehrstätte zu schaffen, in welcher der werktätigen Bevölkerung Berlins die Möglichkeit gegeben werden sollte, die Grundlehren des unverfälschten Marxismus und ihre Anwendung auf alle Gebiete des proletarischen Lebens und Kampfes zu erlernen."

The MASCH initiative was entirely in the spirit of the resolutions of the 5^{th} congress of the Comintern (July 1924) which started heralding the idea of Socialism in one country and a united front from below. This meant that an emphasis was put on Marxist education of the working class and work in the trade unions in particular. The programme of the MASCH was different from the many (rather non-political) popular education efforts (*Volksbildungsbestrebungen*). Although KPD cadres, like Hermann Duncker, were involved in its organisation, the school had to finance itself by small fees and was open to everybody. Hence MASCH operated parallel to the stricter formal party cadre school. It included a very broad educational programme from history of the labour movement to natural science, and from type-writing to Marxism-Leninism (Gerhard-Sonnenberg 1976, Friedjung 1977, Schmidt [1931] 2016).

Fig. 2. Schickler-Haus near Alexanderplatz where the MASCH occupied rooms on the first floor.

The format was so successful that soon branches in other places were opened. In the 1930s, schools existed in 30 different German cities, each an autonomous entity. Most of its participants were not organised in a party even though the programme was clearly shaped by a communist agenda. As course lecturers we find famous names such as: Bertolt Brecht (dramaturg and writer), Alfons Goldschmidt (economist, writer, and journalist), Walter Gropius (architect), Bruno Taut (architect, urban planner), John Heartfield (Helmut Herzfeld, visual artist and famous for his political photomontages), Egon Erwin Kisch (writer and journalist), Erwin Piscator (theatre director and producer), Jürgen Kuczynski (economist), Hanns Eisler (composer), Wilhelm und Annie Reich (psychoanalysts), Käte Duncker (feminist political activist), and Edwin Hoernie (Marxist agronomist) et al.

Next to the regular courses, working group discussions (*Arbeitsgemeinschaften*) and special public meetings were organized. The entrance fee to these special public meetings was 50 Pfennig for members of proletarian organisations, 20 Pfennig for unemployed and 1 Mark (100 Pfennig) for people who were not member of a proletarian organisation.

Many prominent academics were invited to give lectures. Thus Anna Seghers, famous writer and the wife of Johann-Lorenz Schmidt (leader of the largest branch of MASCH) convinced Albert Einstein to give a special public lecture on relatively theory in 1931.[4]

Unfortunately, we lack the programme of the school year 1930, but given the fact that the 1931 public lecture is well mentioned in the literature, we must conclude that the 1930 meeting on causality, Korsch attended, was not a big event, but took place in the frame of a working group meeting (*Arbeitsgemeinschaft*)[5] in the usual rooms of the school, which at the time were located on the first floor of an office building in the centre of Berlin (Fig.2). After the Nazi take-over in 1933, which immediately was connected with purges against communists, MASCH had to close and most of its materials and archives were destroyed.

2. Korsch

At the time Karl Korsch (1886–1961) was very active in communist politics. He was born into an intellectual family and followed university studies to become a lawyer.[6] In his student years he became active in left wing circles. With a study grant he visited the UK and became a member of the Fabian Society, a very active ethical and politically reformist organization. In 1914 he returned to Germany to enter the army, but not because he was supporting the war, but to be, as he put it, with the masses. In 1917 he joined the Independent Social Democratic Party of Germany (USPD), a left-wing split of the Social Democratic SPD, which then became part of the new Communist Party of Germany (KPD). He became a communist politician and was

[4] Anna Seghers is the pen-name of Anna Reiling, (1900–1983). In 1925 she married László Radványi, who worked under the name Johann Lorenz Schmidt (1900–1978), a Hungarian Communist, economist and academic philosopher who fled after the fall of the Hungarian council republic to Germany and became a central figure in the MASCH.

[5] Also Korsch notes entail hints on working group discussion.

[6] For a good introduction to Korsch see: (Fred Halliday 2012). See also: Interview with Hedda Korsch 1972.

elected as a member of the parliament and subsequently Minister of Justice in the left-wing regional Thuringian government from October till end of November 1923, when the KPD representatives had to step down due to pressure from the central government. At Jena University Korsch was, at the same time, promoted to professor of legal theory, but was prevented from lecturing, since the new right-wing government in Thuringia forbid it and tried to expel him. Although he won the legal case to be reinstated (in 1925) his position at the university remained precarious. He concentrated much more on his political activities and got elected into the *Reichstag* in 1924. He also became editor in chief of the KPD journal *Die Internationale* and took part in the 5th Congress of the Comintern. As a reaction to the decline and ultimately defeat of the German revolution (*Novemberrevolution*), he put an emphasis on workers education as precondition for a successful workers movement. Due to his criticism of the rising Stalinist influence, he was expelled from the KPD in 1926.[7] At this time a circle formed around him in Berlin which included the physician and writer Alfred Döblin, Bertolt Brecht and writer Susanne Leonhard. In line with his workerism Korsch's position at the time came close to the ideas of the council communists currents in which (the Dutch astronomer) Anton Pannekoek and Otto Rühle (writer and economist) played an important role. The central issue here is the understanding of the fundamental notion that the worker's class has to emancipate itself, in combination with the council communist dogma that the flow of history is a given (as function of the class struggle), which cannot be pushed, contrary to Lenin's idea of a vanguard party. In particular, this last point was one of the fundamental ideas attacked by Pannekoek and other council communists. This remained a constant issue not only of the KPD, but of socialist organisation and apparatus up until the Prague Spring.

When in 1933, Nazis started to imprison communists on a mass scale Korsch escaped Germany via Denmark and the UK to the USA and dedicated his time to writing and lecturing at different US universities. An appointment to a permanent post failed due to his political background.

