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Las Enfermedades Infecciosas Transmiten Filosofía

Summary

Infectious Diseases Transmit Philosophy

Already in January 2020, the coronavirus had spread worldwide. By 1 June of the same year, more than six million people had been affected and approximately 370,000 had died. In Japan, a state of emergency was declared. People refrained from going outside, and the closure of businesses was implemented. In Japan, more than 17,580 individuals were affected and 910 died. These figures are not as high as in the United States, where 1.77 million people were infected and around 100,000 died. We must remain vigilant, as there is concern that these numbers may increase exponentially in a short period of time. I write this article as a precaution, for future reflection.

With regard to infectious diseases and philosophy, the "Plague of Athens" in Thucydides' *History of the Peloponnesian War* (circa 430 B.C.), when Socrates was 40 years old, is famous. Various theories have been proposed concerning the nature of this infection, but I assume that it was a hemorrhagic fever caused by the Ebola virus. It was a great tragedy in which, it is said, a thousand soldiers out of a total of four thousand perished. The plague and the war continued for about thirty years. As a result, Greece was devastated and plundered; killing became a daily routine, and people sank into hopelessness, darkness, and nothingness. From the depths of this darkness, the Greeks began to seek justice, peace, and love, and to pursue human ideals. Thus philosophy was established.

In the face of the mysteries of nature, human beings have no power, as Pascal also observed. Socrates experienced this nothingness in his own life while serving as a soldier, and he used this circumstance to elucidate ignorance. His theory guided Plato and Aristotle at the height of Greek philosophy and remains valid in modern times. The great tribulation brought about by the plague gave rise to philosophy. The coronavirus crisis is global and represents a threat to the human race, but it is also a sign of the emergence of a new philosophy—indeed, it may already have emerged.

Keywords: Virus, corona, infectious disease (COVID-19), pandemic, Plague of Athens, Thucydides, Ebola, Socrates, nothingness, Confucian benevolence and Aristotelian *philia*, principle of Nothingness and Love, Biocosmological Association.

Resumen

Ya en Enero del 2020 el coronavirus se había extendido mundialmente. Para el 1 de Junio de ese mismo año más de seis millones de personas estaban afectadas y aproximadamente 370.000 murieron. En Japón se declaró el estado de alarma. Las personas se abstuvieron de salir de casa y el cierre de los establecimientos se llevó a cabo. En Japón más de 17.580 personas se vieron afectadas y 910 murieron. Estas cifras no son tan elevadas como en EEUU donde 1.77 millones se infectaron y alrededor de 100.000 murieron. Debemos estar alerta porque existe la sospecha de que estos números aumenten exponencialmente en poco tiempo. Escribo este artículo con prevención para reflexiones futuras.

Sobre enfermedades infecciosas y filosofía es famosa “La peste de Atenas” en “*Historia de la Guerra del Peloponeso*” (circa B.C. 430) de Tucídides, cuando Sócrates tenía 40 años de edad. Hay varias teorías sobre la naturaleza de esta infección pero yo asumo que se trataba de fiebres hemorrágicas causadas por el virus del Ébola. Una gran tragedia en la que se dice un millar de soldados de un total de 4000. La plaga y la guerra duraron todavía unos treinta años. Como resultado, Grecia quedó abrasada, saqueada; el asesinato era una rutina diaria y las personas se sumieron en la desesperanza, en la oscuridad y en la nada. En el fondo de esta oscuridad los Griegos empezaron a buscar justicia, paz, amor y a perseguir ideales humanos. Entonces se estableció la filosofía. Ante los misterios de la naturaleza los humanos no tienen ningún poder como también dijo Pascal. Sócrates experimentó en sí mismo esta nada cuando estaba cumpliendo como soldado por lo que aprovechó la circunstancia para explicar la ignorancia. Su teoría guió a Platón y a Aristóteles en el apogeo de la filosofía Griega y continúa vigente en tiempos modernos. La gran tribulación provocada por la plaga dio lugar a la filosofía. La crisis del coronavirus es global y es una amenaza para la raza humana pero también es un signo de la emergencia de una nueva filosofía. O quizás haya emergido ya.

Keywords: Virus, corona, infeccioso (COVID-19), pandemia, peste de Atenas, Tucídides, Ébola, Sócrates, nada, benevolencia de Confucio y philia de Aristóteles, principio de la Nada y del Amor, Asociación Biocosmológica.

INTRODUCCIÓN

La epidemia de coronavirus que apareció en Diciembre de 2019 se extendió por el mundo en un instante. El posible origen de la pandemia se sitúa en Wuhan (武漢), una de las ciudades más populosas del centro de China. Tiene una población de 10.89 millones de habitantes y alrededor 30 millones en su área metropolitana. Es tres veces más grande que la capital de Japón, Tokio. El virus apareció en el mercado de marisco (Huan Seafood Wholesale Market). En el pasado, en el caso de S.A.R.S (Severe Acute Respiratory Syndrome), fueron enviados desde Estados Unidos investigadores al Instituto de Estudios Viroológicos de Wuhan de la Academia China de Ciencias desde donde una rápida respuesta conjunta fue elaborada. Francia también prestó su apoyo a este instituto. Sin embargo, en esta ocasión, Estados Unidos y China estaban en conflicto y la comunicación se interrumpió entre estos países. Estados Unidos no mandó investigadores hasta mitad de Febrero. Hasta esa fecha China no los había aceptado. Solo China tenía información sobre la situación.

1. CONSIDERACIÓN METAFÍSICA SOBRE EL CORONAVIRUS

Un coronavirus no es un ser vivo. Sin embargo, posee RNA o DNA y está rodeado por proteínas. Es por ello una masa de ácidos nucleicos y proteínas. Sin embargo,

cuando el virus entra en un ser vivo, prolifera como una forma de vida causando una variedad de efectos adversos en los humanos. En otras palabras, es materia inerte que viene a la vida cuando coloniza la de un ser vivo. Si uno afirma que es materia, entonces es materia. Pero si uno afirma que es vida, entonces es vida. Es algo que va más allá de ambos y no puede ser explicado mediante la dicotomía convencional materia o vida. Lo cual merece una consideración metafísica. Puede ser explicado mediante la lógica de La Nada Absoluta (Absolute Nothingness). Si uno dice que existe, entonces existe. Pero si uno dice que no existe, entonces, no existe. Esto es como no decir nada porque va más allá de las palabras. Esto requiere el desarrollo de una cosmología. Ya he predicado sobre la creación del mundo a partir de la nada¹. Antes de La Creación no había nada. El universo ocurrió a partir de una fluctuación de la nada (shaking nothingness). El Big Bang se produjo y el universo comenzó a expandirse. La energía que generó el Big Bang y provoca esta expansión es el flujo de la vida. Así es como la antigua cosmología China relata el origen del universo a partir de la nada. Es compatible con el concepto de energía que tiene la Asociación Biocosmológica² según su visión global del mundo. A partir de este concepto, los físicos han propuesto los conceptos de energía de vacío (vacuum energy), y materia oscura. Esta energía llena el mundo y el universo. La física ha confirmado la existencia de átomos, quarks, neutrinos etc.. Desde que se produjo el Big Bang hace 13.8 millones de años, se crearon cuerpos celestes, galaxias, sistemas solares, la tierra y la vida. Los virus son creados por esta energía y van inmersos en el flujo de vida. Aparecieron hace unos 500 millones de años. Son mucho más antiguos que la humanidad. La materia se genera a partir de la energía, pero uno podría decir que un virus es un estado intermedio de existencia, entre el flujo de vida y la materia. Pero, materia o vida son expresiones claramente delimitadas. Hay varios tipos de virus como estos que no se pueden extinguir porque pertenecen al flujo de energía. Es fácil de entender si se piensa de esta manera; es ubicuo y latente. El término físico correspondiente es partícula virtual³. Aunque no existen, de repente existen. Aparecen en un momento dado y de repente desaparecen. Parecen fantasmas. Un coronavirus es materia que en algunas situaciones crece como un organismo vivo. Sin embargo, aunque a veces desaparece, vuelve a aparecer de nuevo como respuesta a cambios de temperatura y del ecosistema.

Infecta y afecta a diferentes seres vivos incluyendo a los humanos. Ponen en riesgo la vida. A lo largo de la historia han existido numerosas plagas infecciosas pero los seres humanos se las han arreglado para sobrevivir. Ha sido una bendición del cielo que desde la pandemia de la gripe española de 1918 (1918-1920) no se haya declarado en cien años ninguna otra a nivel global.

¹ Creation from nothingness, „Philosophy of nothingness and love”, Chapter 3, Nothingness in the Bible, Hokuju Company, Tokyo, 2002, p. 117, English version, Lambert Academic Publishing, Saarbrücken, 11 2016, pp. 169–170, ‘The Synthesis of the theory of relativity and quantum theory’ Elixir I.

² Biocosmological Association, Chief editor is Konstantin S. Khroustski (Veliky Novgorod, Russia). As he is philosopher and medicine, his study field is wide. Since, many various and creative papers are published in the articles “Biocosmology-Neo- Aristotelism”. The characteristics of the society are close to those of my philosophy.

³ Virtual particle. This particle is not directly observed in the experiment. But this is confined in the intermediate process of reaction and disappears.

2. LOS ESTRAGOS DEL CORONAVIRUS

El Dr. Li Wenliang (李文亮), que fue el primero en descubrir el coronavirus, contactó con sus colegas, pero justo antes de la convención del Partido Comunista la policía china les castigó por alborotadores. El Dr. fue obligado a firmar un documento de autocrítica confesando que fue detenido con sus colegas por elaborar información falsa. Mientras tanto el virus se extendía. Se puede decir que el virus se filtró desde las profundas cavernas del conflicto entre China y USA. En el momento de la infección no se observan síntomas. Luego hay un período de incubación de dos semanas. Después, una fiebre de 37.5 grados persiste durante cinco días y de repente, aparece un cuadro de fiebre alta con dificultades de respiración que conduce a la muerte. El virus es difícil de identificar durante el periodo de incubación. Las autoridades chinas reconocieron oficialmente la existencia del virus el 20 de Enero y la ciudad de Wuhan fue sellada el día 23 de ese mes. Pero fue muy tarde. Wuhan es una ciudad central del sur de China en cuya zona rural viven repartidas muchas personas. China es una nación globalizada por lo que el virus se ha extendido por todo el mundo. En Japón el crucero Diamond Princess atracó inesperadamente en el puerto de Yokohama. El capitán del barco pidió ayuda pero los pasajeros no pudieron ser evacuados debido a que el periodo de incubación aconsejaba aislarlos durante dos semanas. Alrededor de 3.700 personas estaban atrapadas a bordo del barco. El super crucero de lujo se convirtió en una trampa. China bloqueó la ciudad de Wuhan por mandato oficial. Prohibió la salida y la entrada del país y murieron alrededor de 7.000 personas. Xi Jinping declaró que fue una “Victoria del Partido Comunista Chino”. Después, desde China han sido enviados numerosos paquetes de ayuda a muchos países afectados por la pandemia.

Por otra parte, fue EEUU el país que sufrió el conflicto. Los Estados Unidos se ofrecieron para analizar muestras de virus pero China rechazó enviárselas. Esta política enfocada solo a salvar el momento tuvo resultados mortales. Atlanta, en los Estados Unidos, tiene el laboratorio más completo del mundo dedicado a las enfermedades infecciosas, el “Center for Disease Control and Prevention (CDC)”, pero sin virus que poder analizar no se pueden tomar medidas. Finalmente los investigadores americanos entraron en China a mediados de Febrero en nombre de la Organización Mundial de la Salud (World Health Organization). Trump no entendió lo que significaba esta situación. Él confiaba en el poderoso y experimentado CDC pero de hecho desoyó el consejo de los expertos. El Partido Democrático pidió medidas contra el virus pero Trump las ignoró y las calificó de: “Conspiración antidemocrática”. Las medidas se retrasaron y no se declaró el estado de emergencia hasta el trece de marzo.

El virus dobló su velocidad de propagación en unos pocos días. El número de infectados creció exponencialmente llegando a las decenas de miles en una semana. Por ello en la superpoblada New York hacia el 19 de abril habían muerto 20.000 personas. Al igual que en Italia y Francia no había tiempo para funerales. Europa también estaba en un estado lamentable. Como existe una cultura de cercanía personal y el uso de mascarillas no es un hábito diario la infección se extendió rápidamente, además no había seguimiento de personas infectadas. Especialmente en Italia donde hay muchos ancianos, el número de muertos era muy alto, junto con España y Francia. Las grandes urbes se convirtieron en ciudades fantasmas con poca gente en calles como

Los Campos Elíseos en Francia y Main Street en Nueva York. Solo Korea, Taiwan y Vietnam lograron contener el virus.

Japón también sufrió 910 muertes. Los hospitales en el área metropolitana de Tokio estaban casi al borde del colapso. La administración de Abe ordenó la consolidación de hospitales debido a los problemas financieros. Muchos hospitales han desaparecido debido a sus bajos beneficios. Ocurre lo mismo con las escuelas en la educación. Este es el resultado de la búsqueda de beneficios. Las enfermeras no son bien tratadas y no pueden prolongar su actividad por muchas horas. En algunos casos tiene que dejar el trabajo cuando tienen hijos. Lo mismo ocurre en las guarderías y con los cuidadores de personas. Actualmente Japón tiene escasez de doctores y enfermeras pero si las condiciones laborales mejorasen esta escasez de personal sanitario se podría subsanar. En pocas palabras, como Japón está intentado que le salga barato, Japón está empezando a sufrir. Lo mismo ocurre con Rusia que vio un rápido aumento de casos en abril. Según unas noticias recientes de la televisión, en solo unos años en Japón el número de doctores y enfermeras se ha reducido en unos 130.000. En Japón el número de test PCR (polymerase chain reaction) disponibles resultó ser insuficiente como, por otra parte, se esperaba. ¿Por qué no se pueden efectuar inspecciones “drive-through” como en Corea? La razón es que el gobierno japonés no puede hacer cosas sin equipo. El número de respiradores artificiales disponibles es la mitad de los que había en Italia. Las unidades de cuidados intensivos son escasas en los hospitales generales. Parece que el número de respiradores y de unidades de cuidados intensivos se mantienen usualmente al mínimo. Recientemente el primer ministro puso apresuradamente una orden para adquirirlos de una compañía privada. Para ocultar esta falta de recursos, se planeó distribuir dos mascarillas a cada familia. Actualmente el presupuesto de sanidad y educación se ha recortado para cubrir la escasez de máscaras. Este gesto parece que está encaminado a proteger la vida de los ciudadanos pero en realidad es para disfrazar el fracaso de la política de reducción de presupuestos. El gasto ascendió a 3.8 millones de euros. Aunque el primer ministro elogió el efecto de la política económica del primer ministro, “Abenomics”, ha sido irónico en relación al efecto de las mascarillas “Abenomask”. En mitad de la pandemia, las hábiles amas de casa confeccionan sus propias mascarillas (lavables y reusables) como antaño. Antes de las mascarillas desechables, solíamos lavar y usar varias veces una mascarilla de gasa. La expresión simbólica tradicional es “MOTTAINAI” (¡Qué derroche!), expresión que la bióloga y ecologista keniana Wangari Muta Maathai, premio Nobel de la Paz en 2004, gritaba al mundo para pedir moderación. Era más aconsejable dar prioridad al sector médico y dotar de equipo de protección y máscaras al personal médico que dárselos a las familias.

Las máscaras que se repartieron eran mortalmente defectuosas. Se encontraron pelos y moho por lo que no podían usarse con confianza. El 70 por ciento de los ciudadanos estaban descontentos. Los colegios se cerraron desde el 2 de marzo hasta el 31 de mayo. Los estudiantes que no podían asistir a las clases se consumían en casa provocando conflictos con los padres.

3. RAZONES DE LA EXPANSIÓN MUNDIAL

Durante el pasado brote de SARS, la cooperación entre China y Estados Unidos produjo una respuesta inicial temprana. Por eso no se expandió por el mundo. Pero esta vez ocurrió de manera diferente: había un conflicto entre China y Estados Unidos. El lema del Presidente Trump para su legislatura era “America First”. Su prioridad era reconstruir la economía y el poder militar. Pero China estaba enfrente. China adelantó a Japón como potencia mundial situándose en segundo lugar en la lista de países poderosos. En China hay varios grupos étnicos. Para controlarlos el líder siempre tiene necesidad de crear un enemigo externo por lo que vierte estas contradicciones domésticas por Japón y América. China también proclama su “China First”. Naturalmente el conflicto se produce. Este conflicto se materializa en el terreno económico, creando aranceles y controles a las exportaciones y a las importaciones.

Trump llevó a cabo un recorte económico en sanidad. El famoso seguro médico universal, el Obama Care⁴ fue suspendido. Este recorte hizo que se suspendiera temporalmente la contratación en el Instituto Nacional de Enfermedades Infecciosas de Atlanta. Trump dejó de enviar investigadores al Instituto Nacional de Wuhan de la Academia China de Ciencias interrumpiendo la investigación conjunta. Cuando sólo había personal investigador chino empezaron a investigar con nuevos virus procedentes de murciélagos para mostrar su nivel de investigación (y posiblemente para convertirlos en arma militar). Se sospecha que se trataba del coronavirus. El virus se filtró desde el laboratorio y se extendió por el mercado según se dice en un informe del Profesor Xiao Botao (肖波涛)⁵ “The possible origins of 2019-n-CoV coronavirus”. En esos momentos, los murciélagos no se vendían en el mercado de mariscos. Hay otro instituto de virología, el Wuhan Center for Disease Control Prevention, cerca de este mercado. En este Centro situado a 280 metros del mercado había alrededor de 600 murciélagos. A veces, los murciélagos se lanzaban contra los investigadores infectando accidentalmente a algunos de ellos que posteriormente fueron al mercado de mariscos desde donde se empezó a extender el virus. Este es el contenido del artículo publicado en Research Gate el día 6 de febrero del 2020. Pero dicho artículo fue eliminado rápidamente y el Profesor Xiao Botao es hasta la fecha en paradero desconocido. El gobierno Chino y la Oxford Academy han negado que este fuera el origen de la pandemia. Actualmente está bajo investigación pero hay fallos cruciales.

Los doctores que descubrieron personas infectadas a mediados de diciembre del 2019 fueron castigados. Descubrieron que el virus no era normal, que era peligroso, como el SARS. La Dra. Ai Fen (艾芬, director de emergencias del Hospital Central de Wuhan), El Dr. Li Wenliang (departamento de Oftalmología del mismo hospital) y 6 personas más fueron expulsadas. El Dr. Li se infectó con el virus y murió en febrero. La escena del ventilador fue emitida por televisión en el extranjero. La Doctora Ai

⁴ Obama care: Patient Protection and Affordable Care Act (2010) by Barack Obama.

⁵ Dr. Xiao Botao is the professor of South China University of Technology. He studied in Harvard University. Kensaku Tokito, The full impact translation of ‘Erase Corona paper’ of missing Chinese researcher will be published. <https://gendai.ismedia.jp/articles/-/71310> Cf. Prof. Naoki Saito (斎藤直樹 Yamanashi Prefectural University), ‘The mystery on the origins of new coronavirus’, e-Discourse “Hundred Schools of Thought Contend (百家争鳴)”, The Council on East Asian Community (CEAC), Tokyo, 2020-04-02, <http://www.ceac.jp/j/index.html>

Fen escribió una nota sobre la situación pero desapareció y su nota fue borrada. Aunque su nota fue eliminada de repente, los editores de otros países la volvieron a hacer pública.

El 2 de enero la doctora recibió una llamada del comité disciplinario del Partido Comunista del hospital. La llamada fue como sigue: "¿Por qué propagas rumores y causas problemas? El oficial continuó: "Cuando vuelvas, no les digas falsedades a los 200 empleados que trabajan en la sala de emergencias. No lo hagas en Weibo (famosa aplicación de chats en China) o por email. Habla directamente o llama. No hables con nadie sobre pneumonia, ni siquiera con tu marido...."

"Estaba aterrada. No sólo me acusaban de negligencia en el trabajo, era como si el brillante desarrollo de la ciudad de Wuhan podía ser obstaculizado por mi. Estaba desesperada."

"Wuhan Chinese Female Doctor's Note" Bungeishunju May issue 2020 and Bushun Online: <https://news.yahoo.co.jp/articulos/439a6481a1ace5d82c375c87575d6e639ce1de03>

En lo que el autor quiere insistir es en el gran error de las autoridades al ocultar el hecho revelado por los doctores y castigarlos por ello. Aunque los doctores dieron a conocer la existencia del brote las autoridades lo calificaron de rumor y farsa. La responsabilidad reside en la constitución nacional. Este es un sistema cuya prioridad es la seguridad del comunismo en detrimento de la verdad. La injusta ocultación de la verdad ha causado esta indignante pandemia mundial y esta tragedia que vivimos. El líder supremo de China se debe disculpar ante el mundo.