Karl Korsch's most famous work is his *Marxismus und Philosophie* published in 1923 (Korsch [1923] 2012), the same year as Lukács' *Geschichte und Klassenbewusstsein* (Lukács [1923] 1988). Both are seen today as early exponents of so-called 'Western Marxism,' which was at the time far from the academic affair it came to be.[8]

> In fact, however, the first three important theoreticians of the post-1920 generation—the real originators of the whole pattern of Western Marxism—were all initially major political leaders within their own parties: Lukács, Korsch and Gramsci. Each, too, was a direct participant and organizer in the revolutionary mass upheavals of the time; the emergence of their theory

[7] For his battles in the KPD and the discussions at the 5th Comintern congress see Halliday (2012).

[8] An interesting recent assessment of Korsch is given by the American historian Paul le Blanc on the occasion of the republication in 2016 of Korsch's 1938 book *Karl Marx* (Le Blanc 2017).

> cannot, indeed, be understood except against this political background (Anderson, 1976, 29).

In the same year Korsch took part in the *Erste Marxistische Arbeitswoche* (Jay 1973, 5); a workshop, which today is seen as providing the founding impetus for the famous Frankfurt Institute for Social Research. This all speaks of the liveliness of Marxist engagement and exchange in the 1920s (Fig. 3).

In the context of the document we publish, it is an interesting open question to what extent Korsch, at that moment, positioned himself in the context of the historical materialist discussion in the background of the lecture. Our guess is, that he was neither tempted by power and the vanguard party, nor naive enough to believe in the self-development of socialism as a strict historical determinsim, a belief which was which was aligned with mechanical determinism in scientific theories (*a la* Pannekoek).

Einstein is known for his defence of the ideas of determinism and causality vis-a-vis the hypothesis of indeterminism discussed in Quantum Mechanics, which Einstein dismissed as incompleteness of the theory. However, he acknowledged that theories can provide results without including complete causal explanations and in the talk not only presents his own views but reports about the new developments in physics, like the introduction of probabilistic and statistical explanations. That is to say, that he understood causality and determinism not in the mere unilinear mechanical sense of causality but in a heuristic sense providing the orientation for theory development. It obviously poses the question of determinism to which we will come back at the end of this essay.

3. Albert Einstein at the MASCH

Most presumably Albert Einstein (1879–1955) belongs to the small community of highly known and venerated people in human history whose ideas are still subject to amazement and intense debate.[9] Today he still is seen as the quintessential mathematical natural scientist, who overthrew Newtonion cosmology. Be that as it may, in 1930 he certainly was an important public figure in Berlin.

As already mentioned Einstein was a humanist and pacifist and in his Marxist inspired anti-bureaucratic 'Why Socialism?' (originally in *Monthly Review*), he defends an ethical and social world against the perils of capitalism and private capital (Einstein 1954).[10] Einstein's democratic and socialist inspired thinking is a red line in his entire life. This induced permanent suspicion by governments (Grundmann 1998, Jerome

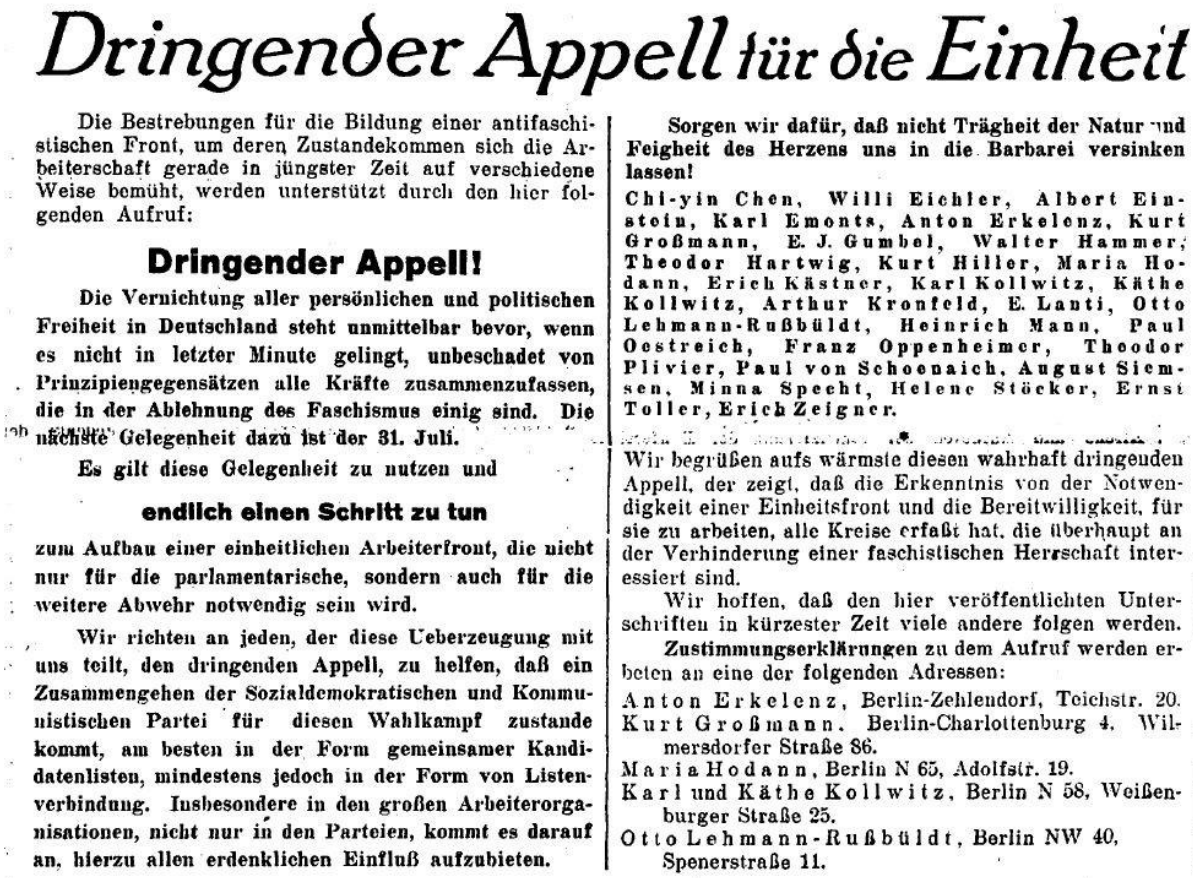
[9] On Albert Einstein there exist an enormous amount of papers and biographies which made the historian and philosopher of science Don Howard (2008) to call for a moratorium of Einstein's biographies. Consequently, apart from academic studies about his work and life, the poor man is exploited today for all kinds of lofty ventures, including merchandize.

[10] Reprinted in the collection *Ideas and opinions by Albert Einstein,* Crown Publ. Inc. 1954, 151–158 (and many times in left-wing journals).

Fig.3. Participants of the Marxistische Arbeitswoche. Standing from left to right: Hede Massing, Friedrich Pollock, Eduard Ludwig Alexander, Konstantin Zetkin, Georg Lukács, Julian Gumperz, Richard Sorge, Karl Alexander (child), Felix Weil, unknown; sitting: Karl August Wittfogel, Rose Wittfogel, unknown, Christiane Sorge, Karl Korsch, Hedda Korsch, Käthe Weil, Margarete Lissauer, Bela Fogarasi, Gertrud Alexander.

Fig. 4. Einstein in Berlin 1932

2002). A significant engagement today is almost forgotten: in 1932 he was one of the signatories of a public appeal (Fig. 5) to the leaders of SPD and KPD to form an antifascist coalition—alas, to no avail. In the next elections the Nazis (NSDAP) won—SPD and KPD would have had enough seats to win in a coalition. The rest is history...



Dringender Appell für die Einheit

Die Bestrebungen für die Bildung einer antifaschistischen Front, um deren Zustandekommen sich die Arbeiterschaft gerade in jüngster Zeit auf verschiedene Weise bemüht, werden unterstützt durch den hier folgenden Aufruf:

Dringender Appell!

Die Vernichtung aller persönlichen und politischen Freiheit in Deutschland steht unmittelbar bevor, wenn es nicht in letzter Minute gelingt, unbeschadet von Prinzipiengegensätzen alle Kräfte zusammenzufassen, die in der Ablehnung des Faschismus einig sind. Die nächste Gelegenheit dazu ist der 31. Juli.

Es gilt diese Gelegenheit zu nutzen und

endlich einen Schritt zu tun

zum Aufbau einer einheitlichen Arbeiterfront, die nicht nur für die parlamentarische, sondern auch für die weitere Abwehr notwendig sein wird.

Wir richten an jeden, der diese Ueberzeugung mit uns teilt, den dringenden Appell, zu helfen, daß ein Zusammengehen der Sozialdemokratischen und Kommunistischen Partei für diesen Wahlkampf zustande kommt, am besten in der Form gemeinsamer Kandidatenlisten, mindestens jedoch in der Form von Listenverbindung. Insbesondere in den großen Arbeiterorganisationen, nicht nur in den Parteien, kommt es darauf an, hierzu allen erdenklichen Einfluß aufzubieten.

Sorgen wir dafür, daß nicht Trägheit der Natur und Feigheit des Herzens uns in die Barbarei versinken lassen!

Chi-yin Chen, Willi Eichler, Albert Einstein, Karl Emonts, Anton Erkelenz, Kurt Großmann, E. J. Gumbel, Walter Hammer, Theodor Hartwig, Kurt Hiller, Maria Hodann, Erich Kästner, Karl Kollwitz, Käthe Kollwitz, Arthur Kronfeld, E. Lanti, Otto Lehmann-Rußbüldt, Heinrich Mann, Paul Oestreich, Franz Oppenheimer, Theodor Plivier, Paul von Schoenaich, August Siemsen, Minna Specht, Helene Stöcker, Ernst Toller, Erich Zeigner.

Wir begrüßen aufs wärmste diesen wahrhaft dringenden Appell, der zeigt, daß die Erkenntnis von der Notwendigkeit einer Einheitsfront und die Bereitwilligkeit, für sie zu arbeiten, alle Kreise erfaßt hat, die überhaupt an der Verhinderung einer faschistischen Herrschaft interessiert sind.

Wir hoffen, daß den hier veröffentlichten Unterschriften in kürzester Zeit viele andere folgen werden.

Zustimmungserklärungen zu dem Aufruf werden erbeten an eine der folgenden Adressen:

Anton Erkelenz, Berlin-Zehlendorf, Teichstr. 20.
Kurt Großmann, Berlin-Charlottenburg 4, Wilmersdorfer Straße 86.
Maria Hodann, Berlin N 65, Adolfstr. 19.
Karl und Käthe Kollwitz, Berlin N 58, Weißenburger Straße 25.
Otto Lehmann-Rußbüldt, Berlin NW 40, Spenerstraße 11.

Fig. 5. Dringender Appell (urgent appeal) to the party leaders of SPD and KPD to form an antifascist front as published in the journal "Der Funke," 25th June 1932. Other versions of this appeal were published as posters and in other journals and included a special appeal to mental labour (Geistesarbeiter) to join the fight.

The engagement for the MASCH clearly fits with Einstein's principles. For Einstein such engagement seemed to be just the normal thing to do. As far as we know there is no special mentioning of Einstein's lectures for the MASCH in the vast literature on him. Korsch notes Einstein's remark at the beginning of the meeting: 'No written report should be published about this.' So, it clearly was not meant as an authoritative talk.

On 28 October 1931, Einstein gave another lecture for MASCH: "What the workers must know about the theory of relativity," in a loaded auditorium of a community school in the north of Berlin.[11]

In physics, the principle of relativity is the requirement that the equations describing the laws of physics have the same form in all admissible frames of reference. That is to say that a physical 'reality' is independent of the way it is described. It is an invariant whilst the descriptions are relative. Einstein's lecture was about his relativity theory, which knows two versions: The special theory which integrates Newtonian mechanics and electro-magnetism. In this theory we still deal with three space and one time dimension, in a (flat) Euclidean geometry. A big difference with Newtonian mechanics is that it postulates the finite velocity of light c in empty space, as a universal constant for all types of interactions (communications). The General Theory was an attempt to also integrate gravity into the theory and makes gravity also "relative," henceforward to integrate all known "forces" in nature in, what is now called, "a theory of everything" (ToE). However this failed and the general theory is technically speaking less relative than the special one, but essentially a theory of gravity. In this gravity theory we don't work anymore with the old 3+1 dimensions, but now with an integrated spacetime system of 4 dimensions that exist in a curved, so-called semi-Riemannian, geometry. That is to say the mathematical model employs a certain novel geometry which describes our experience.