Originalmente, China es la cuna de respetados sabios sagrados en el mundo de la filosofía, como Confucio. Personalmente, tengo muchos amigos chinos. Son excelentes y no puedo imaginarme que dicha oscuridad sea propia de ellos. En 2018, el Congreso Mundial de Filosofía se celebró en la Universidad de Beijing. China se ha convertido en un país líder en los círculos filosóficos. El presidente de la Asociación Biocosmológica es el Doctor Xiaoting Liu, profesor de la Universidad de Beijing. He visitado dicha universidad en varias ocasiones y siempre me han recibido con respeto. En el campus se encuentra el prestigioso Instituto Confucio y ciertamente el trato que recibí estaba a la altura del gran maestro. El hecho de que China nos haya dado buena impresión no nos hace sospechar que oculte la verdad. Para los líderes chinos esto puede que sea una pequeña mancha o falta.

Sin embargo, el oponente era un enemigo procedente del micromundo llamado coronavirus. Los terremotos y los tsunamis son macro amenazas. Los líderes chinos menospreciaron esta amenaza del micro mundo, pero desde nuestra perspectiva, incluso un pequeño agujero es un agujero inmenso para un virus microscópico. El micro/macro análisis es un método que viene de Aristóteles. Dicho método ha abierto campos académicos en biología y astronomía. Una gran cantidad de virus fueron liberados al mundo a través de este pequeño agujero. La ciudad de Wuhan se cerró el 23 de enero. Pero en un mes el virus ya se había extendido por el mundo. Japón celebra a principios de febrero el Festival de la Nieve de Sapporo y reúne a 2.5 millones de personas cada año. Anticipándose a dicho evento, los turistas chinos llegaron a Japón antes del 23 de enero, fecha en la que comenzaba el cierre de Wuhan.

Por lo tanto, el virus se extendió por Hokkaido antes de la llegada del Diamond Princess, el crucero de lujo antes mencionado. El gobernador de Hokkaido anunció el estado de emergencia a principios de febrero. Se establecieron restricciones a los ciudadanos para que no salieran de sus casas. La primera ola finalizó pero la segunda golpeó en abril. Tokio estaba al borde del colapso sanitario a mediados de ese mes.

Los Estados Unidos fueron golpeados severamente por el virus. Trump dijo que iba a iniciar acciones legales contra China, cuya contención del virus fue una "victoria del Partido Comunista". China se dedicó a proveer de mascarillas, equipos de protección y equipos médicos a muchos países. Sin embargo esto es solo un subterfugio. China debería admitir que actuó de manera deshonesto y disculparse ante el mundo. ¿No exigieron China y Corea del Sur a Japón que se disculpase por su responsabilidad en la Segunda Guerra Mundial? Las circunstancias que rodean las desapariciones del profesor Li Xiao Botao y de la Doctora Ai Fen deben ser expuestas al público. Aunque permitieron que la doctora publicara un vídeo en su cuenta de Weibo se adivinaba que tenía restricciones de libertad y que su cara estaba oculta tras una máscara. Estas desapariciones se produjeron porque sus escritos eran incómodos. En resumen, la expansión del coronavirus es en primer lugar, resultado de la salida del virus desde la profundidades del conflicto entre China y Estados Unidos y en segundo lugar, de la injusta ocultación de información. Escribo este artículo para resaltar este hecho. Los humanistas que respetan a Confucio son contrarios a estas injusticias. Hay que decir que las confrontaciones entre países poderosos causan guerras y epidemias. Esto ha ocurrido en repetidas ocasiones en la historia. Esta idea es retomada en mi libro *"Philosophy of Nothingness and Love"*⁶.

4. SÓCRATES Y LAS ENFERMEDADES INFECCIOSAS

Los conflictos entre países poderosos provocan guerras. En los tiempos de Sócrates las potencias poderosas eran Atenas y Esparta. Políticamente, Atenas era una democracia y Esparta una potencia militar. El conflicto enfrentó a la Liga ateniense de Delos contra la liga del Peloponeso de Esparta. Esta confrontación recuerda a la moderna confrontación entre América y China. Este conflicto que fue en sus comienzos de naturaleza económica se prolongó durante 27 años. Atenas era una ciudad comercial con una buena flota que controlaba el Mediterráneo. Los espartanos tenían un ejército superior. Sin embargo, el control del mar demostró no ser muy efectivo. Fue más efectivo el control militar terrestre de varios países aunque debido a ello fueron infectados por una enfermedad contagiosa. Comenzando en Etiopía, el brote se extendió por Egipto y Libia. Se dice también que se extendió también por el territorio Persa. Para contrarrestar a Esparta, cuyas falanges eran más poderosas en campo abierto, Pericles aconsejó reagruparse dentro de los muros defensivos de la ciudad. Pero el resultado fue lamentable⁷. Las personas que se refugiaron intramuros de la ciudad se infectaron y sufrieron vómitos, convulsiones y hemorragias. Un cuarto de la población de Atenas murió. Hay varias teorías sobre la naturaleza de esta enfermedad infecciosa que asoló Atenas el año 430 a.C., fiebre roja, sarampión,

⁶ "Philosophy of Nothingness and Love", Chapter 4, Nothingness in ancient Greece, p. 147–148, English version, Lambert Academic Publishing, Saarbrücken, 2016, pp. 211–212.

⁷ "Mystery of Oedipus", Atsuhiko Yoshida, Seidosha, Tokyo, p. 216, 1995.

etc..Según un ensayo de Hiroshi Saito⁸, investigador del Saitama Medical University “...¿Fue la enfermedad de Marburg o la fiebre hemorrágica del Ébola la que sufrió Atenas?...” parece que fue una de estas dos. El factor decisivo es la alta tasa de mortalidad, la fiebre alta, las hemorragias y la zona donde se produjo el brote, África. Según Tucídides, la plaga de Atenas vino de Etiopía. El Ébola del siglo XX está localizado en el Congo. Ambos lugares se encuentran en África. Siempre han existido enfermedades infecciosas. Durante la Guerra del Peloponeso se propagaron. Atenas estaba en peligro de muerte. De un ejército de 4000 soldados murieron más de 1000. También murieron un cuarto de los atenienses por lo que colapsó el sistema médico. No se celebraron los entierros a tiempo y los cuerpos se apilaban como desechos. Los pájaros y animales carnívoros no se aproximaban a los cuerpos que no habían podido ser enterrados, sino también hubieran muerto⁹. Las aves rapaces desaparecieron. La convivencia y el orden social se deterioraron. La moralidad se resintió. Los atenienses experimentaron la oscuridad y la nada.

Sócrates vivió en estos tiempos tan complicados. Para restablecer el orden y la moralidad en un país devastado predicó la sabiduría de la ignorancia (la conciencia de la nada), el encuentro entre el conocimiento en acción y la unidad entre felicidad y virtud. Este espíritu es continuado por Platón y florece en Aristóteles. Es el nacimiento de la filosofía griega. La filosofía no solo nació como curiosidad intelectual sino de la pasión y del espíritu para reconstruir una nación. Sócrates fue un hombre que como soldado no temió la muerte. Movidado por la amistad ayudó a encontrar a un amigo que se perdió en el campo de batalla. La actitud de Socrates fue heredada por Platón y Aristóteles. Especialmente los conceptos de justicia y amistad (philia).

Ahora es conveniente hablar de la "Benevolencia de Confucio y la philia de Aristóteles"¹⁰. De la misma manera los problemas que se derivan de la pandemia originada en China tienen que ver con la justicia y la amistad. Las enfermedades infecciosas acercan las filosofías Griega y China. Ambos, Confucio y Aristóteles eran hombres honestos movidos por la verdad.

5. BENEVOLENCIA DE CONFUCIO Y PHILIA DE ARISTÓTELES

Un enorme tsunami causado por el Gran Terremoto del Este se produjo en 2011 arrasando muchas ciudades y causando 22.000 víctimas mortales. Además el tsunami provocó una pérdida de corriente eléctrica en la planta nuclear de Fukushima por lo que se apagó el sistema de refrigeración. El reactor se recalentó y hubo una explosión causada por el vapor. Todavía no se ha subsanado totalmente. Escribí sobre esto cuando Japón estaba severamente dañado por el tsunami pero en esa ocasión Japón recibió ayuda de 130 países. Los americanos se acercaron con sus portaaviones y equipos terrestres a las costas de la región de Sanriku, donde se encontraban las ciudades dañadas, transportando material de ayuda con helicópteros. Esta fue la

⁸ Saitama Medical University, the curriculum bulletin, No.8, p. 15-25 2000-03-31.

⁹ Thucydides, "History of the Peloponnesian War", "Great Books of the World : Herodotus and Thucydides" Chuōkōronsha, Tokyo, 1970, p. 366.

¹⁰ 10.The first publication of this paper was Voice of Intellectual Man - An International Journal, Year 2011, Volume-1, Issue-2 (July–December), India, Lucknow University.

operación Tomodachi (amigo) impulsada por el Presidente que en aquel momento era Obama.

Este tipo de ayuda amistosa conmovió el corazón de los japoneses. La philia de Aristóteles (友愛, yūai), que desea lo mejor al prójimo, y la hermandad entre humanos de Confucio (仁, jin) se encontraron en estas desoladas tierras. Ahora hay una crisis global. Todos los países están pasando por dificultades. Japón, Europa y América están sufriendo por igual. Sin embargo, nosotros los japoneses no queremos sumergirnos en nuestros sufrimientos sino recordar la ayuda y los beneficios que una vez recibimos del mundo. Aún más, queremos animar y cooperar con los seres humanos de este mundo. Por eso escribí el siguiente artículo del cual presento el resumen.

Benevolencia de Confucio y Philia de Aristoteles

Durante los tiempos difíciles del gran terremoto y tsunami de Japón

RESUMEN

El gran terremoto y posterior tsunami golpearon Japón el 11 de marzo del 2011. El Gran Terremoto del Este, como se ha venido a conocer posteriormente, destruyó varias ciudades rápidamente y devastó un cuarto del territorio japonés. Los daños fueron comparables a los producidos por el Gran Terremoto de Kanto en 1923 y los producidos por la Segunda Guerra Mundial. También causó daños en los sistemas de refrigeración de una planta nuclear en la cual se produjo una explosión debido a la acumulación de Hidrógeno. Esta es una triple catástrofe. Los japoneses nos enfrentamos a una gran crisis. Pero muchos países no apoyan. Los equipos de rescate y asistencia de 130 países nos han proporcionado ánimo y esperanza. No importa lo desarrolladas que están la civilización y las ciencias, están indefensas ante la majestad de la naturaleza. Algunos de los muros de protección más robustos del mundo de 10 metros de altura fueron barridos inmediatamente por un tsunami de unos cuarenta metros de altura. Tememos la majestad de la naturaleza y reconocemos con impotencia que frente a ella los seres humanos no somos nada. Pero nos ayudamos y apoyamos unos a otros en estos tiempos difíciles. En la oscuridad, la esperanza del apoyo y del rescate iluminan nuestro camino. Hemos aprendido que aunque las ciencias y la técnica avanzan rápidamente necesitamos de la benevolencia y la amistad (philia). En el artículo que se da a continuación explico estas dificultades.

"New Horizon of Sciences by the Principle of Nothingness and Love" (Lambert Académica Publishing, 2012, p.188)

CONCLUSIÓN

El coronavirus sigue produciendo daños. Con la excepción de China, Corea del Sur y Taiwán, todos los países están en estado de emergencia. Los comercios, el centro de las ciudades y las escuelas están cerrados. Incluso durante las vacaciones debemos esperar dentro de nuestras casas. Los seres humanos estamos en peligro de ser atacados por un virus invisible a nuestros ojos. Uno no puede estar siempre preocupado por la crisis. Si miramos hacia atrás en la historia vemos que una nueva

filosofía nació de una crisis. Sócrates vivió en una época determinada por la guerra y una epidemia. Los ciudadanos de Atenas también experimentaron la oscuridad y la nada y vivieron sumidos en ellas. Sin embargo, en estas circunstancias Sócrates predicó filosofía con inacabable pasión por la sabiduría (infinita), con coraje que no teme a la muerte, respeto por la voz del divino espíritu (Daimonion) y amor por la gente de Atenas. Se ajusta al principio de la Nada que desemboca en el Amor; nada→infinito→eternidad→Dios (ser trascendente)→amor. Esto fue heredado por Platón y Aristóteles. Aristóteles, como huérfano, también experimentó la nada en forma de ausencia de padres. Se preguntó sobre el infinito y la naturaleza eterna del mundo. Experimentó una continuidad orgánica entre él y el universo al intuir a un ser trascendente (Dios). Esta contemplación filosófica es la theoria como felicidad. Sin embargo esta felicidad se da en el mundo no solo en el plano individual sino como philia que desea lo mejor para el prójimo. Confucio que predicó la benevolencia (Jin) también sufrió la ausencia de padres y como huérfano buscó el infinito, el eterno aprendizaje y la verdad. Fue el cielo (ser trascendente) lo que encontró al final. La enseñanza de Confucio es la práctica de la benevolencia y el amor celestiales. Este es el nuevo horizonte de la filosofía. Desde ahora, lo que podemos hacer en medio de las tribulaciones de esta época es orar humildemente al ser trascendente por la paz y por la pronta recuperación del mundo. Es la transmisión de la filosofía lo que vencerá la próxima confrontación entre América y China mediante la cooperación del mundo.

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Life Satisfaction and Feelings of Loneliness in Marital Relationships

Summary

The aim of this article was to investigate the relationship between life satisfaction and feelings of loneliness in marriage. The research encompassed both theoretical and empirical aspects, focused on adult individuals in marital relationships. The theoretical part presented the relationship as a system, its functions and dynamics, as well as the phenomenon of loneliness in close relationships and the concepts of life satisfaction and subjective well-being.

The research results showed that positive experiences of loneliness can contribute to a higher level of life satisfaction, while negative aspects of loneliness lower well-being. An interesting and original finding is that for women, feelings of loneliness have a strong relationship with life satisfaction, while for men, such a relationship does not occur, suggesting differences in experiencing relationships and regulating emotional needs.

The study emphasizes the importance of the quality of partner relationships and individual emotional regulation mechanisms for the mental well-being of adults. It also indicates potential directions for practical actions in the area of marital support and psychological interventions. The results of this work represent a significant contribution to the literature on marital psychology and subjective well-being in middle and later adulthood.

Keywords: life satisfaction, loneliness, marriage, mental well-being, adults.

THE CONCEPT OF LONELINESS

The issue of loneliness is becoming increasingly common and is the subject of research in various fields, such as psychology, sociology, psychiatry, literature, and philosophy. An essential element of the considerations on loneliness is establishing its definition. Loneliness in psychology is defined as a subjective emotional feeling of social isolation and a sense of being cut off from others, which can occur independently of the presence of people around the individual (Mikołajczyk, 2014). Loneliness is the lack of emotional bonds, not just physical solitude (psychocare.pl, 2023).

TYPES OF LONELINESS

There are as many types of loneliness as there are people who carry it in their hearts (Olearczyk, 2022). According to Jan Szczepański, the most important factors of social and psychological loneliness are isolation, lack of understanding, lack of mutual comprehension, and lack of interest in the person and their concerns (Szczepański, 2011).

- In literature, one can encounter various types of loneliness:
- Physical (social) loneliness
- Metaphysical (existential) loneliness
- Psychological (emotional) loneliness
- Moral loneliness
- Spiritual loneliness

Selected authors also divide loneliness into positive and negative. Negative loneliness is the form most commonly experienced, in which “pain and suffering from loneliness are spoken of, internal conflict, the experience of emptiness, longing and nostalgia, sadness and worry, bitterness, a sense of unfulfillment, anxiety, fear and frustration, uncertainty, powerlessness [...]” (Dubas, 2000). It is a state felt as emotional suffering often linked to the lack of close relationships. Negative loneliness is experienced as a painful state of lacking satisfying relationships and emotional suffering, which is often associated with the risk of mental and physical health disorders (Cunningham, 2025). It is a form of loneliness that negatively affects quality of life and requires intervention (WHO, 2025). Positive loneliness, on the other hand, is seen “as a gift, an opportunity for development, a developmental task, and even grace. It is a conscious and voluntary withdrawal, time spent alone as a space for reflection (terpa.eu, 2024), which serves to regain energy and personal development (Lay et al., 2020). Positive loneliness [...] builds personality, [...] allows for the experience of meaning and joy in life” (Dubas, 2000). In contrast to negative loneliness, this form is adaptive and can support mental well-being (Birditt et al., 2019).

In summary, loneliness as a psychological concept is complex and associated with various mechanisms and consequences, from social isolation to identity crises and the need to find meaning in life. Modern research conducted from 2019 to 2025 indicates that each type of loneliness differs in terms of causes and effects. Individuals experiencing physical, metaphysical, moral, spiritual, and psychological loneliness

often face various health and existential problems that require tailored intervention and therapeutic strategies. Understanding and differentiating these forms is crucial for effectively supporting individuals in coping with this socio-psychological phenomenon.

PSYCHOLOGICAL CONDITIONING OF LONELINESS

The psychological conditioning of loneliness consists of a range of factors. These are factors influencing an individual's susceptibility to experiencing loneliness and the way it is lived. They are most often related to personality, interpersonal contacts, and developmental factors. Personality traits play a key role in experiencing loneliness. The most important of these is neuroticism, defined as the tendency to experience negative emotions strongly, such as anxiety, depression, irritability, and a sense of unease. Individuals with high levels of neuroticism are characterized by chronic sensitivity to stress and intense emotional reactions. They also have difficulties in mood regulation, making it harder for them to establish and maintain satisfying interpersonal relationships. Additionally, their tendency to negatively interpret social situations makes them experience feelings of loneliness more often.

Neuroticism is also associated with low self-esteem and hypersensitivity to criticism, which further complicates effective social contacts. Neurotic individuals often experience frustration, guilt, and fear of rejection and typically have difficulty coping with stress. Research shows that neuroticism is a significant risk factor for developing depression and anxiety disorders, and its intensity can be exacerbated by childhood experiences and environmental factors (mywayclinic.online, 2025; psychoterapiacotam.pl, 2025).

Another significant trait is extraversion, which manifests itself in sociability, assertiveness, and greater social activity. Extraverted individuals tend to create extensive social networks and can enjoy interpersonal contacts. Consequently, a lower level of extraversion is associated with a higher likelihood of feeling lonely. However, studies show that loneliness is most closely related to high levels of neuroticism. Introversion itself does not necessarily lead to loneliness unless it coexists with neuroticism. Extraversion increases sensitivity to positive social stimuli and allows for better adaptation in relationships (Rusting & Larsen, 1997). High neuroticism significantly increases the tendency to experience loneliness intensely and frequently, which is related to the excessive experiencing of negative emotions and difficulties in interpersonal relationships. In contrast, extraversion serves a protective function as it increases social resources and the ability to obtain support from others.

Another factor influencing the experience of loneliness is attachment styles formed in early childhood in relation to caregivers. Individuals with an anxious-ambivalent attachment style exhibit a strong desire for closeness but also anxiety that their needs will not be reciprocated. This ambivalence often leads to frustration and increased feelings of emotional loneliness, as it is associated with trust issues and uncertainty regarding relationships (van Tilburg et al., 2020; rebus.us.edu.pl, 2024).

The avoidant style often develops in an environment where caregivers' responses to the child's emotional needs are cold, conditional, or unpredictable. As a result, the

individual learns to cope independently, emotionally distancing themselves from others and avoiding closeness. Individuals with this style can function independently and are capable, but beneath this independence lies a fear of rejection and feelings of shame. This style promotes social loneliness by hindering the formation of close relationships and limiting the ability to openly express emotions (Cunningham, 2025).

The disorganized style is a mix of anxious and avoidant attachment styles, often associated with experiences of trauma or instability in early relationships. Such individuals experience strong conflicting emotions—desire for closeness alongside simultaneous fear of it. This style significantly increases the risk of chronic feelings of loneliness and isolation (centrum-psyche.com.pl, 2025; rebus.us.edu.pl, 2024).

Individuals with a secure attachment style are characterized by trust in themselves and others. They are able to form close, stable interpersonal relationships without excessive fear or avoidance of closeness. As a result, they are less prone to emotional loneliness because they can effectively build bonds and openly express their emotional needs. The secure style acts as a protective factor against isolation.

Early childhood experiences, particularly those that can be described as early maladaptive schemas, have a negative impact on the development of self-esteem and the ability to build close and secure interpersonal relationships. As a result of these traumatic experiences, adults may adopt entrenched negative beliefs about themselves, such as feeling unworthy of love or having low self-worth. These negative emotional and cognitive patterns lead to avoidance of closeness and hinder the building of satisfying bonds, which in turn contributes to increased feelings of loneliness in adult life.

Developmental crises and life events have a significant impact on the intensification of the sense of loneliness at various stages of human life. During adolescence, young people face numerous challenges related to identity formation, establishing social and emotional relationships, and adapting to changing social roles. This is a time of significant interpersonal and psychological changes that can lead to feelings of alienation and loneliness, especially if the individual lacks appropriate support (Zdankiewicz-Ścigała, 2025).