Obviously for normal mortals this geometrical reasoning is not easy to comprehend and in popular visualisations, the analogue of a trampoline is made, where we can illustrate that the curvature of the trampoline is a function of the weight of an object on it, like the notion that matter curves space-time. However, our world we live in is not a mathematical world. Model and reality are two different concepts.

4. Korsch's notes

Einstein's lecture on causality is certainly important as this was one of his main concerns about Quantum Mechanics. In this theory we do not deal with "real" objects such as in classical mechanics, but mathematical entities such as the famous Schrödinger wave function. In Quantum Mechanics we deal with "states" of a "system" in N-dimensional vector space (aka Hilbert space). In this "picture" the wave function is spread out in a many dimensional "flat," Eucledian, space and hence an attribute (e.g. spin, polarisation, place of a particle) has no firm value. Only by measuring with

[11] According to Gabriele Gerhard-Sonnenberg (1976), who quotes an article: "Einstein in der MASCH" in *Wochenpost* Volume 21, 30 August 1974, Nr. 36. Also Seghers is quoted as: "In the last days of the Weimar Republic, I went to a place near Caputh, a lake of Berlin, to ask Einstein to give a lecture at the MASCH. My husband, the head of the school, had asked me to do so." Albert Einstein spent in the years 1929–32 most of the year in his summer house in Caputh, a small village about 6 km south from Potsdam, idyllically situated directly on the Schwielowsee. The city of Berlin had given the property to Einstein as a present. It now hosts a small museum.

a classical mechanical apparatus, out of the many possibilities a value is detected. This is the so-called collapse of the wave function. The hegemonic interpretation is that we can only speak about probabilities of a measurable value. This understanding induces an ever growing literature on the question if we have to drop causality from physics, and consequently from whatever. Einstein's biographer and successor as professor in Prague, the experimental positivist of the Vienna school Philipp Frank published his influential *The Law of Causality and its Limits* in 1932 (Frank 1932; 1977).

Einstein was vehemently opposed to the idea that Quantum Mechanics was an all-compassing final theory (as was the opinion of Niels Bohr and his school) and throughout his life he insisted that, although the theory works splendidly, it was clearly unfinished and incomplete. This remains also an issue in the present discussions on the possible integration of Gravity and Quantum Mechanics (Quantum Gravity). Interestingly, Korsch does not mention in his notes the basic issues of quantum "uncertainty" and its probabilistic essence. We don't know how complete his notes are, but he seemed to have followed the argument closely. Let us see what Korsch emphasises.

Einstein (according to Korsch's notes) stresses that we have determinist laws which reveal themselves in repetitive experiences and henceforward are the data for a theory that, given causality is expressed in deterministic laws, allows us to make predictions. Einstein also stresses that basic notions are human made:

> Nature must have the incomprehensible quality of being comprehensible. It must somehow be such that it can be captured and made comprehensible by our thoughts.

And:

> In contrast to a few decades ago, causality or lawfulness or determinism in nature was not a problem at all. [...] But today we can say that the deeper we penetrate into nature, the more enormous its riddles pile up before us.

Einstein then continues with some examples where mono-causal processes don't work (e.g. Brownian motion)[12] and we have to call in

> ...statistical laws that can be derived with rigour from the previous discussed laws of nature. This is a sublimation of the concept of causality. We still believe in the strict causality or deterministic structure.

Einstein mentions quantum mechanical examples such as radioactivity "where it has not yet been possible to devise a strictly deterministic mechanism that would make this thinks comprehensible to us." Einstein's more philosophical views are expressed by the following quote:

[12] Obviously the meeting was held in German and hence Korsch in his notes talks about "Braunian" motion, which we corrected in the translation. Brownian motion (named after the botanist Robert Brown) is one of the subjects Einstein became famous for and proving the existence of atoms.

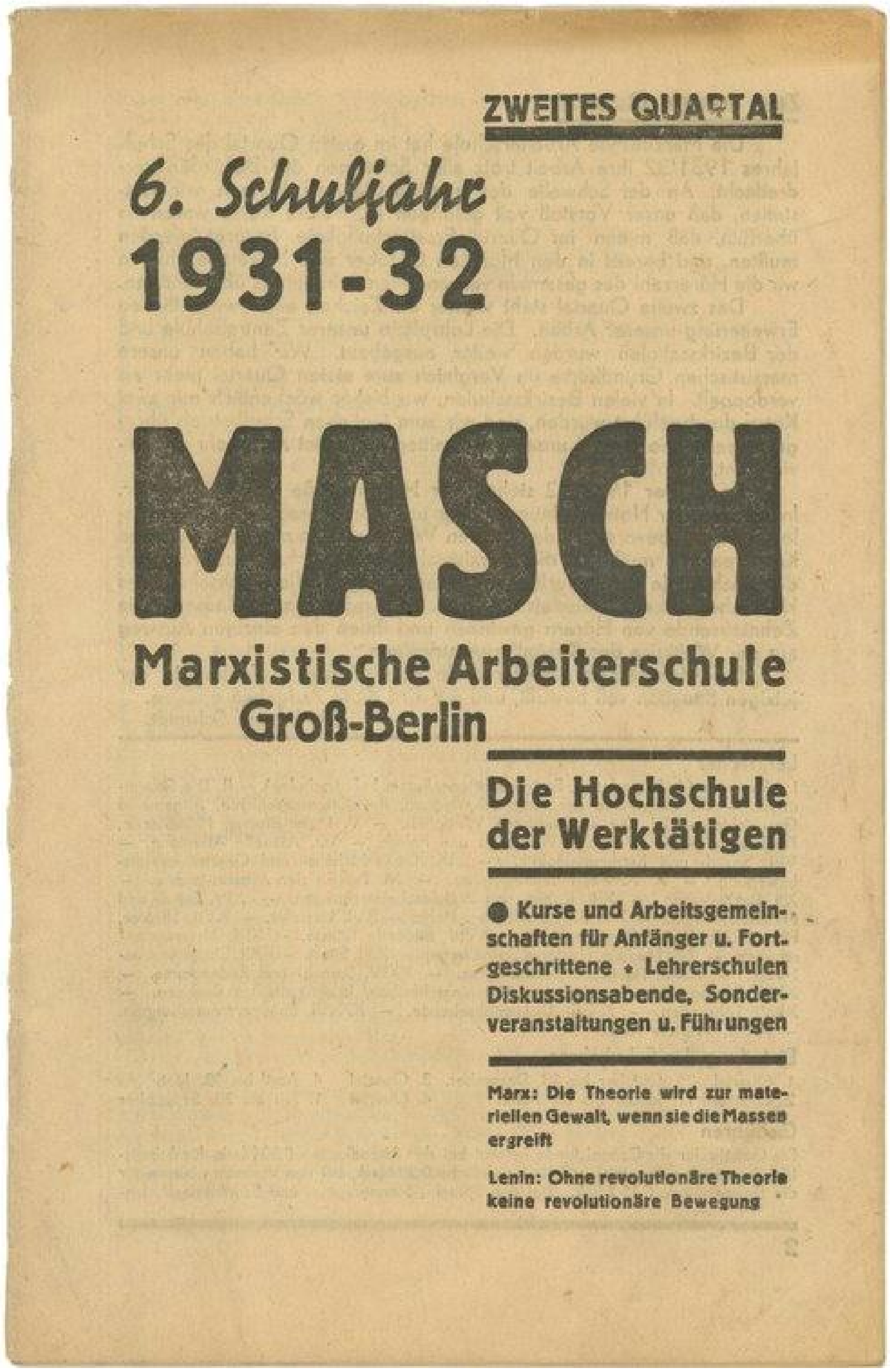


Fig. 6. Programme for the 1931–32 school year announcing "courses and working groups for beginners and advanced learners, teachers' schooling, discussion evenings, special events and guided tours." Below are two quotes by Marx ("Theory will become a material force, if it reaches the masses") and Lenin ("Without revolutionary theory, no revolutionary movement").

> It would be so strange, a nature that has statistical but not deterministic laws. The human mind's hunger for beauty speaks in favour for determinism, and so far it has been shown that, in the end, the beautiful is also the truth.

It is interesting to note that Einstein in his lecture stresses the 'subjective' element in scientific theory (see our epigraph above). It is not sufficient to just observe, we also act in the process, at least via our tools of understanding. This is in correspondence with a Lenin quote which was put on the covers of the MASCH programs: *Ohne revolutionäre Theorie, keine revolutionäre Bewegung* ("Without revolutionary theory, no revolutionary movement," see Fig. 1 and 6).

The theoretical emphasis on the 'subjective element' in theory and science Einstein might have picked up in his exchange with philosopher Ernst Cassirer (1874–1945), who had his background in Marburg NeoKantianism and wrote one of the earliest philosophical books on the theory of relativity (1921), which Einstein read and commented on. Usually Einstein preferred more empiricist presentations, like those of philosopher Moritz Schlick (1882–1936), who later became a professor at Vienna University and the instigator of the Vienna Cirlce.[13]

5. Some implications

As explained above, in physics we still have the pertinent tension that two excellently working theories: Gravity (General Relativity Theory) and Quantum Mechanics don't match. In Gravity theory we still have a classical deterministic mechanical outlook, despite the fact that the model that describes the experimental results (the reality we experience) is mounted in a not simple pictorial geometry. The question thus raised is: do we "live" in a curved space or is the theory, expressed in curved space, the best we have? This is in line with Einstein's comment on reality and poetry in the talk about causality. In Quantum Mechanics the situation is even more abstract, as the theory is completely strange to us—but works. No hyped AI generator will give the answer. Nobel laureate Richard Feynman supposedly said: "If you think you understand quantum mechanics, you don't understand quantum mechanics."

Obviously, in our everyday world nobody cares, as long as it works somehow. But Marxism, including its long and often painful history, teaches us to dig deeper and try to understand reasons as well as causes. We have to ask 'why' next to the 'how.' Laws are human made within the boundary conditions of actual knowledge. And this is as important in science as in politics. Marx already was fighting against the so-called Iron

[13] Schlick and Einstein cultivated a theoretical exchange as can be seen in there correspondence (Schlick-Einstein-Briefwechsel 2022). The discussion on Einstein's perceived positivism and his discussions with the logical empiricists is an enduring point of discussion. A nice overview is given by (Giovanelli 2013).

Law of Wages, and this meant that he demanded a more complex understanding. So we should not be afraid of complexity. There are always reasons and/or causes involved. Complexity should not become an argument for the prevention of intervention and can also be understood in a sufficient way.

We can avoid mono-causal and unilinear explanations without giving up on explainability altogether, because modern science, and particularly Gravity theory, teaches us that the world as we know her is not a linear object, but a complex and concrete 'system' of mutually reciprocal interactions (which is the meaning of the Marxists' insistence on the dialectic). Although, we can describe complicated (non-linear) interactions in first (and often sufficient) approximations as being linear, for "All Practical Purposes," this is only the beginning of the journey of human understanding of the world. As Einstein emphasized—in perfect alignment with Marx—theory development is not only inductive but demands vision and phantasy to even be able to imagine better explanations—or a better world.

II. Translation

Albert Einstein: Causality. Lecture at the Marxist Workers School 1930 (private notes by Karl Korsch)

Introduction

Einstein explains that he wants to tell the audience something about the laws of nature, as if we had never heard of them before. He wanted to talk about certain difficulties inherent in the concept. No written report should be published about this:

We have all been taught that everything in nature is lawful, that there is nothing problematic about it. For example, a stone falls downwards. This process is repeatable the same. It is similar with the clock.

You only need to re-establish an initial state in the same way, then the same sequence will result. Such experiences give rise to the idea that perhaps everything else that happens in the world could follow the same pattern as a clock. This idea already emerged in ancient Greece with a very poor and primitive knowledge of the course of all natural processes. The Greek philosophers were convinced of the strict regularity of the course of events. It is part of this idea that this process occurs according to laws that we can find. This is what is meant by causality.