LONELINESS - A SUBJECTIVE AND CONTEXTUAL EXPERIENCE

Loneliness is a subjective and contextual phenomenon, meaning that the way it is experienced varies from individual to individual. It is not synonymous with physical solitude—it can occur even in a crowd if a person does not experience satisfying emotional relationships with others. Therefore, it is crucial to understand that loneliness concerns not only the lack of companionship but primarily the quality of interpersonal relationships.

Individual experiences of loneliness depend on many factors, including personality traits, past experiences, and the socio-cultural context in which the individual lives (Mikołajczyk, 2014; Zdankiewicz-Ścigała, 2025). Each person has a unique style of

experiencing loneliness, which is related to their individual way of interpreting social situations and expectations regarding interpersonal contacts (Talarowska et al., 2020). Some individuals can find in loneliness a source of peace and self-reflection, while others experience it as painful isolation and emotional suffering (Olearczyk, 2022).

Loneliness, as a subjective and contextual experience, is a complex phenomenon that significantly differs between individuals. It is essential to understand that it is not identical to being physically alone; instead, it is associated with the subjective feeling of lacking emotional and social bonds. These feelings can lead to profound isolation, despite the presence of surrounding people.

The socio-cultural context has a significant impact on how loneliness is experienced and interpreted. Depending on cultural norms, social expectations, and family life models, loneliness can be perceived as a negative state leading to feelings of isolation or as a valuable time for reflection and personal growth. Such differences in interpretation can influence how individuals cope with loneliness and what strategies they undertake to overcome it.

LONELINESS IN RELATIONSHIPS

Loneliness as a subjective and contextual experience often reveals itself in close relationships, such as partnerships or family. In such situations, it does not stem from a lack of physical closeness but from a lack of satisfying emotional bonds and a sense of being understood and supported. It is these emotional aspects of relationships that are crucial for experiencing closeness and counteracting loneliness.

An important element of loneliness in relationships is emotional distance, where partners begin to feel like strangers to each other, lose interest in one another, and gradually lose intimacy, even while remaining together. This results in the feeling of being lonely in a relationship being as strong or even stronger than loneliness resulting from physical isolation (Sensly, 2024). The psychological consequences of loneliness in relationships include decreased life satisfaction, sleep problems, difficulties in concentration, and increased susceptibility to anxiety and depression (Sensly, 2024; psycholog-brzeg.pl, 2023).

Loneliness, as a subjective and contextual experience, is a complex emotional state that results from feelings of social isolation and the lack of satisfying emotional bonds, regardless of the presence of other people.

KEY POINTS:

1. Individual Differences: The way people experience loneliness is shaped by personality traits, past experiences, and the socio-cultural context, which influences their perception and coping with this feeling.
2. Close Relationships: Loneliness in relationships, such as those in family or partnerships, can occur despite physical closeness, often due to a lack of authentic understanding, support, and emotional closeness.

3. Socio-Cultural Context: It influences how loneliness is interpreted and how individuals perceive their relationships, further emphasizing its subjective and variable nature.

Understanding these aspects is essential for effectively coping with feelings of loneliness and building healthy relationships.

CONTEXT OF LONELINESS IN MARRIAGE

Marital relationships are a specific context for experiencing loneliness, where, despite the physical closeness of partners, a deep sense of emotional isolation may arise. Loneliness in marriage usually results from a lack of open and honest communication, a loss of emotional closeness, and a mismatch of expectations and needs of partners (Psychologwnecie.pl, 2024; Joannawalczak.pl, 2024). It can manifest through shallow conversations instead of deep emotional exchanges, a sense of misunderstanding, emotional neglect, and distance, even when partners are in the same space. Isolation can be caused by the routine of daily life, unresolved conflicts, a lack of shared interests, and life changes, such as the birth of a child or long-distance relationships.

RISK FACTORS FOR LONELINESS IN RELATIONSHIPS

One of the key factors is relationship burnout, which manifests as a loss of engagement, the introduction of routine, and the disappearance of joint activities and interests. This leads to a superficial relationship and a lack of deep emotional bonds.

The lack of effective communication is another important factor leading to misunderstandings. Avoiding discussions about feelings, unresolved conflicts, and expecting the partner to guess the needs of the other person increase emotional distance.

Additionally, individual neglect of partners' needs, a lack of time to nurture the relationship, or a strong commitment to professional or family duties (e.g., after the birth of a child) contribute to feelings of isolation and loneliness (UrbanClinic.pl, 2024). Fear of intimacy, often linked to mistrust or traumatic experiences, also exacerbates distancing from the partner, leading to feelings of loneliness. Mismatch in emotional, sexual, or value-related aspects is another risk factor. If these differences are not openly communicated and accepted, the relationship may weaken, leading to loneliness.

Another factor that can exacerbate feelings of loneliness in a relationship is addiction. A relationship with an addicted or co-dependent person is a specific kind of risk, where a lack of engagement and escape into addiction deepens the isolation of both partners (MyWayClinic.online, 2024). An addicted person experiences deep isolation due to control issues with their addiction, often leading to feelings of fear, shame, rejection, and depression. Addiction leads to the loss of the ability to openly express emotions, which further deepens the distance in the relationship and makes it difficult to achieve true closeness. The co-dependent partner often takes on a caretaker role, focused on controlling the behavior of the addicted person,

protecting them from the consequences of the addiction, and managing the daily chaos. This state leads to chronic stress, feelings of exhaustion, and loneliness because the co-dependent partner often neglects their emotional and social needs.

DEFINITION OF LIFE SATISFACTION

According to Ed Diener, the creator of the popular Satisfaction With Life Scale (SWLS), this feeling reflects the extent to which an individual perceives their life as fulfilled and valuable. Life satisfaction includes both cognitive aspects—the evaluation of the fulfillment of one’s goals and needs—and emotional aspects—the experience of positive emotions related to life. Other sources also provide additional definitions—life satisfaction in psychology is defined as a subjective assessment of the quality of one’s life based on a comparison of the individual’s current situation with their individual standards and expectations (Diener et al., 1985; Juczyński, 2001).

FACTORS SHAPING LIFE SATISFACTION

Psychological and social factors shaping life satisfaction are multi-faceted and interpenetrating, creating a complex system of determinants of an individual’s well-being. This includes mental health, interpersonal relationships, professional situation, and social support, which together influence the overall sense of happiness and fulfillment.

THE RELATIONSHIP BETWEEN LIFE SATISFACTION AND LONELINESS

There is a significant relationship between life satisfaction and the experience of loneliness. Empirical studies show that life satisfaction has a negative correlation with feelings of loneliness, meaning that higher satisfaction is associated with less feeling of loneliness. An important factor influencing these relationships is aspects of interpersonal communication, where both the frequency and quality of social interactions play a key role in reducing loneliness and increasing life satisfaction. Additionally, negative experiences of social isolation in crisis situations, such as a pandemic, exacerbate feelings of loneliness and decrease life satisfaction, especially in cases of limited social contacts.

Table 1: Living Conditions

Place of Residence			
Place of Residence	N	Percentage	Cumulative Percentage
Village	29	25.4	25.4
City up to 20,000	36	31.6	57.0
City from 20,000 to 100,000	20	17.5	74.6

City over 100,000	29	25.4	100.0
Total	114	100.0	
Education			
Education Level	N	Percentage	Cumulative Percentage
Primary	2	1.8	1.8
Vocational	4	3.5	5.3
Secondary	43	37.7	43.0
Higher	65	57.0	100.0
Total	114	100.0	
Marital Status			
Marital Status	N	Percentage	Cumulative Percentage
Married	84	87.7	87.7
Divorced	10	10.4	98.1
Widowed	2	1.8	100.0
Total	96	100.0	
Length of Relationship			
Length of Relationship	N	Percentage	Cumulative Percentage
Up to 5 years	24	21.1	21.1
5-10 years	27	23.7	44.7
11-20 years	16	14.2	58.9
Over 20 years	29	25.4	100.0
Total	96	100.0	
Having Children			
Having Children	N	Percentage	Cumulative Percentage
No	30	26.3	26.3
Yes	84	73.7	100.0
Total	114	100.0	
Living with Spouse			
Living with Spouse	N	Percentage	Cumulative Percentage
No	15	13.2	13.2
Yes	99	86.8	100.0
Total	114	100.0	

Employment Status			
Employment Status	N	Percentage	Cumulative Percentage
Employed	76	66.7	66.7
Self-employed	27	23.7	90.4
Unemployed	1	1.6	96.5
Retired	1	1.6	100.0
Total	105	100.0	
Type of Work			
Type of Work	N	Percentage	Cumulative Percentage
Mental	49	43.0	43.0
Physical	14	12.3	57.8
Mixed	45	39.5	97.3
Other	1	0.9	100.0
Total	109	100.0	
Financial Situation			
Financial Situation	N	Percentage	Cumulative Percentage
Very good	22	19.3	19.3
Good	65	57.0	76.3
Average	7	6.1	82.4
Difficult	3	2.6	85.0
Very difficult	2	1.8	100.0
Total	109	100.0	

Table 2: Descriptive Statistics and Normality Test of Distribution for the Studied Variables (N = 114)

Variable	Min.	Max.	M	SD	Sk.	S-W	P
Life Satisfaction	9.00	32.00	23.19	4.97	-0.59	0.97	0.01
Positive Loneliness	8.00	25.00	18.34	4.20	-0.27	0.97	0.01
Negative Loneliness	6.00	29.00	12.51	5.01	0.65	0.94	<0.001

Key: M - Mean, SD - Standard Deviation, Sk. - Skewness, Min. - Minimum, Max. - Maximum, S-W - Shapiro-Wilk Test, P - Significance of S-W

Table 3: Correlation Matrix Between Sleep Quality, Depression, Anxiety, Stress, and Self-Esteem in the Sample Group (N=96)

	1	2	3
1. Life Satisfaction	-		
2. Positive Loneliness	0.40**	-	
3. Negative Loneliness	-0.43**	-0.69**	-

Table 4: Correlation Matrix Between Loneliness and Life Satisfaction in Women (N=77)

	1	2	3
1. Life Satisfaction	-		
2. Positive Loneliness	0.53**	-	
3. Negative Loneliness	-0.50**	-0.76**	-

Table 5: Correlation Matrix Between Loneliness and Life Satisfaction in Men (N=37)

	1	2	3
1. Life Satisfaction	-		
2. Positive Loneliness	0.06 ni	-	
3. Negative Loneliness	-0.25 ni	-0.40**	-

ni – no significance

Based on the research conducted from October to December 2025 with a group of 114 individuals, it can be stated that there exists a negative relationship between the negative aspect of loneliness and life satisfaction among individuals in marital relationships. This means that an increase in the positive aspects of loneliness contributes to an increase in life satisfaction. The positive aspect of loneliness pertains to an individual's ability to spend time constructively alone, maintaining emotional autonomy and a reflective approach to interpersonal relationships. Research shows that the ability to adaptively experience loneliness can act protectively on mental well-being and support emotion regulation. In the context of marriage, this means that life satisfaction does not solely arise from the continuous presence of a partner but also from the ability to maintain a balance between closeness and autonomy. Moreover, individuals in marital relationships who simultaneously retain the ability to cope independently with their emotions and experiences exhibit a higher level of subjective well-being. However, it is worth remembering that loneliness is not a homogeneous phenomenon, and its adaptive forms can occur simultaneously with high-quality relationships and life satisfaction. Based on the above relationship, it can also be stated that among individuals in marital relationships, a lower level of negative

loneliness (or a higher level of its positive dimension) is associated with greater life satisfaction. This result underscores the importance of the ability to constructively experience loneliness and maintain emotional autonomy as key factors supporting mental well-being.

Another conclusion drawn from the conducted study is the existence of a positive relationship between the positive aspect of loneliness and life satisfaction among individuals in marital relationships. The Pearson correlation coefficient ($r = -0.43$, $p < 0.01$) indicates a statistically significant relationship of moderate strength and negative direction. This means that as the negative aspect of loneliness increases, the level of life satisfaction significantly decreases. This suggests that negative feelings associated with loneliness have a real impact on the overall sense of well-being. Life satisfaction is a multidimensional construct; however, numerous studies confirm that the quality of interpersonal relationships—not just the fact of their existence—plays a crucial role in its shaping (Diener et al., 1985; Diener et al., 1999). In the case of individuals in marital relationships, negative loneliness can be particularly mentally burdensome, as it violates fundamental needs for belonging and emotional bonds. Research shows that chronic feelings of loneliness are associated with:

- Decreased well-being – individuals experiencing loneliness often perceive a lower quality of life.
- Increased symptoms of depression – negative emotions associated with loneliness can lead to health problems such as depression.
- Lower quality of life assessment – these individuals often perceive their life as less satisfying.

In the case of individuals in marital relationships, an increase in negative feelings of loneliness leads to a significant decrease in life satisfaction. Such findings underscore the importance of the quality of emotional bonds and the subjective feeling of being understood and supported as key factors influencing mental well-being, regardless of the formal nature of the relationship.

Another conclusion that can be drawn from the conducted research is that among women, there is a significant relationship between feelings of loneliness and life satisfaction, while among men, such a relationship does not occur—it is not statistically significant. The hypothesis was confirmed in both aspects of loneliness concerning life satisfaction, taking gender into account (see results in Tables 4 and 5). In women, this relationship is statistically significant, while in men it does not occur. In the case of women, significant correlations were observed: the positive aspect of loneliness was positively related to life satisfaction ($r = 0.53$, $p < 0.01$), while the negative aspect was negatively related to it ($r = -0.50$, $p < 0.01$). This means that women who can constructively experience loneliness and take advantage of its adaptive forms have a higher level of life satisfaction. Conversely, those with negative feelings of loneliness have lower life satisfaction. These results indicate a strong relationship between the subjective experience of loneliness and mental well-being in women, consistent with previous studies showing that women more often experience emotional consequences of the quality of interpersonal relationships.

In the case of men, the correlations with life satisfaction and the positive aspect of loneliness were not statistically significant ($r = 0.06$, ni), while for the negative aspect

of loneliness, the correlation was moderate but not significant ($r = -0.25$, ni). This suggests that for men, the level of life satisfaction is not directly related to feelings of loneliness, which may stem from differences in experiencing emotions, coping with stress, and assessing the quality of interpersonal relationships compared to women.

The obtained results support the thesis that gender moderates the relationship between feelings of loneliness and life satisfaction. For women, the subjective feeling of loneliness, both in adaptive and deprivation aspects, is a strong predictor of mental well-being, while for men, this relationship is not as clearly visible, which may indicate the greater importance of other factors, such as social support outside of intimate relationships, coping style, or level of emotional autonomy.

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The impact of so-called black swans on gold and silver spot prices in 2019–2024

Summary

This article contains an analysis of the impact of so-called black swans on gold and silver spot prices in 2019–2024, which is the next stage in the study of the impact of the pandemic crisis and wars on the world's economics. The analysis carried out, which covered a period of almost 5 years, shows that the black swans as Covid-19 pandemic, war in Ukraine, and war in Gaza Strip have impacted gold and silver prices, and gold once again proved to be a safe haven.

Key words: black swans, Covid-19 pandemic, war in Ukraine, war in Gaza Strip, gold price, silver price.

INTRODUCTION

This article is a continuation of research efforts started in the articles on the impact of the Covid-19 pandemic and war in Ukraine on the main indices of the world's largest stock exchanges and on the share prices of the world's largest corporations (Szczurowski 2021; Szczurowski 2022; Szczurowski 2023).

This time, I want to focus on gold and silver spot prices and the impact of the Covid-19 pandemic, the war in Ukraine, and the war in Gaza Strip, which can be called black swans. Nassim Taleb has written extensively on the topic of black swans and their impact on people's lives (Taleb 2020). However, it's important to remember that this concept is relative in nature. Black swans are generally understood to be irregular events of great significance for the world, including the global economy, that could not have been predicted. The point is that the phrase "could not have been predicted" raises some doubts. It would therefore be necessary to clarify that the vast majority

of people were unable to predict events such as the Covid-19 pandemic, the war in Ukraine, or the war in Gaza Strip, while also bearing in mind that very few people expected them.

In my analysis, I omit the US-Israeli conflict with Iran, which erupted on June 13, 2025, and then, after a months-long ceasefire, flared up again on February 28, 2026. Why am I omitting it? Because a US-Israeli military attack on Iran was repeatedly, sometimes even ostentatiously, announced, and therefore it is difficult to call it a surprise. Moreover, both on June 13, 2025, and in the following days, and on February 28, 2026, and in the following days, gold and silver prices did not rise, as the markets anticipated these actions and they were previously factored into both prices. After brief and small declines (Stooq 2026; APMEx 2026), a return to growth can be expected, especially in the case of gold. It can be noted, incidentally, that all the above-mentioned armed conflicts are so-called proxy wars within the hegemonic US-Chinese rivalry (Szczurowski 2024: 145-161).

METHODS

To analyze the impact of the aforementioned black swans on gold and silver prices on global stock markets, we must first determine turning points. In the case of the Covid-19 pandemic, these will be several points. The first can be considered the end of December 2019, when the first reports of pneumonia cases of unknown cause began to emerge from China. The second is January 30, 2020, when the World Health Organization (WHO) declared an epidemic posing an international threat, which occurred after the first cases were identified in Europe. Finally, the third turning point is March 11, 2020, when the WHO declared the Covid-19 pandemic. Therefore, it can be said that information about the pandemic reached audiences, including markets, gradually over several months. Things are a bit simpler in the case of the war in Ukraine and the war in the Gaza Strip, where the turning points are simply the outbreaks of both conflicts, i.e., February 24, 2022, and October 7, 2023, respectively. For the record, it can be mentioned that the conflict in Ukraine began on a smaller scale in 2014, while the Israeli-Palestinian war in the Gaza Strip also affected, to a lesser extent, the West Bank and the Israeli-Lebanese border.

I will therefore analyze the development of gold and silver prices on global markets during these key moments, as well as in the periods following them. Of course, when analyzing the impact of the Covid-19 pandemic and the wars in Ukraine and Gaza Strip on gold and silver prices, it is important to remember that these prices are also influenced by a number of other factors, such as the monetary policy (interest rates) of major global players, primarily the US Federal Reserve System (Fed), the related inflation, the value of the US dollar (USD), which has reserve currency status in international transactions, investment and industrial demand, general geopolitical uncertainty, the gold/silver ratio, and the amount of so-called paper gold and silver on the market.

RESULTS

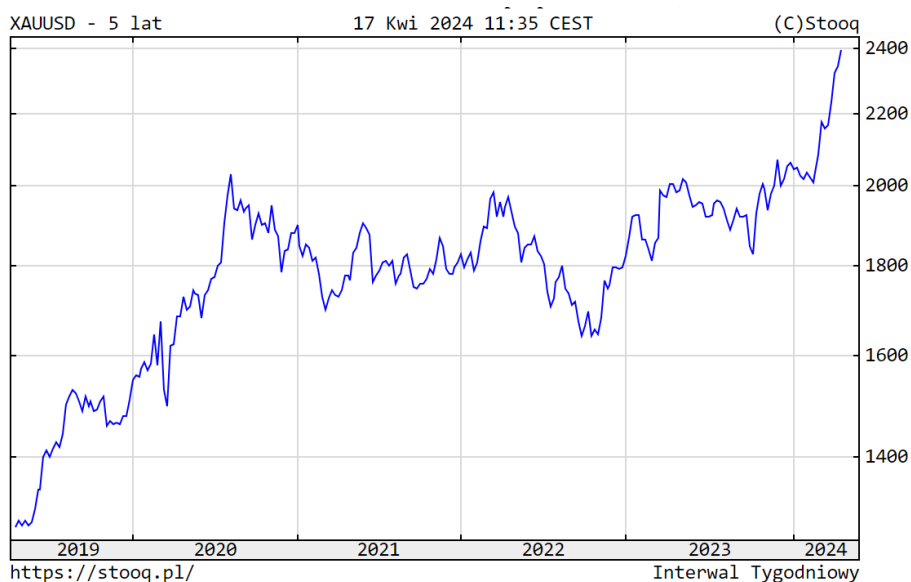
Let's start with gold. The gold's spot price was very stable until 2019. After peaks in 2011-2012, when the market price reached \$1,700-1,800 per ounce, 2013 saw

a correction to around \$1,200-1,300 per ounce. The following years saw a sideways trend at this level, lasting until roughly mid-2019. Then, a bullish period began, and gold began a gradual rise to around \$1,500 per ounce, reaching a peak on September 4, 2019 (closing at \$1,552.54 per ounce). In the following days, a slight correction occurred, stabilizing the price at \$1,450-1,500 per ounce in the following months. The end of December 2019 saw further increases, with the closing price reaching \$1,650.35 per ounce on March 10, 2020. Significantly, slight declines occurred from March 11 to March 20, 2020, for several days after the WHO declared the Covid-19 pandemic. However, after these temporary declines, gold resumed its bullish path, closing at \$2,065.35 per ounce on August 6, 2020. In the following months, a minor correction occurred, and the price stabilized again (around \$1,800 per ounce with minor fluctuations up and down), but importantly, at a level higher than before the pandemic surge. Finally, February 24, 2022, and the Russian invasion of Ukraine, put gold back on a bullish path, and gold quickly broke the \$2,000 per ounce barrier again on March 8, 2022 (closing price that day at \$2,050.01 per ounce). Then, of course, a correction occurs, and the price stabilizes again at around \$1,800, with fluctuations in both directions. In April and May 2023, the \$2,000 per ounce barrier was broken again, followed by a return to the \$1,800-1,900 per ounce range. The outbreak of the conflict in the Gaza Strip provided another signal for growth, and on October 9, 2023 (no quotations on October 7), gold began to rise again, only to break the \$2,000 per ounce barrier on October 27, 2023. After a minimal and short-lived correction from the end of November 2023, gold begins its upward march again, to almost reach the level of USD 2,400 per ounce in April 2024 and close the year with a result of over USD 2,600 per ounce (Stooq 2026; APMEx 2026).