Collaborative dialogue

Einstein invites listeners to ask questions without feeling embarrassed. Before God, everything is equally clever and equally stupid.

The first listener objects that the clockwork does not run at a uniform speed, but starts with a higher initial speed. —Einstein replies: “The process proceeds in the same way every time, even if the individual parts of the process do not always remain the same.”

Second listener asks about the validity of causality for animate nature. —Einstein replies that he will answer this question later.

Third listener asks whether man is a machine. —Einstein says that he will answer this question now.

Continuation of the lecture

If we can clearly see the regularity of processes in simple cases, why did it take such a high level of development for people to come to this realisation? The reason is easy to see. I can say what I want, turn my head as I like, where is the law?

The phenomenon of being able to act as one wishes, is naturally at the centre of human interest. Even more so than the running of the clock and the falling of the stone. Prehistoric humans were therefore originally more inclined to organise the world according to the scheme of volitional acts rather than causality. For example, they related lightning, death and all the important processes associated with their hope and fear to an unknown will. This was the so-called animistic view of events. How should we respond to this question? The resigned answer is: nothing can be proven. For what would we have to have achieved in order to be able to say with justification, without unauthorised presuppositions? The world is causal. We would have to be able to characterise the initial conditions of all things and the exact nature of the sequence, and we would have to have established all this. Then we would have God's view. We are ridiculously far from that.

So with causality we express a *belief*, but never a *knowledge*. It is an idea that we entrust ourselves to if we want to understand the connection between natural processes. Essentially, however, those who have seriously studied nature are completely convinced of this kind of causality or determinism. According to this, for example, whether I say A or B is also causally determined.

Even with these opaque, seemingly internal entities, everything depends on previous conditions, like a clockwork. Except that we have no hope of seeing through it as deeply as we do with clockwork. We do not have such a deep insight into the states of the brain, for example, that we could determine in advance with a kind of calculation what the individual creature will do.

We are also familiar with such structures where we are more easily convinced that everything proceeds according to certain laws, and yet we are unable to predict anything. For example, the course of the weather over several months, the processes in the atmosphere. Natural scientists know and understand these processes, but the diversity of interactions between the various factors is too great to allow predictions to be made. This is simply due to the complexity of the process. In the same way, the natural scientist thinks, it will be even more so with the volitional acts of living creatures.

So the natural scientist is a determinist. But for him this is more a belief than knowledge. Without this belief it would have been impossible to muster the energy to investigate those laws in nature that have been more or less clearly recognised up to now.

This deterministic view imagines the causal connection in nature as perfect and seamless—but not as a truth per se, but as a belief, or as a proposition, which is used to give us the courage to search for more subtle laws.

A new question

A listener asks: How is man capable of knowing? —Einstein answers: We can't say.

The same listener goes on to ask whether there are such limits to knowledge that the possibility of transcending them does not lie within man. —Einstein replies that he wants to clarify this question when discussing a complex that is in itself accessible to knowledge:

The investigation of the laws according to which the stars move appears to be a task that obviously falls into two parts. We can 1. determine by measurement, e.g., the distance of the Earth from the sun and its motion, its curve, speed, etc. We can determine all these facts. But there is a second task: 2. to determine the general rule according to which this movement takes place, so general that it can also be applied to other stars. Guessing this law is not simply a matter of observation.

Natural scientists have determined the true orbit of the Earth by the astute use of observations of planets and fixed stars. We will not go into this in detail now. We will assume that it is approximately determined by observation. Kepler then came up with the following theorem: This orbit has the shape of an ellipse. No matter how long he looked at it, he could not have found the law of this orbit. You have to know this kind of curve, which is called an ellipse, in advance by thinking about it. Then you can see whether this object, i.e. the movement of the Earth, corresponds to this kind of mentally determined curve. This can then be found by numerical comparison.

So we see that the formulation of laws is something that does not come directly from experience, but only through the shaping of the mental expression material with which one tries to express what one really observes.

Einstein explains his view by comparing science with poetry. He says: "You hear a bird singing, see the blue sky and a tree with a bird. But you have to make the poem yourself. —It is the same in science: we have to create the formula and apply it in such a way that we do justice to what we observe. The lawfulness of events does not fall into our laps if we only look; we must also create."

Working group dialogue

A listener asks about the difference between psychological and natural lawfulness and in turn asserts the existence of a special psychological lawfulness which entitles the poet, for example, to say "If it is madness, it has method." —Einstein replies: "We are not talking now about the processes that go on inside us. We don't want to talk about psychology."

Another listener repeats the question of how far we can go in determining the laws of nature. —Einstein: “No one can answer that question. (Just as little as the other question of how far we can go in designing machines to produce the necessities of life).”[1]

A listener asks about the meaning that Einstein associates with the word belief. —Einstein: “Belief in the laws of nature is not a mere belief, because that would be a foolish belief.”

We have learnt to formulate a relatively large and subtle number of relationships in such a way that we can predict with certainty how things will happen. For example, the orbit of the Earth and Mars. So it is not an empty belief.

There is a certain connection of phenomena that are sufficiently simple that we can penetrate to exact prophecies about what will happen. But the vast amount of events that surround us are not sufficiently clear to us to be able to say that we can make precise statements about what will happen. That is where faith comes in, where our solid knowledge stops.

Our view that it would be possible, in principle, to grasp the rest—in such a way that we would be able to predict the future if the present were known—is a belief, a belief in the complete causality of events. It is as much a belief as the expectation that we would be able to fly was a belief a hundred years ago.

A listener suggests that Einstein should now finish his lecture without interrupting it with questions. —Einstein declares this to be reasonable.

Coherent lecture

From what has been said so far, we can already see that the establishment of the laws of nature is not something as purely empirical as it appears to be. For in order to express laws, one needs certain thoughts. They do not come to us from nature. Instead, we must somehow create them ourselves, even if nature suggests that we form these thoughts. For example, how does a body fall? Do we need the concept of time, length, number?

Where do we get the concept of number, for example? There may well have been some needs in practical life that made the use of numbers expedient for us in order to find our way around better. But the need does not provide the number. The number has to be invented. A humansubjective element is therefore unavoidable here.

Nature does not speak its laws into our ears, no matter how closely we observe them. The mental invention can only be compared retrospectively with what we perceive. Purely empirical research into nature— without a speculative element that forms thoughts independently—is impossible. Such a law is therefore not only a reproduction of our sensory experience, but also a mental formulation shaped by us. And yet it is not man who makes the laws of nature, but man who must grope around in nature with

[1] I’m not sure whether this sentence was said by Einstein or whether I intentionally added it for possible discussion. KK.

his thoughts and mental forms until he succeeds in expressing with his self-created language what he observes in nature.

From here we can go back to the original question: If we ourselves fabricate the thoughts and concepts with which we want to master nature, how can we still speak of the laws of nature? After all, it is our lawfulness that is carried into nature!

But that's not how it is. For nature would be very well conceivable in such a way that we could not establish anything that is true in nature with any intellectual methods or methods of measurement. Nature must have the incomprehensible quality of being comprehensible. It must somehow be such that it can be captured and made comprehensible by our thoughts.

Let us imagine that the Earth was constantly changing the way it moves and that we could not account for this change, that the change was irregular, then no herb would grow to maintain the laws of nature. We would then have to resort to completely uncontrollable imaginings in order to maintain the idea of causality. So it makes good sense to say that nature is lawful, because otherwise our efforts at prediction could never lead to a favourable result.

Now we need to say a little about the approximate results that have been achieved with regard to the laws of nature. With the help of the mathematical method, the course of the stars can be predicted with great certainty and accuracy. We can also say something about the transport of heat, the way chemical reactions take place, and mechanical and electrical processes. Today's radio technology is also based on considerations that are based on laws that we recognise clearly and completely.

In contrast, until a few decades ago, causality or lawfulness or determinism in nature was not a problem at all. People were convinced that nature was such that its laws could be fully understood in principle. But today we can say that the deeper we penetrate into nature, the more enormous its riddle piles up before us. I would like to point out the difficulties that arise here step by step:

I have already noted at the outset that one difficulty consists in the apparently immense complexity of certain natural objects, which prevents us from fully grasping the causal becoming in the area in question. For example, in the case of living beings or processes in the atmosphere.

There are other cases, however, which belong to the realm of the apparently quite simple, where similarly great difficulties pile up which are of much more immediate interest from the point of view of the general causal apprehension of things—though these processes appear quite insignificant to everyday life.

I will relate the following: In the attempt to conceptualise the phenomena of heat in causal terms, the view has been arrived at that the smallest parts of bodies, the molecules, perform irregular movements, the more violent the higher the temperature. These movements of the smallest particles are completely irregular. For example, the pressure of the gas in a vessel on the wall of the vessel consists of the molecules bouncing and flying back against the wall. This theoretical concept has now been used to calculate law-like relationships.

With this theory, we can already see a new fundamental difficulty for our question of causality, which we did not think of at first. At the beginning we spoke of a clock. It was wound up. Now the system was in a certain state, and the process was absolutely necessarily determined. However, this is only a very crude idea. In reality, there is always a variable temperature in space, there are certain air currents, the Earth's magnetic field always has a slightly different value where there is electricity, etc. All this also influences the processes in the system.

Just like the processes that constitute the clock; changes the wood, the material parts, etc. But in the case of the clock, we can understand the matter without these complications. It is different with the gas: here we do not need to know how the individual molecules fly through space— if it is true at all; it is enough to perceive the pressure on the vessel wall. But when we talk like this, we have taken a different position than we did at the beginning. We never know exactly what state the individual molecules are in. If we nevertheless calculate law-abiding events, then causality takes on a somewhat different character. The preconditions according to which we carry out our calculations are indeed strictly lawful. But the strict sequence of cause and effect as such eludes our experience.

After all, that wouldn't be so bad. There are phenomena that are very easy to observe, which show us this character of the construction of the world very directly: For example, if we place a small grain with a diameter of $\frac{1}{2}$ 1,000 mm in a drop of water under the microscope, we can see that this grain does not stand still, but makes irregular zigzag movements. It moves about 2/1000 mm to the right or left, which can still be seen very clearly under the microscope. The movement is absolutely irregular. And if you had seen nothing in the world but that, you would say the other way round that there is nothing to do with causality.

But someone has calculated before all observation that it should be like this, such an irregular dance. And if I observe a hundred times how much to the right and left the particle has travelled in a second and I take the average, then you can calculate from the theory how large these paths must be on average—depending on the fluidity and the size of the particle, but regardless of whether it is heavy or light. Such *statistical laws* can be derived with rigour from the previously discussed laws of nature.

This is only a sublimation of the concept of causality. We still believe in the strict causality or determinacy of nature. But we are convinced that the actual structure of natural objects is such that we can never observe the state of an entity at a given time precisely enough to determine unambiguously what will happen next.

We can be glad that such phenomena were not the first to come to our attention, otherwise we would never have had the courage to establish a principle of causality as a maxim of research.

This example has not yet caused any particular revolution in the physicists' view of nature. For we need not be upset by the fact that in a particular individual case, we cannot observe the state of a physical thing so precisely. It is enough that we can calculate what is really to be observed, the statistical laws of becoming and happening, on the basis of a law which is itself a completely causal law—of the kind of laws we have in astronomy, that is, of a strictly deterministic structure.

Finally, I would like to say that physics is currently in a third phase, where at least a large number of physicists no longer believe in strict causality or determinism. Imagine if, before we had established the laws of molecular motion from other phenomena, we had discovered this Brownian motion of particles in water. Then we would have said: there is complete lawlessness for this particle.

The law now says: If I observe the particle a hundred times, it will make certain movements on average. It is therefore a *statistical law*.