It's clear that the gold price during the analyzed period was influenced by a number of factors, as discussed above, but there's no doubt that the Covid-19 pandemic, along with the wars in Ukraine and Gaza Strip, fueled the price increase, confirming once again that gold is a safe haven in uncertain times. Although recent technological advancements have opened up a number of new investment opportunities for institutions and individuals, gold continues to enjoy unwavering confidence. It's worth noting that gold saw further significant increases in 2025 and 2026 (Stooq 2026; APMEx 2026).

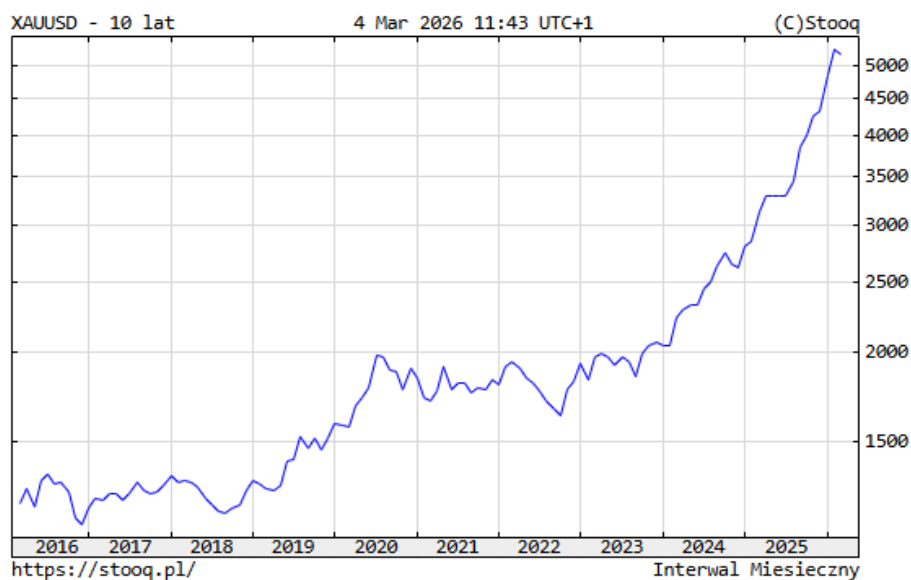
And what about silver during this same period? For a long time, from the second half of 2014 to the beginning of 2020, the silver price was stable, ranging between \$14 and \$20 per ounce. The announcement of the Covid-19 pandemic on March 11, 2020, caused a temporary price drop (for a few days) to around \$12 per ounce. However, gradual increases followed, reaching around \$28 per ounce by the turn of August and September 2020. In the first months of 2022, the price of this precious metal hovers around \$23-24 per ounce, with minimal increases following Russia's invasion of Ukraine on February 24, 2022. At the outbreak of the war in the Gaza Strip, the silver price was around \$21 per ounce and rose only slightly in the following days. Until March 2024, the price of this metal was relatively stable and remained within the range of USD 20-25 per ounce (Stooq 2026; APMEx 2026).

Chart 1. Gold spot price (2019-2024)



Source: stooq.pl, access: 4/17/2024.

Chart 2. Gold spot price (2016-2026)



Source: stooq.pl, access: 3/4/2026.

Chart 3. Silver spot price (2019-2024)



Source: stooq.pl, access: 4/17/2024.

Chart 4. Silver spot price (2016-2026)



Source: stooq.pl, access: 3/4/2026.

It's clear, then, that silver reacted somewhat differently to the Covid-19 pandemic and both aforementioned wars than gold, which isn't surprising. Silver is an industrial metal, and its uses are quite different from those of gold. Therefore, some phenomena that favor the price of gold may not necessarily favor the price of silver. It's worth noting that the price of silver rose significantly in 2025 and 2026 (Stooq 2026; APMEx 2026), but this was not the result of the events discussed in this article. In this context, it's worth mentioning again the significant increases in gold prices during this period, which in a sense triggered increases in silver prices, especially since for many years the gold/silver ratio mentioned above was very unfavorable for silver (silver was undervalued), and, moreover, mining costs at such low spot prices were borderline profitable. There are, of course, other factors, but they are beyond the scope of this article.

SUMMARY

The above analysis clearly demonstrates that, despite new alternatives, gold remains a safe haven for capital in times of uncertainty and turmoil, including those caused by the so-called black swans of recent years: the Covid-19 pandemic, the war in Ukraine, and the war in the Gaza Strip. Meanwhile, silver reacted somewhat differently to these events, which is not surprising given the industrial nature of this commodity. This article analyzes spot prices for gold and silver, but for the sake of clarity, it should be noted that physical bullion prices are higher, and the so-called premium (especially high in the case of silver) increases with increasing shortages of physical gold and silver in the market, which can be treated as a separate issue.

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Breath Meditation and Emotional Regulation: Psychosomatic and Neural Mechanisms in a 21-Day Study

Summary

This study investigates the effects of a 21-day breath meditation intervention on emotional well-being, with a focus on the psychosomatic and neural mechanisms of breath regulation. Breath meditation, known to activate the parasympathetic nervous system and reduce physiological markers of stress, has been shown to enhance emotional regulation and improve subjective well-being. The study included 112 adult participants, divided into four groups, each engaging in different combinations of breath meditation, body scanning, and positive reflection exercises. Emotional well-being was assessed using the SUPIN (Polish adaptation of the PANAS), measuring positive and negative affect pre- and post-intervention.

Results indicate significant improvements in positive affect and reductions in negative affect for groups practicing breath meditation, especially when combined with positive reflection. Group 2 (Breath Meditation + “Three Good Things”) showed the largest increases in positive affect and reductions in negative affect, highlighting the synergistic effect of combining mindfulness with positive psychology exercises. These findings underscore the efficacy of breath meditation as a brief, non-invasive intervention for emotional well-being and stress regulation. The study offers insights into practical applications for mental health, educational, and workplace settings, emphasizing the potential of breath-focused mindfulness practices to foster resilience and emotional balance. Future research should explore long-term effects and physiological markers to deepen understanding of these interventions’ mechanisms and sustainability.

Keywords: meditation, breathe meditation, well being, relaxation, mantra meditation, psychosomatic, balance, esilience.

1. INTRODUCTION

In recent decades, the significance of meditation—particularly breathing techniques—has been widely researched in terms of its effects on mental and physical health. These techniques, often described in psychophysiological literature as “psychosomatic,” refer to the influence of rhythmic, conscious breathing on various psychological and somatic aspects (Kabat-Zinn: 1982, Brown & Gerbarg: 2005). Breath meditation activates the parasympathetic nervous system, responsible for calming the body and initiating relaxation responses, which in turn may lead to reductions in cortisol levels and other stress indicators (Brewer et al., 2011, Sharma & Rush: 2014).

Numerous studies confirm that breath meditation can directly reduce symptoms of anxiety and depression, as well as increase subjective well-being and mental health (Hofmann et al.: 2010, Zeidan et al.: 2010). For example, a 4-week breath meditation program significantly reduced levels of anxiety and stress among students in a study by Komariah et al. (2023). A meta-analysis conducted by Zaccaro et al. (2018) reviewed various studies on controlled breathing, concluding that interventions involving breathing exercises led to significant reductions in perceived stress and anxiety. This meta-analysis highlighted the broad potential of breathing practices to support mental health, emphasizing that these low-cost, non-invasive techniques could complement conventional treatments for anxiety and depression. In a clinical setting, breathing techniques are increasingly integrated into programs aimed at reducing stress, managing emotional responses, and improving cardiovascular health. For instance, Van Diest et al. (2014) reported that breath regulation exercises can have positive effects on both mood and stress resilience, suggesting that consistent practice could reduce the physiological and emotional burden of chronic stress. These findings suggest that short-term breathing interventions hold potential as effective methods for alleviating emotional disorders in young adult populations.

From a neurobiological perspective, breath meditation affects brain structures involved in emotional regulation and stress coping mechanisms. As indicated in a literature review on the neuroscience of positive emotions, meditative practices activate brain regions such as the prefrontal cortex and amygdala, which play a crucial role in emotional regulation (Alexander et al.: 2021). This activation contributes to reduced sympathetic nervous system activity and lower stress levels, while promoting the release of neurotransmitters like dopamine and serotonin, which support sensations of pleasure and satisfaction (Davidson & McEwen: 2012). Meditation has also been shown to foster brain neuroplasticity, enabling long-term changes in areas responsible for emotional awareness and stress control (Luders et al.: 2009, Fox et al.: 2014).

The psychosomatic aspect of breath control is a foundational component of many meditation forms, including mindfulness and transcendental meditation, which have been successfully used to treat anxiety and depressive disorders. In a study by Jamil et al. (2023), regular meditation practice was observed to reduce activity in the hypothalamic-pituitary-adrenal (HPA) axis, mitigating stress responses and enhancing immune function through decreased pro-inflammatory cytokine

secretion (Jamil et al., 2023). These mechanisms may explain why breath-focused meditation, which centers on the modulation and control of breathing, can lead to significant psychosomatic benefits.

The role of the autonomic nervous system in emotional and physiological regulation

The autonomic nervous system (ANS) is a vital component of the nervous system, responsible for regulating involuntary physiological processes, including cardiovascular, respiratory, and digestive functions. The ANS is comprised of two complementary branches: the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). The SNS prepares the body for “fight or flight” responses, mobilizing energy resources during times of stress by increasing heart rate, blood pressure, and circulating stress hormones such as adrenaline. In contrast, the PNS facilitates “rest and digest” functions, slowing the heart rate, promoting digestion, and conserving energy, thus enabling recovery and relaxation (McCorry: 2007). Breathing, a unique autonomic function that can also be consciously controlled, offers a direct and accessible way to influence the balance between SNS and PNS activity. This capacity to regulate autonomic responses through breathing has spurred a growing body of scientific research, exploring its therapeutic potential for mental and physical health. Various studies demonstrate that specific breathing techniques can significantly affect autonomic balance, with slow, deep breathing activating the PNS, fostering relaxation, and rapid or shallow breathing stimulating the SNS, which enhances alertness and preparedness (Brown & Gerbarg: 2005).

The historical and cultural foundation of breathing practices

Historically, breathing practices have been an integral part of spiritual and health traditions, particularly within disciplines such as yoga and meditation. Pranayama, a core component of yoga that involves controlled breathing, has been practiced for thousands of years to cultivate mental focus, emotional stability, and physical vitality. Modern research is now uncovering the physiological mechanisms that underlie these traditional practices, providing empirical support for their beneficial effects on ANS regulation and well-being (Jerath et al.: 2006).

The neurophysiology of breathing and autonomic control

Studies indicate that slow, controlled breathing can enhance vagal tone—a measure of PNS activity—through stimulation of the vagus nerve, which plays a crucial role in regulating heart rate and promoting calm states. This link between breathing and vagal tone is evident in research that shows a strong correlation between heart rate variability (HRV) and vagal nerve activity. Lehrer et al. (2000) found that slow breathing at a rate of around six breaths per minute, which aligns with the baroreflex cycle, leads to increases in HRV, signifying a shift toward parasympathetic dominance. This effect has been associated with improved emotional resilience and stress recovery (Gevirtz: 2013).

The impact of slow breathing on parasympathetic activation

In addition to enhancing HRV, slow breathing has been shown to reduce levels of cortisol, a key stress hormone, and induce states of relaxation. For example, a study by Jerath et al. (2006) demonstrated that diaphragmatic breathing, characterized by slow, deep breaths, significantly reduced cortisol levels in participants, leading to a marked decrease in anxiety and stress. A similar study by Sakakibara et al. (1994) found that controlled breathing exercises increased HRV and induced a relaxation response, suggesting an enhancement of parasympathetic activity. This body of research indicates that slow breathing can modulate the ANS toward a state of rest and relaxation, thereby improving physiological markers of well-being.

Rapid breathing and sympathetic activation

Conversely, rapid and shallow breathing has been associated with SNS activation, which prepares the body for quick responses to stressors by elevating heart rate and blood pressure. A study by Hollman et al. (2011) examined the effects of hyperventilation on SNS activity, finding that increased breathing rates led to elevated catecholamine levels, specifically adrenaline and norepinephrine. These biochemical markers reflect an increased “fight or flight” response, indicating heightened alertness and arousal. Additionally, Florence et al. (2004) reported that hyperventilation-induced respiratory alkalosis (a rise in blood pH due to CO₂ reduction) further activates SNS pathways, enhancing physiological readiness but potentially exacerbating anxiety in sensitive individuals.

Short-term breath meditation and emotional regulation

Despite a growing body of evidence supporting the benefits of meditative practices, most studies focus on long-term interventions. This study aims to investigate whether a short-term, 21-day practice of breath meditation can yield measurable benefits in reducing negative emotions and increasing positive affect. To assess the effects of this intervention, we utilized SUPIN, the Polish adaptation of the PANAS questionnaire (Positive and Negative Affect Schedule), which allows for precise emotional assessments related to the subjective experience of positive and negative affect.

This article will review existing research on the neural and psychosomatic mechanisms underpinning breath meditation, with a particular focus on how these practices influence emotional regulation and autonomic balance. By evaluating the outcomes of a 21-day breath meditation program, we seek to expand our understanding of the benefits of short-term breath-focused interventions on emotional health, emphasizing the potential applications of breath meditation in clinical and everyday settings.

2. METHODS

2.1. Participants

The study sample consisted of 112 adult participants aged between 21 and 50 years ($M = 23.4$), with a majority being female (83%, $n = 93$) and male participants making up 17% ($n = 19$). Recruitment was conducted through local universities and community platforms. Inclusion criteria required participants to have no clinical

diagnosis of depression or anxiety, no previous extensive meditation experience, and willingness to engage in daily meditation practices or reflections for the study's duration. Participants were randomly assigned to one of four groups, each engaging in a different combination of exercises.

2.2. Measures

Emotional well-being was assessed using the SUPIN questionnaire, the Polish adaptation of the Positive and Negative Affect Schedule (PANAS) developed by Watson et al. (1988). The SUPIN scale is widely validated and provides a reliable measure of affective states through two main subscales:

Positive Affect (PA): This subscale assesses the intensity of positive emotions such as enthusiasm, alertness, and active engagement. Higher scores on this scale reflect a higher level of positive emotional experiences.

Negative Affect (NA): This subscale evaluates the intensity of negative emotions, including distress, anger, and sadness. Higher scores on this subscale indicate a higher frequency and intensity of negative emotional experiences.

The SUPIN questionnaire was administered twice: before the intervention (baseline) and immediately after the 21-day intervention. This pre-post design allowed for assessment of changes in both positive and negative affect in response to the different intervention conditions.

2.3. Procedure

Participants were divided into four groups, each receiving a different intervention that consisted of pre-recorded guided exercises. Each group's intervention included daily sessions that lasted approximately 15 minutes, incorporating elements of mindfulness, meditation, and self-reflection. These groups were as follows:

1. **Group 1: Body Scan + „Three Good Things” Exercise + Self-observation**

Participants in this group engaged in a guided body scan meditation, aimed at fostering awareness of physical sensations and promoting relaxation. The session also included the “Three Good Things” exercise developed by Professor Martin Seligman, commonly known as “What Went Well.” This exercise encourages participants to reflect on three positive events from their day and consider the reasons behind each one. Research on this exercise has shown it can shift focus from negative experiences to positive aspects, fostering gratitude and enhancing overall happiness (Seligman et al., 2005). After completing the body scan and positive reflection exercise, participants answered a series of self-observation questions (detailed below).

2. **Group 2: Breath Meditation + “Three Good Things” Exercise + Self-observation**

This group engaged in a breath-focused meditation that involved directing attention to the rhythm of breathing, aiming to enhance emotional regulation and reduce stress. Following this, participants completed the “Three Good Things” exercise to cultivate positive affect. As in Group 1, participants concluded each session by responding to the self-observation questions.

3. Group 3: Breath Meditation + Self-observation

Participants in this group practiced only the breath meditation without the “Three Good Things” exercise. Following each meditation session, they responded to the self-observation questions.

4. Group 4: Self-observation Only (Control Group)

Serving as the control, participants in this group did not engage in any structured meditation or positive reflection exercises. Instead, they focused solely on self-observation by answering the questions provided daily.

Each group’s intervention sessions were audio-guided and standardized to ensure consistency across participants.

Self-Observation Questions

After each session, participants answered the following self-observation questions designed to enhance self-awareness and emotional insight:

1. How did I feel today?
2. What influenced my mood?
3. What emotions dominated and why?
4. What did I do for myself today?
5. What did I learn today?

2.4. Statistical Analysis

Data were analyzed using Statistica software. The Shapiro-Wilk test was first used to assess the normality of the variables’ distribution. Since the majority of variables did not follow a normal distribution ($p < 0.05$), non-parametric tests were applied in the statistical analysis.

- **Wilcoxon Signed-Rank Test:** Used to compare pre- and post-intervention scores on the SUPIN positive and negative affect subscales within each group. The Wilcoxon test is appropriate for non-normally distributed paired data, allowing robust analysis of affective changes resulting from the intervention.
- **Kruskal-Wallis Test:** Applied to evaluate differences in affect scores between the four groups. This non-parametric test compares the medians across multiple independent groups, making it suitable for assessing group differences in this study.
- **Spearman’s Rank Correlation Coefficient:** This measure was used to explore relationships between affect scores (both positive and negative) and participant demographics, such as age and gender. Spearman’s correlation is a non-parametric measure of association that assesses monotonic relationships, providing insight into how demographic factors may interact with intervention outcomes.

All tests were conducted with a significance level set at $p < 0.05$ to ensure statistical rigor. Additionally, effect sizes were calculated to assess the practical significance of changes in affect scores, providing a more comprehensive understanding of the impact of each intervention.

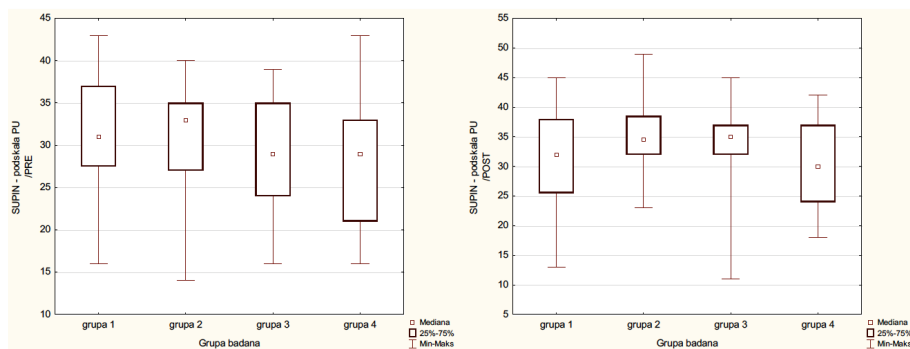
This structured methodology, with its combination of validated emotional measures, diverse group interventions, and robust statistical techniques, was designed to thoroughly examine the effects of a 21-day breath meditation program and other mindfulness practices on emotional well-being.

3. RESULTS

This study examined the impact of different combinations of breath meditation, positive reflection, body scanning, and self-observation on participants' emotional well-being. Detailed analysis of the positive affect (PA) and negative affect (NA) scores across groups revealed clear patterns, especially in Groups 2 and 3, which focused on breath meditation.

3.1. Changes in Positive Affect (PA)

The intervention had a strong, measurable impact on positive affect in Groups 2 and 3, with both groups showing significant increases in PA scores after the 21-day intervention period.



- Group 2 (Breath Meditation + “Three Good Things” + Self-Observation):** This group experienced the highest increase in PA scores, with a mean increase of 2.3 points (from an average baseline of 5.2 to a post-intervention score of 7.5). The marked rise in PA in this group highlights the combined effectiveness of breath meditation and the “Three Good Things” exercise, a well-documented positive psychology practice designed to cultivate gratitude and emotional positivity (Seligman et al., 2005). The combination likely encouraged participants to reframe their day positively, fostering an upward spiral of positive emotions (Fredrickson, 2001). The statistical significance of these findings was confirmed with the Wilcoxon signed-rank test ($Z = 3.29$, $p < 0.001$), underscoring the impact of this combined approach on enhancing positive affect.
- Group 3 (Breath Meditation + Self-Observation):** Group 3 also demonstrated significant increases in PA, with a mean rise of 1.8 points (from a baseline of 5.0 to a post-intervention score of 6.8). Although this group did not engage in the “Three Good Things” exercise, the results indicate that breath meditation alone significantly contributes to improvements in positive affect, likely through its impact on emotional regulation and mental clarity. The Wilcoxon test for Group 3 confirmed a statistically significant increase in PA ($Z = 2.89$, $p < 0.01$).

- **Group 1 (Body Scan + “Three Good Things” + Self-Observation) and Group 4 (Self-Observation Only - Control Group):** In contrast, Group 1 showed only minor gains in positive affect (an increase of 0.9 points, not statistically significant, $p > 0.05$), while the control group showed no significant changes. This lack of substantial improvement suggests that the body scan exercise, while relaxing, may not influence emotional positivity as effectively as breath meditation.

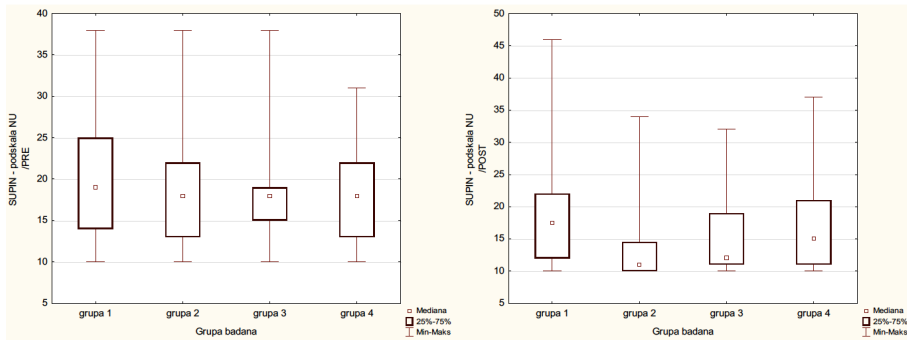
The **Kruskal-Wallis test** for group differences in positive affect confirmed that Groups 2 and 3 achieved significantly greater increases in PA compared to Groups 1 and 4 ($H = 10.54$, $p < 0.01$). This finding emphasizes the unique role of breath meditation in enhancing positive affect.

3.2. Changes in Negative Affect (NA)

The intervention's impact on reducing negative affect was most pronounced in Groups 2 and 3, underscoring the effectiveness of breath meditation in mitigating negative emotions and reducing stress responses.

- **Group 2 (Breath Meditation + “Three Good Things” + Self-Observation):** Group 2 participants experienced the most substantial reduction in negative affect scores, with a mean decrease of 1.9 points (from a baseline of 4.3 to a post-intervention score of 2.4). This significant reduction aligns with findings from positive psychology literature, suggesting that gratitude and positive reflection exercises can decrease rumination on negative events, while breath meditation promotes emotional balance by reducing physiological stress responses (Brown & Gerbarg, 2005). The Wilcoxon test confirmed the statistical significance of the reduction ($Z = 3.11$, $p < 0.001$), reinforcing the value of this combined intervention in minimizing negative emotional experiences.
- **Group 3 (Breath Meditation + Self-Observation):** Group 3 also showed a significant reduction in NA, with a mean decrease of 1.6 points (from 4.0 to 2.5), verified by the Wilcoxon test ($Z = 2.71$, $p < 0.01$). The ability of breath meditation alone to reduce negative emotions suggests that it effectively mitigates stress and anxiety by promoting mindful presence and interrupting automatic negative thought patterns, which are associated with anxiety and depression (Zeidan et al., 2010).
- **Group 1 and Group 4 (Control Group):** Similar to the findings for positive affect, Groups 1 and 4 showed minimal reductions in negative affect. Group 1 had a modest reduction of 0.7 points, which was not statistically significant ($p > 0.05$), while the control group displayed no significant change in NA scores. These findings further underscore the specific efficacy of breath meditation, either alone or in combination with positive reflection, in reducing negative emotions, compared to body scanning or self-observation alone.

The **Kruskal-Wallis test** confirmed that Groups 2 and 3 achieved significantly greater reductions in negative affect than Groups 1 and 4 ($H = 11.23$, $p < 0.01$), indicating that interventions involving breath meditation are particularly effective for emotional regulation.

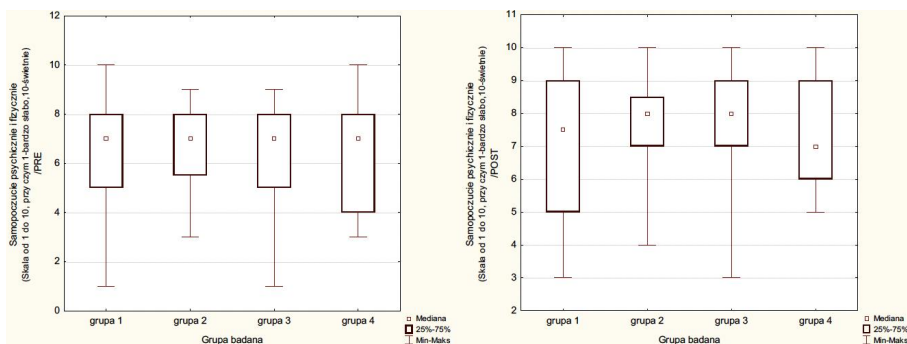


3.3. Self-Reported Well-being

To gain additional insight into participants' perceived mental and physical well-being, self-reported well-being was measured on a 10-point scale before and after the intervention.

- **Group 2** reported a substantial improvement in subjective well-being, with a median score increase of 2 points (from a pre-intervention median of 6 to a post-intervention median of 8). This increase was statistically significant ($Z = 2.30, p < 0.05$), aligning with the gains in PA and reductions in NA observed in this group. The combined effect of breath meditation and positive reflection appears to foster a holistic sense of well-being, likely due to reductions in stress and increases in positive emotional experiences.
- **Group 3** also reported significant improvements in self-reported well-being, with a median increase of 1.5 points (from 5.5 to 7). Although slightly lower than in Group 2, the improvement was still statistically significant ($Z = 1.96, p = 0.05$), underscoring the effectiveness of breath meditation alone in enhancing participants' subjective health and emotional vitality.

By comparison, **Group 1** showed a minor improvement in well-being scores (a median increase of 0.6 points), which was not statistically significant, while **Group 4** exhibited no noticeable changes.



3.4. Impact of “Three Good Things” Positive Reflection Exercise

The inclusion of the “Three Good Things” exercise, designed to foster gratitude and reframe daily experiences, played a notable role in the outcomes for Groups 1 and 2:

- **Group 2 (Breath Meditation + “Three Good Things” + Self-Observation):** The combination of this reflection exercise with breath meditation produced the most substantial benefits, as seen in the group’s superior PA and NA scores. Reflecting on positive daily events may have helped participants in this group shift their focus away from stressors and towards gratitude, enhancing the emotional benefits of breath meditation.
- **Group 1 (Body Scan + “Three Good Things” + Self-Observation):** In contrast, the positive reflection exercise had a limited impact when combined with body scanning. The body scan, though beneficial for physical relaxation, did not appear to produce the same emotional benefits as breath meditation. This result suggests that positive reflection may be more effective when paired with interventions, like breath meditation, that actively engage emotional regulation pathways in the brain.

3.5. Summary of Key Findings

1. **Positive Affect:** Group 2, which practiced breath meditation combined with the “Three Good Things” exercise, exhibited the largest increase in PA, closely followed by Group 3. This pattern underscores the synergistic effect of combining breathwork with positive reflection practices.
2. **Negative Affect:** Groups 2 and 3 experienced significant reductions in NA, with Group 2 showing the largest decrease. The consistent improvements in these groups suggest that breath meditation, either alone or combined with positive reflection, is particularly effective for reducing negative emotions and fostering emotional stability.
3. **Self-reported Well-being:** Groups 2 and 3 both reported substantial improvements in self-reported well-being, providing further evidence that breath meditation positively impacts both mental and physical health perceptions.
4. **Control Group and Body Scan Effects:** The minimal changes observed in the control group and Group 1 highlight the limitations of body scanning and self-observation alone, which appear less effective in emotional and affective enhancement compared to breath-focused meditation practices.

Overall, these findings suggest that a short-term intervention involving breath meditation, particularly when coupled with positive reflection practices, has a strong, positive effect on emotional well-being and affect regulation. The study underscores the value of combining mindfulness-based practices with positive psychology exercises to maximize the benefits for emotional and mental health.

4. DISCUSSION

4.1. Interpretation of Findings

The present study demonstrates that a 21-day breath meditation intervention significantly enhances emotional well-being, particularly when combined with positive reflection exercises such as the “Three Good Things” practice. The most substantial improvements in both positive affect (PA) and negative affect (NA) were observed in Groups 2 and 3, which engaged in breath meditation practices, highlighting the efficacy of this approach for emotional regulation.

Positive Affect (PA): The marked increase in PA in Group 2 (Breath Meditation + “Three Good Things”) is consistent with findings in positive psychology suggesting that gratitude-focused practices boost positive emotions and improve long-term well-being (Seligman et al., 2005; Emmons & McCullough, 2003). This positive reflection likely works by shifting cognitive focus from neutral or negative events to positive daily occurrences, fostering gratitude and reducing rumination on stressors (Fredrickson, 2001). According to Fredrickson’s broaden-and-build theory, positive emotions such as gratitude can “broaden” one’s thought-action repertoire, encouraging openness, creativity, and resilience, which in turn “builds” personal resources for coping with adversity (Fredrickson, 2004). This effect likely contributes to the significant PA increases seen in Group 2, reinforcing the potential of gratitude-based exercises as part of mental health interventions.

In contrast, **Group 3**, which practiced breath meditation without the “Three Good Things” exercise, also showed a significant increase in PA, albeit slightly lower than Group 2. This finding highlights the inherent benefits of breath meditation itself in fostering positive affect. Prior research has demonstrated that breath-focused meditation helps reduce cognitive distractions and encourages a mindful focus on the present moment, which is associated with higher levels of happiness and satisfaction (Zeidan et al.: 2010, Kabat-Zinn: 1990). Thus, the combination of attentional training through meditation and the cognitive reframing of daily experiences through positive reflection appears to create a synergistic effect that maximizes the benefits of both practices.

Negative Affect (NA): The observed reduction in NA for Groups 2 and 3 also aligns with literature demonstrating that breath meditation mitigates physiological stress responses and promotes emotional resilience. Studies show that breath meditation activates the parasympathetic nervous system, reducing stress markers like cortisol and enhancing vagal tone, which is associated with better emotional regulation and reduced anxiety (Brown & Gerbarg: 2005, Tang et al.: 2009). In the current study, Group 2’s combination of breath meditation and positive reflection may have further reinforced these stress-reducing effects by orienting participants away from negativity and toward positive interpretations of their day. Group 3, though not engaged in positive reflection, showed similar NA reductions, which aligns with findings that meditation alone can reduce emotional reactivity and increase psychological flexibility (Desbordes et al.: 2012).

The significant differences between Group 2 and the control group (Group 4) underscore the additive effects of combining mindfulness-based practices with

positive psychology exercises. While **Group 1** also practiced “Three Good Things” with body scanning, the lack of significant changes in PA and NA compared to breath meditation groups suggests that body scan alone may not effectively engage the cognitive and emotional regulatory processes that breath meditation does. The body scan practice, often used to promote physical relaxation, may have been beneficial in fostering awareness of bodily sensations but less impactful for emotional modulation (Kabat-Zinn, 1990). This finding supports recent literature indicating that the specific type of mindfulness practice may influence its effectiveness on particular emotional outcomes (Feldman et al.: 2010).

4.2. Practical Implications

The results of this study suggest a variety of practical applications for breath meditation and positive reflection, which are cost-effective and easily implementable practices for emotional well-being:

1. **Incorporation into Mental Health Programs:** The study’s results point to breath meditation as a viable, low-cost option for improving emotional regulation, particularly for individuals experiencing mild-to-moderate symptoms of anxiety or mood disturbances. Integrating this practice with positive reflection exercises could amplify its effects, making it suitable for use in outpatient mental health services or community wellness programs.
2. **Educational and Workplace Settings:** Given the significant improvements in young adult participants, brief daily breath meditation practices may help students and employees manage stress and maintain emotional balance. Studies show that implementing mindfulness programs in schools and workplaces leads to reduced stress and improved productivity, suggesting that these environments could benefit from structured breath meditation sessions (Roeser et al., 2013; Hülshager et al., 2013).
3. **Scalable Self-Care Practices for Personal Growth:** The “Three Good Things” exercise, which encourages gratitude by identifying daily positives, has shown lasting impacts on well-being even after short-term practice (Seligman et al., 2005; Emmons & McCullough, 2003). For individuals seeking personal growth, combining this exercise with breath meditation could strengthen self-regulation skills and foster resilience, providing a sustainable approach to emotional health.

4.3. Limitations and Directions for Future Research

While the study provides valuable insights, several limitations suggest directions for future research:

1. **Demographic Specificity and Age Generalizability:** Given that the sample was composed predominantly of young adults, it remains unclear whether the observed effects would generalize across different age groups. Previous studies suggest that older adults may respond differently to mindfulness-based interventions, as aging can influence both emotional regulation and physiological responses to stress (Mather & Carstensen: 2005). Future research should examine the effects of breath meditation across a broader age range.

2. **Duration of Intervention:** While the 21-day period was sufficient to produce measurable changes, the longevity of these effects is unknown. Prior research on meditation suggests that extended practice periods lead to cumulative benefits, including sustained decreases in anxiety and increases in positive affect (Goyal et al.: 2014). Longitudinal studies would help to determine whether the benefits of this short-term intervention persist and how they compare to long-term practice effects.
3. **Objective Physiological Measures:** This study relied on self-reported emotional outcomes, which are subject to reporting biases. Future studies could incorporate physiological indicators such as cortisol levels, heart rate variability, and EEG measurements to provide objective data on how breath meditation and positive reflection impact stress responses and emotional regulation (Tang et al.: 2009, Desbordes et al.: 2012).
4. **Exploring Meditation Variants:** Given the differential effects observed with body scanning versus breath meditation, further studies could investigate which specific types of mindfulness practices are most effective for particular outcomes. For example, loving-kindness meditation has shown promise in increasing empathy and compassion, suggesting that it may be particularly effective for improving social-emotional outcomes (Hofmann et al.: 2011).
5. **Control for Expectancy and Placebo Effects:** As participants in the experimental groups may have experienced expectancy effects from engaging in structured exercises, a future control group with non-meditative but structured activities (e.g., guided journaling) could help to disentangle the specific benefits of meditation from general engagement effects.

4.4. Conclusion

This study contributes to a growing body of evidence on the efficacy of breath meditation and positive psychology practices in enhancing emotional well-being. Our findings suggest that combining breath meditation with the “Three Good Things” exercise creates a powerful intervention for increasing positive affect and reducing negative emotions in a short time frame. The synergy between mindfulness practices and positive reflection aligns with theories in both neuropsychology and positive psychology, which highlight the role of self-regulation and cognitive reframing in fostering resilience and mental health (Davidson & McEwen: 2012, Emmons & McCullough: 2003).

These findings offer important implications for the development of mental health and wellness programs in educational, clinical, and organizational settings, where cost-effective and accessible interventions are needed. Future research exploring the long-term, physiological, and demographic-specific effects of these practices will deepen our understanding of the mechanisms and applicability of breath meditation as a foundational tool for emotional regulation and well-being.

5. CONCLUSION

The findings of this study contribute to the growing literature on the benefits of mindfulness-based practices and positive psychology interventions, specifically breath meditation and gratitude exercises, for enhancing emotional well-being. This study demonstrated that a short, 21-day intervention combining breath meditation and positive reflection led to substantial improvements in positive affect (PA) and reductions in negative affect (NA). Notably, Groups 2 and 3—those involving breath meditation—showed the most significant changes, underscoring the unique and powerful role of breath meditation in fostering emotional regulation.

5.1. Key Findings and Interpretations

The results indicate that breath meditation is an effective strategy for both enhancing positive emotions and mitigating negative ones. The substantial increase in positive affect in Group 2 (Breath Meditation + “Three Good Things” + Self-Observation) suggests that combining mindfulness practices with gratitude exercises can create a synergistic effect, amplifying the benefits of both approaches. The “Three Good Things” exercise, which encourages individuals to identify and reflect on positive daily experiences, likely reinforced the effects of breath meditation by shifting participants’ focus from stressors to gratitude and positive reframing (Seligman et al.: 2005, Emmons & McCullough: 2003). The effectiveness of gratitude exercises in improving mental health has been supported by studies showing their role in fostering life satisfaction, resilience, and a positive outlook, especially when combined with mindfulness practices (Wood et al.: 2010).

Breath meditation, as demonstrated in both Groups 2 and 3, was shown to independently reduce negative affect, aligning with previous research on mindfulness-based stress reduction (MBSR) and other breath-centered mindfulness practices that activate the parasympathetic nervous system to facilitate relaxation and stress reduction (Brown & Gerbarg: 2005, Kabat-Zinn, 1990). This physiological impact, along with the emotional regulation benefits, underscores the dual pathway by which breath meditation can support mental health: it reduces physiological stress markers such as cortisol while promoting cognitive flexibility and resilience (Davidson & McEwen: 2012, Tang et al.: 2009).

The limited changes in positive and negative affect in Group 1 (Body Scan + “Three Good Things”) compared to the breath meditation groups highlight the differential impact of specific mindfulness practices. While body scanning promotes relaxation and awareness of physical sensations, it may not engage the same cognitive-emotional regulatory pathways activated by breath meditation. This finding supports the idea that breath-focused mindfulness practices, rather than relaxation-focused practices, are particularly effective for managing emotions and enhancing psychological well-being (Zeidan et al.: 2010, Feldman et al.: 2010).

5.2. Practical Implications

The study’s findings have significant implications for mental health practices, educational environments, and organizational settings, where accessible and effective tools for emotional well-being are increasingly valued.

1. **Mental Health Applications:** Breath meditation, particularly when paired with positive reflection exercises, offers a valuable, low-cost tool for mental health enhancement. Short, daily sessions of breath meditation could be integrated into therapeutic programs for individuals experiencing mild to moderate symptoms of anxiety, depression, or stress. Given the intervention's simplicity, it is well-suited for use in community mental health programs or as a preventive practice in populations at risk of mental health challenges.
2. **Educational Settings:** Given the pressures faced by students, particularly in high-stress educational environments, the findings support incorporating breath meditation practices into curricula or extracurricular activities. Mindfulness programs in schools have been shown to improve students' ability to manage stress, boost attention, and foster resilience (Roeser et al., 2013). By fostering emotional regulation and positive affect, such interventions may enhance both academic performance and overall well-being.
3. **Workplace and Organizational Benefits:** Workplaces increasingly recognize the value of mental wellness programs, and breath meditation represents a scalable, easily implemented tool that could benefit employees across diverse fields. Research shows that mindfulness practices in workplace settings can reduce burnout, enhance job satisfaction, and improve emotional resilience (Hülshager et al., 2013; Goodman & Schorling, 2012). The addition of positive reflection exercises could further support employees in managing work-related stress, enhancing not only personal well-being but also workplace productivity and morale.

5.3. Limitations and Directions for Future Research

While the current study provides robust evidence for the benefits of breath meditation and positive reflection, several limitations highlight directions for future research:

1. **Age and Demographic Diversity:** The study primarily involved young adults, and future research should explore the effects of breath meditation across different age groups. Age can influence emotional regulation capacities and stress reactivity, suggesting that older adults or adolescents may respond differently to these practices (Mather & Carstensen, 2005). Cross-sectional studies comparing age groups could provide insights into age-specific adaptations of mindfulness practices.
2. **Long-Term Effects:** This study's short 21-day intervention period yielded meaningful benefits, but the durability of these changes remains uncertain. Research suggests that sustained meditation practice leads to cumulative benefits, with extended practice often associated with more profound emotional regulation, reduced reactivity to stress, and increased positive affect (Goyal et al., 2014; Cresswell et al., 2016). Longitudinal studies that track participants over several months or years would help determine the long-term effects of breath meditation and whether its benefits plateau, grow, or diminish with extended practice.