Until recently, it was generally believed that this was only due to the limits of our ability to observe. But physics is currently faced with phenomena, so-called quantum phenomena, where it has not yet been possible to devise a strictly deterministic mechanism that would make these things comprehensible to us. I would like to mention a few such phenomena which we have not yet been able to master with a deterministic theory:

1. radioactive processes: A lot of radium shoots out particles. The individual atoms of radium burst and certain fractions, which are helium atoms, are thrown out with great vigour. When they hit a plate with a phosphorescent coating, we see a flash of light on the plate. So here we have a direct manifestation of individual molecular processes.

The first question is now: How do these atoms decay? The first thought was that there are some external influences, rays or something like that, that do this. But it turned out that there is absolutely nothing in the world that we can blame for this. It is the substance's own law to disintegrate or as we can also say, to "die." So what is the manner in which this substance decays? If we were to carry out the same experiment with human beings, we would find that relatively few die at first; when they get old, they die like flies. The death rate would therefore depend on the age of the substance.

In reality, it has been shown that there is no ageing in radium. If we first have the ratio 1:100 in the unit of time, then later we have the same ratio again, 1:100. It has not yet been possible to devise a reasonably reasonable causal theory for such a process. Even if one would always assume that the radium's time of existence must express itself in its inner nature, as an ageing weakness, it has not been possible to devise a mechanism for this. —This is also by no means an isolated case. Rather, this behaviour is quite general in molecular processes. Let me give you a second example: If you use short-wavelength light (something beyond the visibility at the blue end of the spectrum) on a metal plate in a vacuum, so-called electrons emerge, which can be observed using suitable means. In weak light, these are only very few electrons. The surface consists of an enormous number of atoms, all of which are irradiated, but only here and there does an electron emerge from an atom.—This statistical behaviour, too, has never been explained by a deterministic picture.

A large number of today's theoretical physicists are convinced that there is no strict determinism at all in nature, but that the very last laws are to a certain extent statistical laws—as with Brownian motion. According to this, even the most precise observation of the radioactive atom would not reveal when it would decay, but only a law of probability would apply, which does not allow any further analysis. These physicists therefore believe that the deterministic law, which gross experience so conspicuously presents to us, is only an effect of large masses and numbers, i.e. something similar to the laws of mortality according to the statistical table.

It must be admitted that the difficulties that stand in the way of establishing ultimate deterministic laws are very great. It is also possible to consider them fundamentally insurmountable.

Personally, however, I openly admit that I do not share this pessimism. It would be something so strange, a nature that had statistical but not deterministic laws. The human mind's hunger for beauty speaks in favour of determinism, and so far it has been shown that, in the end, the beautiful is also the truth.

Questions and answers

A listener asks: Where do the mathematical forms of our thinking come from? —Einstein: A very sensible question! Psychologically speaking, most of the thoughts that are conceived, especially the elementary ones, are probably somehow suggested by external experiences. Numbers, for example, or figures such as the ellipse, which arises quite naturally when a string is used to describe the largest closed circle around two fixed points marked with nails. But we still need to have the concept of a line. Strictly speaking, there are no ellipses in nature, only irregular, similar curves. Nevertheless, for the concepts of geometry, it is still easy in this way to determine the experience that led us to form these concepts.

However, there are primitive peoples who, for example, do not have the concept of the number 2. For them, "two nuts" is something different from "two apples." Generally speaking, there is always something in the formation of our concepts that is not forced on us by external experiences, but that comes from us. So there really is something creative in these concepts. And without these concepts we are not able to express anything.

The same listener asks whether this view does not amount to dualism. —Einstein: I wouldn't call it dualism. Poetic language and the things sung about is not dualism either. After all, it is true that if the conceptual tools, i.e. the terms with which we represent a certain series of experienced things, are chosen differently, then the regularity, i.e. the poem, can look quite different. It is therefore possible for two reasonable theories to be quite different and yet both correct in a certain sense.

Another listener asks why there is only one mathematics? —Einstein: It is multifaceted. There are different geometries, etc.

Another listener makes lengthy remarks about whether mathematics in all its forms is really metaphysical and cannot be justified in any way. As a Marxist, he is used to linking all his thinking to historical events. And if he took Marx as the basis for his logical views, Marx would explain that all ideological events, including mathematics, are dependent on the mode of production. He therefore believed that mathematics could only have its origin in productive actions and was therefore just as real as these human actions. In his opinion, this would establish the link between mathematics and the practice of life. —Einstein: In my opinion, the points of view I have discussed and the Marxist view are by no means mutually exclusive. For me, the Marxist view is nothing other than the scientific, psychological, causal view of everything that humans do as a lawful life process. My question today, however, was directed at something else. I asked whether what can be found in the concepts can also be found in the experiences to which the concept refers. In this sense, I said that mathematics is logically independent of the experiences it expresses. *Psychologically* it is different, but that is not what I was talking about. The Marxist view now seems to me to be specifically not only a causal one, but one in which *external causes* are pushed to the fore as the essential ones. That seems to me to be a certain one-sidedness. The psychological parts of the causal complex, man, his tradition, etc., will have to be ascribed an influence equivalent to that of external causes. The question of the distinction between the two sets of causes seems to me to be like the famous question of the scholastics about the priority of hen or egg. The Marxists, however, give the external causes an exaggerated importance. For example, the Marxist will gladly say that the invention of machines is a consequence of certain external circumstances, e.g. the thin population of a country, the shortage of labour, etc. But the reverse is also true.[2] Economic conditions are also created by certain mental dispositions. The term "interaction" is not a solution here either. The question is what weight is given to the individual factors.

A listener asks whether Einstein believes that there are still voluntary actions? — Einstein: The term "voluntary" does not belong to the domain of a causal view of the world. The determinist calls *will* the feeling a person has when something happens to him. Will as a cause does not occur for him.

After a leading member of the MASCH has argued that the lawfulness of the development of human society certainly has the character of a statistical lawfulness and that there is therefore no reason to doubt causality as the basis of communist politics from the recent development of natural science, Einstein also agrees with this assertion and says: "These refinements have nothing at all to say about the legal necessity of human events. This is quite independent of whether the ultimate laws of nature are statistical or strictly causal in character."

[2] Marx e.g. says the opposite in "Capital" about machine and population density. Note by K.K.

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