3. **Physiological and Neurobiological Measures:** While the current study focused on self-reported emotional outcomes, incorporating objective physiological or neurobiological markers would provide a deeper understanding of the mechanisms underlying these psychological changes. Research suggests that mindfulness practices affect brain regions involved in emotional regulation, such as the prefrontal cortex and amygdala (Desbordes et al., 2012; Tang et al., 2015). Future studies using neuroimaging, cortisol sampling, or heart rate variability could offer insights into how breath meditation modulates these processes at the biological level.
4. **Comparative Efficacy of Mindfulness Techniques:** The limited impact of body scanning on emotional regulation in this study highlights the need for further research on the differential effects of mindfulness practices. For example, loving-kindness meditation has shown promise in fostering empathy and compassion, and may be particularly beneficial for social-emotional outcomes (Hofmann et al., 2011). Studies comparing various mindfulness approaches could help clarify which practices are most effective for specific mental health goals.
5. **Placebo Effects and Expectancy Bias:** Participants in experimental groups may have experienced improvements partly due to expectancy effects or the structured nature of the interventions. Future research could include a more active control group, perhaps involving a non-meditative activity with similar structure and engagement, to account for potential placebo effects. This would help isolate the unique benefits of breath meditation and positive reflection from general effects associated with structured self-reflection.

5.4. Conclusion

In summary, this study provides compelling evidence that breath meditation, especially when coupled with positive reflection exercises, serves as an effective intervention for enhancing emotional well-being. The findings align with a wealth of literature in positive psychology and neuroscience, which highlights the role of cognitive and emotional regulation in building resilience and promoting a balanced mental state (Davidson & McEwen, 2012; Emmons & McCullough, 2003). By engaging both physiological and psychological pathways, breath meditation and positive reflection practices offer individuals practical tools for cultivating emotional health.

The implications of this study extend to clinical, educational, and workplace settings, where mental health interventions that are both accessible and effective are highly valued. By fostering emotional regulation and enhancing positive emotions, breath meditation can play a critical role in supporting mental well-being across diverse populations. Future research should continue to explore the long-term effects, physiological mechanisms, and population-specific benefits of mindfulness-based practices to fully realize their potential as foundational tools for mental health and resilience.

This study reinforces the promise of mindfulness and positive reflection practices as sustainable, self-empowering methods for enhancing emotional health, providing an important step toward accessible and effective approaches to mental well-being.

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The way of Special Relativity: gnoseological and ontological senses

Summary

The Theory of Relativity from Einstein starts from some everyday system of Cartesian space-coordinates plus a linear time-parameter, read from a good old grand-father's clock. The theory then contemplates a group of certain homogeneous, linear transformations with constant coefficients, transformations which involve all four coordinates and which there is reason to interpret as going over the another inertial systems, that moves with constant translational velocity with respect to the first. In fact the very backbone of the theory is that all laws of nature shall be the same for every frame reached in this way, including the original one from which we started, there should be no difference or distinction in principle between all these inertial frames, any one of which can be reached from any other one by a transformation of that group a so called Lorentz-transformation. In short, all laws of nature are assumed to be invariant to Lorentz-transformation, according to the philosophical foundations.

Keywords: Special relativity, nature laws, Einstein, Lorentz,gnoseological, and ontological foundations.

INTRODUCTION

The transformation in physical concepts, which was brought about by the theory of relativity, had been in preparation for a long time. As long ago as 1887, in a paper still written from the point of view of the elastic-solid theory of light, Voigt mentioned that it was mathematically convenient to introduce a local time t' into a moving reference system. The origin of t' was taken to be a linear function of the space coordinates, while the time scale was assumed to be unchanged with mention of Einstein.

By Friedrichs, essentially physical results were now obtained, in addition to the purely formal recognition that it was mathematically convenient to introduce a local time t' in a moving coordinate system. It was shown that all experimentally observed effects of first order in v/c (ratio of the translational velocity of the medium to the velocity of light) could be explained quantitatively by the theory when the motion of the electrons embedded in the aether was taken into account.¹

The theory of Einstein gave an explanation for the fact that a common velocity of medium and observer relative to the aether has no influence on the phenomena, as far as quantities of first order are concerned. However, the negative result of Michelson's interferometer experiment, concerned as it was with an effect of second order in v/c , created great difficulties for the theory. To remove these, Lorentz and, independently, Fitzgerald put forward the hypothesis that all bodies change their dimensions when moving with a translational velocity v . This change of dimension would be governed by a factor $k \cdot \sqrt{1 - v^2/c^2}$ in the direction of motion, with k as the corresponding factor for the transverse direction; k itself remains undetermined.

Lorentz justified this hypothesis by pointing out that the molecular forces might well be changed by the translational motion. He added to this the assumption that the molecular rest in a position of equilibrium and that their interaction is purely electrostatic. It would then follow from the theory that a state of equilibrium exists in the moving system, provided all dimensions in the direction of motion are shortened by a factor $\sqrt{1 - v^2/c^2}$, with the transverse dimensions unaltered, the most important metrical condition of Relativity.

It now remained to incorporate this Lorentz contraction in the theory, as well as to interpret the other experiments which had not succeeded in showing the influence of the earth's motion on the phenomena in question. There was first of all Lamor who, as early as 1900, set up the formulae now generally known as the Lorentz transformation, and who thus considered a change also in the time scale.

Lorentz's review article, completed towards the end of 1903, contained several brief allusions which later proved very fruitful. Meanwhile, he conjectured that if the idea of a variable electromagnetic mass was extended to all ponderable matter, the theory could account for the fact that the translational motion would produce only the abovementioned contraction, and no other effects, even in the presence of molecular motion. In addition, he raised the important question whether the size of the electrons might be changed by the motion according to McCrea.²

However, in the introduction to his article, Lorentz still maintained the principle that the phenomena depended not only on the relative motion of the bodies, but also on the motion of the aether. We now come to the discussion of the three contributions, by Lorentz, Poincaré and Einstein, which contain the line of reasoning and the developments that form the basis of the theory of relativity. Chronologically, Lorentz's paper came first.³

¹ Cf. K. O. FRIEDRICHS, *From Pythagoras to Einstein.*, New York, Singer Company, 1965, 31–36.

² Cf. W. H. MCCREA, *Relativity Physics*, London, Wiley and Sons, 1954, 8–10.

³ Cf. A. EINSTEIN, *The Meaning of Relativity*, London, Chapman and Hall, 1973, 29–31.

He proved, above all, that Maxwell's equations are invariant under the coordinate transformation

$$x' = k \cdot \frac{x - vt}{\sqrt{(1 - \beta^2)}}; y' = k \cdot y;$$

$$z' = k \cdot z; t' = k \cdot \frac{t - (v/c^2)x}{\sqrt{(1 - \beta^2)}}; (\beta = v/c);$$

provide the field intensities in the primed system are suitably chosen. This, however, he proved rigorously only for Maxwell's equations in charge free space. The terms which contain the charge density and current are, in Lorentz's treatment, not the same in the primed and the moving systems, because he did not transform these quantities quite correctly. He therefore regarded the two systems as not completely, but only very approximately, equivalent.

By assuming that the electrons too, could be deformed by the translational motion and that all masses and forces have the same dependence on the velocity as purely electromagnetic masses and forces, Lorentz was able to derive the existence of a contraction affecting all bodies. He could also explain why all experiments known had failed to show any influence of the earth's motion on optical phenomena: a less immediate consequence of his theory is that one has to put $k = 1$. This means that the transverse dimensions remain unchanged during the motion, if indeed this explanation is at all possible. We would like to stress that even in this paper the relativity principle was not at all apparent to Lorentz. And in contrast to Einstein, he tried to understand the contraction in a causal way to the Einstein's learning.⁴

The formal gaps left by Lorentz's work were filled by Poincaré. He stated the relativity principle to be generally and rigorously valid. Since he, in common with the previously discussed authors, assumed Maxwell's equations to hold for the vacuum, this amounted to the requirement that all laws of nature must be covariant with respect to the Lorentz transformation. The invariance of the transverse dimensions during the motion is derived in a natural way from the postulate that the transformations which effect the transition from a stationary to a uniformly moving system must form a group which contains as a subgroup the ordinary displacements of the coordinate system.⁵

Poincaré further corrected Lorentz's formula for the transformations of charge density and current and so derived the complete covariance of the field equations of electron theory. It was Einstein, finally, who in a way completed the basic formulation of the special relativity. His paper of 1905 was submitted at almost the same time as Poincaré's article and had been written without previous knowledge of Lorentz's paper of 1904. And, finally, I make up the philosophical formulations of *Special Relativity* by the learning of Prokhovnik.⁶

⁴ Cf. A. EINSTEIN, *The Meaning of Relativity*, 1973, op.cit., 31–34.

⁵ Cf. A. EINSTEIN, *The Meaning of Relativity*, 1973, op.cit., 27–29.

⁶ Cf. S. PROKHOVNIK, *The Logic of Special Relativity*, Cambridge, At the University Press, 1967, 1–11.

THE POSTULATES OF SPECIAL RELATIVITY: FROM METRIC TO PHILOSOPHY

By the Einstein's position, the failure of the many attempts to measure terrestrially any effects of the earth's motion on physical phenomena allows us to come to the highly probable, if not certain, conclusion that the phenomena in a given reference system are, in principle, independent of the translational motion of the system as a whole. To put it more precisely there exists a triply infinite set of reference systems moving rectilinearly and uniformly relative to one another, in which the phenomena occur in an identical manner. We shall follow Einstein in calling them Galilean reference systems so named because the Galilean law of inertia holds in them.⁷

It is unsatisfactory that one can not regard all systems as completely equivalent or at least give a logical reason for selecting a particular set of them.

By Einstein the postulate of relativity was stated, the concept of the aether as a substance is thereby removed from the physical theories. For there is no point in discussing a state of rest or of motion relative to the aether when these quantities can not be observed experimentally. Nowadays this is all the less surprising as attempts to derive the elastic properties of matter from electrical forces are beginning to show success. It would, therefore, be quite inconsistent to try, in turn, to explain electromagnetic phenomena in terms of the elastic properties of some hypothetical medium. Actually, the mechanistic concept of an aether had already come to be superfluous and something of a hindrance when the elastic-solid theory of light was superseded by the electromagnetic theory of light. In this letter the aether substance had always remained a foreign element. Einstein has recently suggested an extension of the notion of an aether.⁸

It should no longer be regarded as a substance but simply as the totality of those physical quantities which are to be associated with matter free space.

According to Landsberg, in this wider sense, there does, of course, exist an aether; only one has to bear in mind that it does not possess any mechanical properties. In other words, the physical quantities of matter free space have no space coordinates or velocities associated with them.⁹ It might seem that the postulate of relativity is immediately obvious, once the concept of an aether has been abandoned. Naturally, we cannot subject the whole universe to a translational motion and then investigate whether the phenomena are thereby altered. Our statement will, therefore, only be of heuristic value and physically meaning full when we regard it as valid for any and every closed system. But when is a system a closed system? Would it be sufficient to stipulate that all masses should be far enough removed? Experience tells us that this is sufficient for uniform motion, but not for a more general motion, according to Einstein. The postulate of relativity implies that a uniform motion of the centre of mass of the universe relative to a closed system will be without influence on the phenomena in such a system by the time influence.

⁷ Cf. S. PROKHOVNIK, *The Logic of Special Relativity*, 1967, op.cit., 27–51.

⁸ Cf. R. B. LINDSAY; H. M. ARGENTAU, *Foundations of Physics*, New York, Dover Publications, 1957, 330–350.

⁹ Cf. P. T. LANDSBERG, *The Enigma of Time*, Bristol, Adam Hilger Ltd., 1982, 37–39.

The relativity theory obeys to these postulates, and there are now forever the opportunity to formulate the generalization from Newtonian mechanic and to define where is the extension and unification of all classical theories of *Physics*.¹⁰

With the *Special Theory of Relativity* we have a new workshop to write the equations of classical theories, and carries out one bridge to the *Quantum Mechanics*. The two relativistic postulates are the basis of the new mathematical equations adaptations from the classical to the new physics. Although we will see that he also helped to initiate the development of *Quantum Mechanics*, it evolved in a way that he found unsatisfying. Modern quantum mechanics holds that only the relative likelihood of various outcomes from an experiment may be predicted and not the result of a specific measurement.

Einstein played an important role as a consultant and sympathetic protagonist in the development of *Quantum Mechanics*, in his later years Einstein's research concentrated on attempts at a unified theory of gravitation and electromagnetism.

His philosophy and work took him out of the mainstream of physics, although his only contributions continued to play an important role in the theory of modern physics. Einstein's reputation was greater and more lasting than that of any other scientist of this century, according to the Newton's position on *Relativity Theory*.¹¹

According to the *Special Theory of Relativity*, the invariance of c is put forward before any procedure for synchronizing clocks, i.e., for defining coordinate-time, it proposed. Further more only in the light of the postulated invariance of c , does the convention of clock-synchronism make sense, i.e., prove to be convenient. The following except demonstrates that theoretical considerations – totally unrelated to sense – experience preceded and founded Einstein's operational definition of distant simultaneity. Note that the facts adduced by Einstein – which might incidentally include the Michelson-Morley results – do not involve any distant simultaneities but only round-trip velocities, so no convention about clock-synchronisation need he invoked. As for reducing the General Theory of Relativity to a system of relations between sense-data, it was neither undertaken nor even seriously envisaged by Einstein, for he admitted that the connection between the coordinates and the results of measurement had been made problematic by the new theory from reading of Supples.¹² Meanwhile, we find in Einstein's thinking, on the one hand, an insistence on the epistemological primacy of concepts directly connected with sense-experience; and on the other, the recognition that science operates with notions which, though ultimately linked in sense-data, remain logically independent of the latter.¹³

Einstein was not driven to scepticism of the inductive method. For a time, he was drawn to Kant's theory that the possibility of science to the so called synthetic *a priori* principles: these are imposed, with absolute necessity, by the mind on the material

10 Cf. S. PROKHOVNIK, *The Logic of Special Relativity*, Cambridge, At the University Press, 1967.

11 Cf. R. G. NEWTON, *Thinking about Physics*, New Jersey, Princeton University Press, 4, 13, 28, 29, 32, 34, 37, 59–60, 136, 167.

12 Cf. P. SUPPES (edited), *Space, time and geometry*, Dordrecht, D. Reidel Publishing Company, 1973, 178–180.

13 Cf. R. G. NEWTON, *Thinking about Physics*, New Jersey, Princeton University Press, 4, 13, 28, 29, 32, 34, 37, 59–60, 136, 167.

provided by the senses.¹⁴ There are a more important “verification’s judgment” to *Special Relativity* foundation, because the “synthetic judgment no more necessary and sufficient to foundation the statistical laws of *Physics*.”¹⁵

The way in which this revolutionary modification had to be carried out was, however, determined, not by any phenomenalist analysis of experience, but by examining the transformational properties of Maxwell’s equation, and hence the possibility of turning c into an invariant, according to Einstein, that he carries out the implication from Maxwell equations to Newton Mechanics.

The axiomatic nature of Lorentz Transformation: metric and philosophy

At first sight it appears as if the two postulates were incompatible. For, let us take a light source L with moves relative to an observer A with velocity v and consider a second observer B at rest with respect to L . Both observers must then see as wave fronts spheres whose centres are at rest relative to A and B , respectively. In other words, they see different spheres. This contradiction disappears, however, if one admits that space points which are reached by the light simultaneously for A , are not reached simultaneously for B . This brings us directly to the relativity of simultaneity according to Einstein.¹⁶

Here, it will first of all be necessary to say what is meant by the synchronization of two clocks at different places. The following definition was chosen by Einstein.

A light ray is emitted from point P at time t_p , is reflected at Q at time t_Q , and returns to P at time t'_p . The clock at Q is then considered synchronized with that at P if $t_Q = (t_p + t'_p)/2$. Einstein uses light for regulating the clocks because the two postulates enable us to make definite statements about the mode of propagation of the light signals. Naturally, one could think of other ways of comparing the clocks, such as transporting them, or using mechanical or elastic couplings, etc. Only it must be stipulated that no such method should lead to a contradiction with the optical regulation method.

We can now derived the transformation formulas which connected the coordinates $(x, y, z, t, \text{ and } x', y', z', t')$ of two reference systems k and k' in uniform relative motion. The x -axis is chosen to lie along the direction of motion in such a way that k' moves relative to k with velocity v in the positive x -direction. All writers start with the requirement that the transformation formulae should be linear. This can be justified by the statements that a uniform rectilinear motion in k must also be uniform and rectilinear in k' . Furthermore it is to be taken for granted that finite coordinates in k remain finite in k' . This also implies the validity of Euclidean geometry and the homogeneous nature of space and time.

According to Einstein, it follows from the two postulates that the equation:

¹⁴ Cf. D. HATTRUP, “O Deus de Einstein, afinal, joga aos dados”, *Revista Portuguesa de Filosofia*, 61–1/2005, 113–128.

¹⁵ Cf. R.D. BORGES DE MENESES, *Filosofia da Matemática e da Física em Kant*, Roma, IF Press, 2025, 195–217.

¹⁶ Cf. H. A. LORENTZ; A. EINSTEIN ; H. MINKOWSKI, *O Princípio da Relatividade*, Volume I, tradução do alemão, Lisboa. Fundação Calouste Gulbenkian, 1972, 49–55.

$$x^2 + y^2 + z^2 - c^2 t^2 = 0$$

entails the corresponding equation:

$$x'^2 + y'^2 + z'^2 - c^2 t'^2 = 0^{17}$$

Since the transformation is to be a linear one, this is only possible if:

$$x'^2 + y'^2 + z'^2 - c^2 t'^2 = k(x^2 + y^2 + z^2 - c^2 t^2)$$

where k is a constant depending on v . If one also bears in mind that any motion parallel to the x -axis must remain so after the transformation formulae will be seen to follow immediately. It is, however, still necessary to show that k can be put equal to 1. Einstein's procedure consists in applying transformation once more, with the velocity in the opposite direction:

$$\begin{aligned} x^j &= k(-v) \cdot \frac{x' + vt'}{\sqrt{(1 - \beta^2)}}; \\ y^j &= k(-v)y'; \quad z^j = k(-v)z'; \\ t^j &= k(-v) \frac{t' + (v/c^2)x'}{\sqrt{(1 - \beta^2)}}. \end{aligned}$$

Then:

$$\begin{aligned} x^j &= k(v) \cdot k(-v)x; \\ y^j &= k(v) \cdot k(-v)y; \\ z^j &= k(v) \cdot k(-v)z; \\ t^j &= k(v) \cdot k(-v)t. \end{aligned}$$

Since k^{ij} is at rest relative to k , it must be identical with it. Hence,

$$k(v) \cdot k(-v) = 1.$$

The above relation then gives $k(v) = 1$, since k must be positive. Poincaré arrives at this conclusion in a similar way. He considers the totality of all linear transformations which transform:

$$x^2 + y^2 + z^2 - c^2 t^2 = 0$$

¹⁷ Cf. A. EINSTEIN, *The Meaning of Relativity*, 1973, op.cit., 26–30.

into itself and demands that it should contain as subgroups:

- The one-parameter group of translations parallel to the x-axis;
- The ordinary displacements of the coordinate axes;
- Once again $k = 1$ follows, since Einstein's symmetry requirement $k(v) = k(-v)$.

We have thus obtained the definite result that:

$$x' = \frac{x - vt}{\sqrt{(1 - \beta^2)}}; \quad y' = y; \quad z' = z;$$

$$t' = \frac{t - (v/c^2)x}{\sqrt{(1 - \beta^2)}}.$$

By Einstein, the simple structure of the anterior formulae makes one wonder. Whether they could not have been derived from general group-theoretical considerations, without having to assume the invariance of the last equations.¹⁸

From the group-theoretical assumption it is only possible to derive the general form of the transformation formulae, but not their physical content. Incidentally, it is to be noted that contains the transformation formulae of ordinary mechanics:

$$x' = x - vt \quad ; \quad t' = t$$

which can be obtained by putting $\alpha = 0$.

The rod is, therefore, contracted in the ratio $\sqrt{1 - \beta^2} : 1$, as was already assumed by Lorentz. Since the transverse dimensions of a body remain unaltered, the same formula applies to the contraction of its volume:

$$V = V_0 \sqrt{(1 - \beta^2)}.$$

According to Tonnelat, we have seen that this contraction is connected with the relativity of simultaneity, and for this reason the argument has been put forward that it is only an apparent contraction, in other words, that it is only simulated by our space-time measurements.¹⁹

If a stable is called real only when it can be determined in the same way in all Galilean reference systems, then the Lorentz contraction is indeed only apparent, since an observer at rest in k' will see the rod without contraction.

But we do not consider such a point of view as appropriate, and in any case the Lorentz contraction is in principle observable. It shows that the determination of the simultaneity of spatially separated events, which is necessary for the observation of

¹⁸ Cf. A. EINSTEIN, *The Meaning of Relativity*, 1973, op.cit., 26–30. 28–29.

¹⁹ Cf. M. A. TONNELAT, *Les Principes de la Théorie Electromagnétique et de la Relativité*, Paris, Masson et Cie, 1959, 110–112.

the Lorentz contraction, can be carried out entirely with the help of measuring rods, without the use of clocks.

For let us think of using two rods A_1B_1 and A_2B_2 of the same rest length l_0 which move relative to E with equal and opposite velocity v . We mark the points A^* and B^* in k at which the points A_1 and A_2 and B_1 and B_2 , respectively, overlap. The distance A^*B^* , as measured by rode at rest in k , will then have the value:

$$l = l_0 \sqrt{(1 - \beta^2)}$$

It, therefore, follows that the Lorentz contraction is not a property of a single measuring rod taken by itself, but is a reciprocal relation between single measuring rod taken by itself, but is a reciprocal relation between two rods moving relatively to each other, and this relation is in principle observable, by the Tonnelat.²⁰

Analogously, the time scale is changed by the motion. Let us again consider a clock which is at rest in k' . The time t' which it indicates in k' is its proper time τ and we can put the coordinate x' equal to zero. It then follows that:

$$t = \frac{\tau}{\sqrt{(1 - \beta^2)}} \quad ; \quad \tau = \sqrt{(1 - \beta^2)} t$$

Measured in the time scale of k , therefore, a clock moving with velocity v will lag behind one at rest in k in the ratio:

$$\sqrt{(1 - \beta^2)} : 1$$

According to Fock, while this consequence of the Lorentz transformation was already implicitly contained in Lorentz's and Poincaré's results; it received its first clear statement only by Einstein.²¹ It is obvious that experiments which are intended to show the effect of the motion of the coordinate systems as a whole on phenomena within it must, according to the theory of relativity, show a negative result. It is nevertheless instructive to investigate how such experiments are seen from a system k which is at rest. For this purpose we shall discuss the Michelson interferometer experiment. Let l_1 be the length, measured in K_1 of the interferometer arm parallel to the direction of motion, and l_2 that of the arm at right angles to it. The time t_2 taken by the light to traverse the arms are then given by:

$$ct_1 = \frac{2l}{1 - \beta^2} ; \quad ct_2 = \frac{2l}{\sqrt{(1 - \beta^2)}}$$

20 Cf. M. A. TONNELAT, *Les Principes de la Théorie Electromagnétique et de la Relativité*, 1959, op.cit., 107–109.

21 Cf. V. FOCK, *The Theory of Space, Time and Gravitation*, London, Pergamon Press, 1959, 12–16.

Now, because of the Lorentz contraction, we have:

$$l_z = l_0 \cdot \sqrt{(1 - \beta^2)}, t_2 = t_0,$$

so that

$$ct_1 = ct_2 = \frac{2l_p}{\sqrt{(1 - \beta^2)}}$$

It would therefore seem that an observer travelling with k' measures a velocity of light:

$$c' = c\sqrt{(1 - \beta^2)}$$

different from that measured by an observer in k . This is the point of view put forward by Abraham. According to Einstein, however, the time-dilatation:

$$t' = t\sqrt{(1 - \beta^2)}$$

has still to be taken into account, so that:

$$ct'_1 = ct'_2 = 2l_0,$$

and thus velocity of light is the same in k' as in k . According to Abraham there is to time dilatation. Abraham's point of view is consistent with Michelson's experiment, but it contradicts the postulate of relativity, since it would in principle admit of experiments which would allow one to measure the absolute motion of a system.²²

Let us discuss the difference between Einstein's and Lorentz's points of view still further. Einstein showed in particular that the distinction between local and true time disappears with a more profound formation of the concept of time. Lorentz's local time is shown to be simply the time in the moving system k' .

There are as many times and spaces as there are Galilean reference systems. It is also of great value that Einstein rendered the theory independent of any special assumptions about the constitution of matter.

The epistemological basis of the theory of relativity has recently been undergoing a close examination from the side of philosophy. In this connection the opinion has been expressed that the theory of relativity has thrown overboard the concept of causality. We take the view that it is perfectly satisfactory from the standpoint of the theory of knowledge in to say that the relative motion is the cause of the contraction, since this latter is not the property of a single measuring rod, but a relation between two such rods. Also it is unnecessary to refer, as Holst does, to all matter present in the universe, in order to satisfy the causality condition. Meanwhile, the group of Lorentz transformation is a very important ontological condition.²³

22 Cf. R. C. TOLMAN, *Relativity, Thermodynamics and Cosmology*, Oxford, At the Clarendon Press, 1973, 32–35.

23 Cf. P. C. W. DAVIES, *Space and Time in the modern Universe*, Cambridge, At the University Press, 1977, 29–56.

THE FOUR-DIMENSIONAL SPACE-TIME WORLD: METRIC AND PHILOSOPHY

The two postulates of relativity and of the constancy of the velocity of light of Einstein's Theory of Special Relativity can be combined into the single requirement that all physical laws should be invariant under the Lorentz transformation. From now on we shall take to mean by the Lorentz transformation the totality of all linear transformation which satisfy the identity. Each such transformation can be made up of rotation of the coordinate system and the special Lorentz transformation of the type. Mathematically speaking, therefore, the special theory of relativity is the theory of invariants of the Lorentz group.

The work of Minkowsky has been fundamental for the development of the theory. He managed to give the theory an extraordinarily elegant form by making consistent use of two facts. If instead of the ordinary time t , the imaginary quantity $u = ict$ is introduced, the behaviour of the space and time-coordinates. It is completely equivalent in the Lorentz group, and thus also in the physical laws which are invariant with respect to this group. In fact, the invariant which is characteristic for the Lorentz transformation:

$$x^2 + y^2 + z^2 - c^2 t^2$$

goes over into:

$$x^2 + y^2 + z^2 + u^2$$

It is therefore expedient from the legitimacy not to separate space and time, but to consider the four-dimensional space-time manifold.

We shall follow Minkowski by calling it, in short, "world".²⁴

Since expression is invariant under the Lorentz transformation and is also quadratic in the coordinates, it would seem natural to define it as the square of the distance of the world point $P(x, y, z, u)$ from the origin, in analogy to the corresponding square of the distance:

$$x^2 + y^2 + z^2$$

in ordinary space. With this a world geometry (metric) is determined which is closely related to Euclidean geometry.

The two geometries are not completely identical because of the imaginary character of one of the coordinates. The latter property implies, for instances, that two world points whose distance from each other is zero do not necessarily coincide, such matter. Notwithstanding these geometrical differences, we can regard the Lorentz transformations as orthogonal linear transformations of the world coordinates and as rotations of the world coordinate axes, in analogy with the rotations of coordinate system in R_3 . Moreover, just as the ordinary vector and tensor calculus can be looked

²⁴ Cf. J. L. SYNGE, *Relativity: the special theory*, Amsterdam, North-Holland Publishing Company, 1958, 56–57.

upon as an invariant theory of the orthogonal linear coordinate transformations in R_3 , so the invariant theory of the Lorentz group takes the form of a four-dimensional vector and tensor calculus by the philosophical lecture of REICHENBACH.²⁵ Therefore, we can express the second aspect which is essential to Minkowski's representation of the theory, in the following way: because the Lorentz group leaves a quadratic form of the four world coordinates invariant, the invariant theory of this group can be represented geometrically and it then appears as a natural generalization of the ordinary vector and tensor calculus for a four-dimensional manifold. But the linear transformations of special relativity involve all four-coordinates x_1, x_2, x_3, x_4 , you can identify the same world-point after the transformation, but there is no good meaning in speaking of the same point in space after the transformation unless you also refer to the moment of time in which it is contemplated neither is there a meaning in speaking of the same moment of time after the transformation without reference to the point in space where it is contemplated.

What in one frame is the same point in space, envisaged at different moments of time, well in general turn out to be two different points in space in the other form envisaged at two different moments.²⁶

Again, what in one frame is the same moment at two different points, will in general be mapped in the other frame as different moments referring to different points in space. It is this state of affairs which has given birth to all the much discussed paradoxes in the *Special Theory of Relativity* of Einstein so difficult to explain to the non-mathematician, while the mathematician is prepared to encounter some clashes with customary views from the mere fact that all four-coordinates are involved in the transformation.

From what has been said it is to be anticipated that neither the "distance" between two points in space nor the time interval between the happening of the two events are invariant to Lorentz transformation; either of them may even vanish in one frame, but not vanish in another frame. If we take for convenience one of the two events to happen at the origin at time zero, the other one at the point x_1, x_2, x_3 at time x_4 the square of their distance in that frame will be given by the Pythagorean theorem thus:

$$x_1^2 + x_2^2 + x_3^2$$

and their time interval by x_4 .²⁷

Since all frames are to be of equal right, the same expressions will hold in any other frame, only with the x'_k 's for the x_k . But only neither is invariant. We shall have in general:

$$x_1'^2 + x_2'^2 + x_3'^2 \neq x_1^2 + x_2^2 + x_3^2$$

$$x_4' \neq x_4$$

²⁵ Cf. H. REICHENBACH, *Space and Time*, translated from Germanic language, New York, Dover Publications, 1958, 109–111.

²⁶ Cf. H. REICHENBACH, *Space and Time*, 1958, op.cit., 58–101.

²⁷ Cf. R. MILLS, *Space, Time and Quanta*, New York, Freeman and Company, New York, 1994, 81–106.

However – and this is the cardinal point – the Lorentz transformation is characterized by the fact that the following expression is “invariant”:

$$-x_1^2 - x_2^2 - x_3^2 + x_4^2 = -x_1'^2 - x_2'^2 - x_3'^2 + x_4'^2$$

Einstein said the transformations are characterized by this “invariance”. Indeed it is well-might an exhaustive definition distinguishing Lorentz transformations among all possible homogeneous linear transformations of the four-coordinates. The state of affairs bears formal analogy to the case of orthogonal transformations in three dimensions, which are characterized among all linear transformations by the invariance of the distance:

$$x_1^2 + x_2^2 + x_3^2$$
 ²⁸

A formal description of the injunction can be given in the following terms. If you write down the four linear transformation formulae and transcribe every term containing x_4 or x_4' thus:

$$ax_4 = (-ia) \cdot (ix_4); x_4' = (-i) \cdot (ix_4')$$

in other words if you regard it as a transformation between the variables x_1, x_2, x_3, x_4 and x_1', x_2', x_3', x_4' then, this is an orthogonal transformation in four dimensions but with some relevant injunction on the coefficients as to being either real or purely imaginary.

According to Einstein, The invariant of two world-points or point-events, one of which was for simplicity taken to happen at the origin of the four-dimensional frame, is the square of the time-interval minus the square of the distance.²⁹

According to Synge, the invariant of two world-points or point-events, one of which was for simplicity taken to happen at the origin of the four-dimensional frame, is the square of the time-interval minus the square of the distance. In the first case x_4^1 can never vanish, and thus, in virtue of our conventions about the determinant and the coefficient $\partial x_4^1 / \partial x_4$ it cannot change its sign on Lorentz transformation. The second event coordinates is then called later or earlier with respect to the first according to whether $x_4 < 0$.³⁰

The Lorentz transformation is correctly the dictionary of the metric from inertial systems, and defines a new epistemological situation to the relationship on the effects of verifiability to the frame articles of relativistic metric in the spacetime connection.

I think so that the Lorentz transformations are the *a posteriori* sentences to the spacetime metric, because they show the sense of metric stationary in the spacetime relationship. These predicates refer the transcendental and universal opportunity.

Only the theory of special relativity shall be taken in account here. The main point of importance is the fusion of time and space to four-dimensional space-time, as

²⁸ Cf. A. EINSTEIN, *Grundzuege der Relativitaetstheorie*, Berlin, Akademie-Verlag, 7–9.

²⁹ Cf. A. EINSTEIN, *La Théorie de la Relativité Restreinte et Générale*, Paris, Dunod, 1916, 5–19.

³⁰ Cf. J. L. SYNGE, *Relativity, the special theory*, 1972, op.cit., 69–113.

formulated by Minkowski. However, the meaning of space-time can be demonstrated considering as example the simplest equation of the Lorentz transformations for inertial systems. It can be written as follows:

$$x = x' \cosh \varphi + t' \sinh \varphi ;$$

$$t = x' \sinh \varphi + t' \cosh \varphi$$

with $\tanh \varphi = v/c$.

It is assumed that the coordinates of the systems are orientated parallel to each other, that the relative movement takes place along the x-axis and that the systems have the same origin at time $t = t' = 0$. Also v represents the relative speed of the coordinate systems and c is the speed of light, according to Hoffmann.³¹

This form of the equations was chosen here because of its analogy to the classical transformation of rotated systems:

$$x = x' \cos \alpha - y' \sin \alpha$$

$$y = x' \sin \alpha + y' \cos \alpha$$

when the rotation of angle α takes place around the z-axis.

It is well known that according to the Relativity of Einstein the flow of time is different in a system that is moving. This difference is given by the above equation of the Lorentz transformation.

By the Einstein's perspective, the analogy between the two equations can be interpreted to show that this difference flow of time is analogous to the rotation of coordinate systems, which correspond to view the world from different perspectives. Thus time and space are fused into a relativistic unity. This fusion of time with the space leads to the concept of space-time in the theory of special relativity. This concept, however, leads to important role to play simplifications. Many cases of this can be found in physics, especially where relativistic effects enter the game. In quantum field theory, e.q., integrations are in general performed on the four-dimensional space-time. Also space and time coordinates are not treated completely and necessarily identical, however the difference is not easily noticeable.

Consciousness at one time can reach only one three-dimensional plane of this four-dimensional space-time. This plate corresponds to the present moment. But this presence is an arbitrary point of reference, arbitrary in the same way as a certain point in space, by the point of view of Synge.³² The relation of events at different times is in principle not different from the relation of events at the same time but at different places. This is usually taken to imply that there is a symmetry between past and present just as well as left and right are symmetrical to each other.

³¹ Cf. B. HOFFMANN, *Perspectives in Geometry and Relativity*, 1966, op.cit., 58–62.

³² Cf. J. L. SYNGE, *Relativity, the special theory*, 1972, op. cit., 59–68.

CONCLUSIONS

For the description of a physical event, according to Einstein one must specify four numbers, say x , y , z , and t , of which the first three refer to the site where the event takes place while the fourth refers to the time of its occurrence. For another observer, the same event would be specified by a different set of numbers, say x' , y' , z' , and t' .

The mathematical connection between these two sets of numbers would depend upon the characteristic features of the transitive from one system of reference to the other. Since there is a large variety of systems of reference, there is a large variety of transformations one has to deal with. One may, therefore, regard the complete set of four members as the coordinates of a world point, representing the event in question in a four-dimensional world of x , y , z and t , rather than regard x , y and z separately as the spatial coordinates of the event in the three-dimensional physical space and t separately as the time of its occurrence in a one dimensional continuum of time, with many implications in Astrophysics and Cosmology, according to Hawking and Ellis.³³

The foregoing scheme was first suggested by Minkowski in 1908 and has since been employed extensively. According to this scheme, a physical event is represented by a world points in the four-dimensional world of events – usually referred to as the “Minkowski world” or the space-time continuum – which may be defined as the totality of representation points of all possible physical events. The position of the representative point, corresponding to a particular event, in the Minkowski world is determined by four coordinates x , y , z and t , as referred to a set of four axes the so called coordinates axed. The development of an event is depicted by a trajectory, usually referred to as the world line, along which the corresponding world point evolves. The relative position of one event with respect to another is denoted by a vector – the line element – that joint the two events in the Minkowski worlds and so forth, by the thinking of Moeller.³⁴

In this representation the study of relativistic theory reduces to a study of the geometry of the four-dimensional continuum. In consequence, the formation of the Special Relativity Theory of Einstein assumes so elegant a form that the importance and usefulness of Minkowski’s contribution can hardly be overestimated.

As regards transformations, their classification would now be based on the fact whether they involve one or both of the following features:

- A rotation of the coordinate axes in the x , y , z , t continuum, with six degrees of freedom, and;
- A displacement of the origin of the coordinate system, with four degrees of freedom, according to Inverno.³⁵

³³ Cf. S. W. HAWKING; G. F. R. ELLIS, *The Large Scale Structure of Space-time*, Cambridge, At the University Press, 1980, 118–120.

³⁴ Cf. C. MOLLER, *The theory of Relativity*, Oxford, At the Clarendon Press, 1966, 118–120.

³⁵ Cf. R. INVERNO, *Introducing Einstein’s Relativity*, Oxford, At the Clarendon Press, 1992, 33–40.

We have seen that the fundamental invariant of the homogeneous Lorentz transformations is:

$$s^2 = x^2 + y^2 + z^2 - c^2 t^2 = x'^2 + y'^2 + z'^2 - c^2 t'^2 = s'^2$$

If we employ the set of coordinates:

$$x'_1 = x; x'_2 = y'; x'_3 = z'; x'_4 = i c t'$$

The anterior equations are remained in this:

$$s^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 = x_1'^2 + x_2'^2 + x_4'^2 = s'^2$$

Written in this form, the analogy with the three-dimensional world becomes complete, except for the fact that the fourth square in the sum here is really negative, according to Naber.³⁶

However, because of the imaginary character of the four-coordinate employed, the geometry of this continuum is only formally identical with Euclidean geometry; that is why it is usually referred to as quasi-Euclidean.

The immediate advantage of the transition from the anterior equation is that now the rotation of the axes of an inertial observer would not lead to an oblique coordinate system. On the other hand, these rotations would now involve only rectangular coordinate systems. Lorentz transformations would, therefore, become linear orthogonal. Confining to the case of homogeneous transformations, viz the ones that do not involve a displacement of the origin, we can write:

$$x'_i = \sum_1^4 x_k \cdot x_{ik}$$

where x_{ik} 's are the coefficient of transformation. Geometrically, the coefficient x_{ik} may be understood as the cosine of the angle between the x_i axis and the x_k axis. In view of the specific nature of the coordinates and the coefficient x_{sp} and x_{4t} would be real while the coefficient x_{4t} and x_{4s} would be purely imaginary, according to Chavel.³⁷

From now onward we adopt the so called "summation convention", i.e., if an index occurs twice in a term, a summation over all possible values of that index is automatically implied. The convention applies to all the equations that appear in the sequel, unless a statement is made to the contrary. For a continuous transformation – the one obtainable from the identity transformation ($S \rightarrow S$) by a continuous rotation of the axes – the value of the determinant must be +1. Such transformations are usually referred to as proper transformation. We can have transformations which involve reflections of the coordinates axes and may, therefore, be discontinuous.

³⁶ Cf. G. L. NABER, *The Geometry of Minkowski Space-time*, Berlin, Springer-Verlag, 1992, 7–87.

³⁷ Cf. I. CHAVEL, *Riemannian Geometry: a modern introduction*, Cambridge, At the University Press, 1993, 49–66.

Such transformations are necessarily discontinuous; they are usually referred to as improper transformation. Of course, transformations that involve an even number of reflections must again have: $\alpha = +1$.

By Buechel the *Special Theory of Relativity* of Einstein is play a very important role in yours applications, from *Electrodynamics* to *Quantum Mechanics*, and defines a progress significantly to the *Physics*.³⁸

Epistemologically, we are not, however, sufficiently advanced in our knowledge of Nature's elementary laws to adopt this more perfect method without going out of our depth. At the close of our considerations we shall see that in the most recent studies there is an attempt. It more clearly follows from the above what is implied by preferred states of motion. They are preferred as regards the laws of Nature. States of motion are preferred when, relative to the formulations of the laws of Nature, coordinate systems within them are distinguished in that with respect to them those laws assume a form preferred by simplicity.

According to classical mechanics the states of motion of the inertial frames in this sense are physically preferred. Classical mechanics permits a distinction to be made between unaccelerated and accelerated motions; it also claims that velocities have only a relative existence, dependent on the selection of the inertial frame, while accelerations and rotations have an absolute existence. This state of affairs can be expressed thus: According to classic mechanics velocity relativity exists, but not acceleration relativity. After these preliminary consideration we can pass to the actual topic of one contemplations, the relativity theory, by characterizing its development so far in terms of principles, according to Buechel.³⁹

The Special Theory of Relativity is an adaptation of physical principles to Maxwell-Lorentz electrodynamics. From earlier physics it takes the assumption that Euclidean geometry is valid for the laws governing the situation of rigid bodies, the inertial frame and the law of inertia. The postulate of equivalence of inertial frames for the formulation of the laws of Nature is assumed to be valid for the whole of physics as special relativity principle.

From Maxwell-Lorentz electrodynamics it takes the postulate of invariance of the velocity of light in a vacuum according to the light principle.⁴⁰ To harmonize the relativity principle with the light principle, the assumption that an absolute time exists, had to be abandoned. Thus the hypothesis is abandoned that arbitrarily moved and suitably set identical clocks function in such a way that the times shown by two of them, which meet, agree.

According to Einstein the specific time is assigned to each inertial frame; the state of motion and the time of the inertial frame are defined, in accordance with the stipulation of meaning, by the requirement that the light principle should apply to it. The existence of the inertial frame thus defined and the validity of the law of inertia with respect to it are assumed. The time for each inertial frame is measured by identical clocks that are relative to the frame.

38 Cf. W. BUECHEL, *Philosophische Probleme der Physik*, Freiburg, Herder-Verlag, 1965, 167–165.

39 Cf. W. BUECHEL, *Philosophische Probleme der Physik*, 1965, op.cit., 197–236.

40 Cf M.S., LONGAIR, M.S., *Theoretical concepts in physics*, Cambridge, At the University Press, Cambridge, 1984.

The laws of transformation for space-coordinates and time for the transition from one inertial frame to another, the Lorentz transformations as they are termed, are unequivocally established by these definitions and the hypotheses concealed in the assumption that they are free from contradiction. Their immediate physical significance lies in the effect of the motion relative to the used inertial frame on the form of rigid bodies – Lorentz contraction – and on the rate of the clocks.

According to the special relativity principle the laws of Nature must be covariant relative to Lorentz transformations; the theory thus provides a criterion for general laws of Nature. It leads in particular to a modification of the Newtonian print motion law in which the velocity of light in a vacuum is considered the limiting velocity, and it also leads to the realization that energy and inertial mass are of like nature, by the commentary of Taylor.⁴¹

The *Special Relativity* of Einstein resulted in appreciable advances. It reconciled mechanics and electrodynamics. It reduced the number of logically independent hypotheses regarding the latter. It enforced the need for a clarification of the fundamental concepts in epistemological terms. It united the momentum and energy principle, and demonstrated the like nature of mass and energy. Yet it was not entirely satisfactory quite apart from the Quantum problems, which all theory so far has been incapable of really solving. In common with classical mechanics the special relativity theory favours, certain states of motion to all other states of motion.

This was actually more difficult to tolerate that the preference for a single state of motion as in the case of the theory of light with a stationary ether, for this imagined, i.e., the light ether. A theory which from the outset prefers to state of motion should appear more satisfactory. Moreover the previously mentioned vagueness in the definition of the inertial frame or in the formulation of the law of inertia raise doubts which obtain their decisive importance, owing to the empirical principle for the equality of the inertial and heavy mass, in the light of the following consideration.

According to Einstein let k be an inertial frame without a gravitational field, k' a system of coordinates accelerated uniformly relative to k . The behaviour of material points relative to k' is the same as if k' were an inertial frame in respect of which a homogeneous gravitational field exists. On the basis of the empirically known properties of the gravitational field, the definition of the inertial frame thus proves to be weak. The conclusion is obvious that any arbitrarily moved frame of reference is equivalent to any other for the formulation of the laws of nature, that there are thus no physically perfected states of motion at all in respected of regions of finite extension.

The implementation of this concept necessitates an even more profound modification of the geometric-kinematical principles than the special relativity theory, according to Pathria, on the lecture of *Special Relativity*.⁴²

The Lorentz contraction, which is derived from the latter, leads to the conclusions that with regard to a system k' arbitrarily moved relative to an inertial frame k , the

⁴¹ Cf. J.G. TAYLOR, *Special Relativity*, Oxford, At the Clarendon, 1975, 2–14.

⁴² Cf. R. K. PATHRIA, *The Theory of Relativity*, second edition, Oxford, Pergamon Press, 15–48.

laws of Euclidean geometry governing the position of rigid bodies do not apply. We arrive at the formal description of the field by the following consideration. For each infinitesimal point environment in an arbitrary gravitational field a local frame of coordinates can be given for such a state of motion that relative to the local frame no gravitational field exists a local inertial frame.

In terms of this inertial frame we may regard the results of the special relativity theory as correct to a first approximation for the infinitesimally small region. There are an infinite number of such local inertial frames at any space-time point; they are associated by Lorentz transformations. These latter are characterised in that they leave invariant the distance ds of two infinitely adjacent point events defined by the equation:

$$ds^2 = c^2 dt^2 - dx^2 - dy^2 - dz^2$$

which distance can be measured by means of scales and clocks. For x, y, z, t , represent coordinates and time measured with reference to a local inertial frame about Dixon.⁴³

To describe space-time regions of infinite extent arbitrary point coordinates in four dimensions are required which serve no other purpose than to provide an unambiguous designation of the space-time points by four numbers each x_1, x_2, x_3 and x_4 , which takes account of the continuity of the four-dimensional manifold by Gaussian coordinates. The mathematical expression of the general relativity principle is then, that the systems of equations expressing the general laws of Nature are equal for all such systems of coordinates, by Misner Thorne and Wheeler.⁴⁴ Since the coordinate differentials of the local inertial frame are expressed linearly by the differential dx_{ik} of a Gaussian system of coordinates, when the latter is used for the distance ds of two events an expression of the form:

$$ds^2 = g_{ik} \cdot dx_i \cdot dx_k$$

is obtained.

The g_{ik} , which are continuous functions of x_{ik} , determine the metric in the four-dimensional manifold where $|ds|$ is defined as an absolute parameter measurable by means of rigid scales and clocks.

These same parameters g_{ik} , however, also describe with reference to the Gaussian system of coordinates the gravitational field which we have previously found to be identical with the physical cause of the metric in General Relativity as a deformation of space-time.

The care as to the validity of the special relativity theory for finite regions is characterised in that when the system of coordinates is suitably chosen, the values of g_{ik} for finite regions are independent of x_{ik} .

⁴³ Cf. W. G. DIXON, *Special Relativity, the foundations of macroscopic physics*, Cambridge, At the University Press, 1978, 25–30.

⁴⁴ Cf. Ch. W. MISNER; K. S. THORNE; J. A. WHEELER, *Gravitation*, Sanct Francis, Freeman and Company, 1973, 385–431.

In accordance with the general theory of relativity the law of point motion in the pure gravitational field is expressed by the equation for the “geodesic line”, according to Frankel.⁴⁵

Actually the geodetic line is the simplest mathematically which in the special case of constant g_{ik} becomes rectilinear. Here, therefore, we are confronted with the transfer of Galileo’s law of inertia to the general theory of relativity by Atwater.⁴⁶ In mathematical terms the catch for the field equations amounts to ascertaining the simplest generally covariant differential equations to which the gravitational potentials g_{ik} can be subjected. By definition these equations should not contain higher derivatives of g_{ik} with respect to x_{ik} than the second and these only linearly, which condition reveals these equations to be a logical transfer of the Poisson field equation of the Newtonian theory of gravity to the general theory of relativity. And that exhausts the direct consequences of the relativity principle. I shall turn to those problems which are related to the development which I have traced.

Already, Newton recognized that the law of inertia is unsatisfactory in a context so far unmentioned in the exposition, namely that it gives no real cause for the special physical position, of the states of motion of the inertial frames relative to all other states of motion, with the commentary of Hoffmann.⁴⁷ It makes the observable material bodies responsible for the gravitational behaviour of a material point, yet indicates in material cause for the material point but devise the cause for it (absolute space), according to the *Special Ontology of Relativity of Einstein*.

Epistemologically, the unification of *Newtonian mechanics* with *Maxwell’s electrodynamics* led to the emergence of *Einstein’s Special Theory of Relativity*, a major step towards beginning to think about a general theory unifying all of physics, which includes *Quantum mechanics*, in what is already being called a *Theory of Everything*.

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⁴⁵ Cf. Th. FRANKEL, *Gravitational Curvature*, Sanct Francis, Freeman and Company, 35–45.

⁴⁶ Cf. H. A. ATWATER, *Introduction to General Relativity*, Oxford, Pergamon Press, 1974, 136–159.

⁴⁷ Cf. B. HOFFMANN, *Relativity and its Roots*, New York, Freeman and Company, 1983, 81–103.

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Artificial Intelligence in the System of Training Students and Postgraduates to Solve Social Issues

Summary

The problem of the advantages and threats posed by artificial intelligence is steadily becoming one of society's priorities. The Institute of Polish Language at Warsaw University together with the Polish Language Foundation announced the results of the 13th annual Word of the Year competition. By the decision of prominent linguists and scholars, the Word of the Year 2023 in Poland was officially recognized as "artificial intelligence." The pandemic, ongoing globalization, military conflicts, and massive waves of emigration highlight the urgent need for modernization in both medical care and social services. It should be noted that these processes often take a long time to implement effectively. One striking fact illustrates this clearly: while speaking to former participants in the Afghanistan war, it was revealed that they continue to face numerous problems even forty years after demobilization, many of which remain latent and undiagnosed. To understand the scale of the tragedy in Ukraine, researchers report that nearly 700,000 people received combatant status from 2014 to 2024, with more than 200,000 over the past two years alone.

Keywords: personality, education, development, artificial intelligence, university, social work.

INTRODUCTION

The relevance of the problem of modernizing social protection of the population is becoming increasingly obvious. For example, in November 2023, the second session of the European Forum of Labor and Social Rights was held in Brussels. As it was emphasized by the Polish researcher K. Pivowska, the subject of discussion was the impact of artificial intelligence on the labor market and workers (protection of rights in the context of the artificial intelligence revolution, work on Internet platforms, the development of artificial intelligence and social protection of workers). The figures cannot but impress those incomes related to digital technologies have increased by 500%, 28 million people in the European Union use digital platforms, and in the near future their number will increase to 43 million (Pivowska, 2025).

Eloquent evidence of the need to study artificial intelligence is the fact that, in addition to Poland, where this concept dominated in 2023, “similar surveys are also held in other countries around the world. This year, opinions in the UK were divided: linguists from Collins Publishing House chose “artificial intelligence”, the team from Cambridge Publishing House University Press – “to hallucinate” in the context of artificial intelligence, and at Oxford Publishing the word of the year was *rizz* – a slang abbreviation for “charisma”. In Germany the word of the year for 2023 was the noun *krisenmodus*, meaning crisis mode, in Spain – *polarización*, expressing deep political disagreements. In Japan, meanwhile, the logographic sign *zei*, meaning tax, was chosen. In Ukraine, the main word of 2023 according to the dictionary of modern Ukrainian language and slang “Myslovo” was the word “mobilization” (Dymydyuk, 2023).

This sounds natural as in modern conditions there are still many unresolved problems in Ukraine, including “the issue of social and psychological rehabilitation of combatants; issues related to missing persons and prisoners of war - combatants; the issue of acquiring housing by investing in housing construction facilities; issues related to improving the quality of social services, improving the regulatory framework in the field of social protection of combatant children in accordance with their needs, state and international standards” (Savka, 2025). It is time to modernize social work, taking into account the laws of personal development, respond to the challenges of modernity, transition to integral thinking, the priority of which was recognized by experts of the Club of Rome in December 2017, and correctly use the capabilities of information technologies, including artificial intelligence.

STUDY RATIONALE

First of all, it is advisable to pay attention to the topics of research by modern authors. As an example, let's consider monographs published in Ukraine, which will be interesting to European colleagues. They are united by the division into two parts. The first considers current issues of social work, and the second analyzes the process of training specialists. The authors of the collective monograph “Social Work in the Face of Modern Challenges: Experience and Development Prospects” (2022) focused on the prospects for the development of social work using socio-cultural technologies, issues of preventive activities, the work of law enforcement agencies

among minors, summarized the interesting experience of the “municipal nanny” program, ethical challenges, the social formation of pre-conscription youth, the resocialization of drug addicts, the activities of a social tutor with child artists, online support for recipients of social services, sexual education of children, and the policy of local governments in the social sphere. Regarding the professional training of specialists, the problems of students’ communication competence, the importance of practical training, the use of art therapy in higher education institutions, leadership development, and the formation of a motivational sphere are highlighted (Palahnyuk, Faichuk, 2022). As we can see, in 2022, the authors mention the importance of Internet support in social work, but the possibilities of using artificial intelligence are not yet considered. Which is natural. In the collective monograph “Social work and social education in the present conditions: problems and prospects for development” (2023), the authors highlight two main problems. Firstly, this is social and socio-pedagogical work in conditions of social crises (raising orphans and children deprived of parental care in a family-type orphanage; helping the elderly and the elderly in conditions of modern social challenges; features of the activities of social workers in the field of public health; rehabilitation of people with addiction to narcotic drugs or psychotropic substances; modeling the process of providing social services in territorial communities). Secondly, attention is focused on theoretical and methodological aspects of training specialists in the social sphere (marketing of services; ethical dilemmas in social work; forming the competitiveness of future specialists by means of professional self-design) (Kalaur, Oleksyuk, Oliynyk, 2023). Based on these and many other publications, a preliminary conclusion can be drawn that Ukrainian scientists continue to search for priority tasks. That is why cooperation with European colleagues is important. At the same time, Ukrainians have unique experience of social work in conditions of modern war. This is evidenced by the content of modern textbooks, in which, in addition to traditional topics: social challenges, assistance to people of all ages, alcohol and drug addiction, social work with people without a fixed place of residence, rehabilitation of people with special abilities, domestic violence, victims of “human trafficking”, assistance to people prone to suicide, social and educational work with persons who have returned from places of deprivation of liberty, etc., fundamentally new topics are analyzed: social work with refugees and internally displaced persons, social work with participants in hostilities and their family members (Belavin, Mitina, Orlovska, 2021). The latter topic is attracting increasing attention. It is no coincidence that in the 2025 textbooks you can see sections with the following topics: “State guarantees regarding social protection of military personnel and members of their families”; “The system of legislation of Ukraine in the field of social and legal protection of military personnel and members of their families”; “The system of ensuring social and legal protection of military personnel and members of their families”; “Organization of social and legal protection of military personnel and their family members”; “Social support of military personnel and their family members in the Armed Forces of Ukraine” (Chernuha, 2025). Let us note another characteristic feature. Monographs appear in which one of the important problems is purposefully considered. This is an interesting trend that is worth paying attention to. As an example, let us name the book (Borysova, Znatkova, Kulha, Nikitina, 2024). The fact that the above-mentioned problems are reflected in regulatory documents is also very important (Strategy of Digital Transformation of the Social Sphere, approved by the Cabinet of Ministers of Ukraine, 28 October 2020).

For Ukrainians and specialists from other countries, the experience of colleagues from other countries is important, which allows us to identify common approaches and promising directions of social work on the basis of comparative studies. Moreover, the integration of theorists and practitioners is becoming a necessary condition for achieving positive results. We are impressed by the experience of Poland. First of all, because the starting conditions are similar, and the dynamics of change can serve as a good example. A special information page "Artificial Intelligence Portal" has been opened on the government portal, where you can read the definitions of the main concepts, the development of artificial intelligence, its role in administrative work and self-government bodies (Portal of Artificial Intelligence). Systematic sociological studies on artificial intelligence are important (Umańska, Augustyniak-Brzezińska, 2024). In the context of social work, we will consider the works of individual authors. Neurobiologist, psychiatrist, author of the popular book "Digital Dementia" M. Spitzer wrote the book "Artificial Intelligence", focusing on issues of overcoming hysteria (Spitzer, 2025). Special attention is paid to the collective work edited by M. Voitsekhovska "Social Work – New Perspectives", published in 2024. First of all, let us pay attention to the structure of the book. This is important for specialists in social work in European countries. The team of authors under the leadership of M. Voitsekhovska analyzes a number of topical issues. The first section examines the demographic, socio-cultural prerequisites for the development of social work, changes in lifestyle, relationships in modern families, the situation with Ukrainian migrants, and overcoming homelessness. The second section is devoted to youth problems. The issues of pedagogy are logically combined with theoretical and practical aspects of the activities of social workers. The issues of youth from the "real and virtual streets", the work of volunteers, the issue of time, the work of educational and resocialization institutions, and the issue of psychological culture are explored in an original way. It is natural that the third section, which is significant in volume, is devoted to the prospects of social work. An interesting attempt at an interdisciplinary approach is the care of sick children, overcoming mental disorders, overcoming stress, caring for the elderly. In the context of the topic of our article, we note that four articles are devoted to issues of new information technologies. The topic of Internet use by the elderly is promising, as well as two articles directly devoted to issues of artificial intelligence. I. Yaros analyzes legal and ethical issues, applications and challenges of artificial intelligence. In our opinion, the material prepared by S. Koziej on the use of artificial intelligence to support the education of people with special needs (Wojciechowska, 2024) deserves the greatest approval. In Table No. 1, we have summarized certain trends and research directions. On the first view quantitative indicators characterize shortcomings in book publishing. At the same time, they "prompt" authors and publishers about the need to switch to specific directions professional activities.

Particular attention is paid to publications whose authors consider specific experience of practical use of artificial intelligence. For example, P. Khrobak describes the experience of using artificial intelligence in working with older people. Based on systematic information support, the level of social assistance is improved, care is individualized, health monitoring is carried out, and the work of personnel is facilitated (Chrobok).

The speed and dynamics of change are impressive. A few years after the appearance of generalizing works, analytical works appeared devoted to specific problems and the targeted use of artificial intelligence capabilities. The authors also paid attention to the popularization of the use of artificial intelligence for the general public. On June 30, 2025, information was published on the website of the Ternopil National Medical University about the visit of Associate Professor of the Department of General Surgery A.V. Pavlyshyn to the Opole Polytechnic (Poland) with the aim of “participating in the international research project “Application of Artificial Intelligence (AI) in Medicine” (Pavlyshyn).

PURPOSE OF THE STUDY

The purpose of the study was an analytical assessment of the capabilities of artificial intelligence in the social work system, theoretical and practical features of preparing an individual for high-quality problem solving, taking into account the capabilities of modern information technologies.

METHODOLOGY

The study used modern methods of scientific knowledge: analysis, synthesis, generalization, comparison, as well as expert assessments, creative essays, achievements of Ukrainian and Polish colleagues in the creative use of artificial intelligence in social work, understanding the advantages and threats of information technologies. To achieve the goal of the study, we used the capabilities of artificial intelligence, comparing data from computer systems with the conclusions of young people, and generalized our own experience in solving complex social issues. The study used an analytical review of sources, generalization, and comparison of data according to the requirements of comparative studies. Special attention was paid to expert assessments, creative essays, achievements of Ukrainian and foreign colleagues in the creative use of artificial intelligence in practical activities, the development of empathy, and the preparation of future doctors for effective communication.

STUDY RESULTS

Researching the possibilities of using artificial intelligence in social work is a pressing task of our time. For comparison, let's consider the experience of Polish colleagues using the example of books on artificial intelligence offered by the online bookstore PWN (Polish Scientific Publishing House).

Table 1. Number of books on artificial intelligence offered by the PWN online bookstore.

SUBJECT	NUMBER	INTEREST
1. Books of general scientific interest (historical background, security, threats, prospects for the use of artificial intelligence, logic)	124	93.93%

SUBJECT	NUMBER	INTEREST
2. Use of artificial intelligence in medicine.	3	2.27%
3. Psychological aspects of artificial intelligence as a means of solving the problems of hysteria and depression. 1.	2	1.51%
4. Mathematics, physics and artificial intelligence Social work and the possibilities of artificial intelligence.	2	1.51%
5. Social work and the possibilities of artificial intelligence.	10.6%	0,6%

Let us emphasize the rather conventional nature of this division. After all, authors of generalizing works have used examples from individual countries and various areas of human activity: from questions of religion, organizational values, and child education to banking matters and preventing terrorist attacks. It should be noted that some books have been reprinted several times. For example, the book written by Jerry Kaplan, *Artificial Intelligence*, was available electronically in 2019, published in Polish in 2021, and became available in audio format in 2024.

We will use the capabilities of artificial intelligence to assess the most popular topics discussed in Polish journals devoted to social work issues. The results are quite interesting and clearly require further study using content analysis.

Table 2. Priority topics of social work in Polish scientific journals.

SUBJECT	DESCRIPTION
Theoretical aspects of social work	Analysis of theoretical concepts, models and approaches in social work.
Practical issues of social work	Practical cases, intervention methods, social diagnostics, case studies.
Social Policy and Social Work	The relationship between social work and politics, work in the education, healthcare, and employment systems.
Professional and ethical aspects	Ethical norms, professional risks, psychological hygiene of social workers
Social problems in Poland and the world	Analysis of current social problems and their impact on social work.
Interdisciplinary approaches	Interaction of social work with psychology, sociology, anthropology, and pedagogy.

Our study attempted to assess general trends in social work, including the use of artificial intelligence capabilities, as well as consideration of specific situations that can cause significant difficulties for social workers. Taking into account statistical data, one of the first places is the problem of suicides, as well as suicide attempts, which have significantly „rejuvenated” and are increasing among primary school students. As an example, we used a situation that we had to resolve after an unexpected phone call. A man said that he had diabetes. All functions, including sexual ones, are disappearing. He had a young wife. He wanted to commit suicide. In our opinion, we have contributed to solving the problem, and now we will compare the proposals of artificial intelligence and medical university students.

After describing the situation and asking for 5 possible answers, we received from the chat GPT has this information: “This is a very difficult and delicate situation. It is important to support the person, show them that they are not alone, and help them find a way out of the crisis. Here are 5 options that you can say to a man who is experiencing illness and has suicidal thoughts:

1. Recognition and support

“I understand that you are going through a very difficult time right now and that you feel helpless. But you are not alone, and there are people who want and can help you get through this.”

2. Emphasize the value of life and loved ones

“You are important to your wife and to many other people. Your life has meaning, even if now it seems like all is lost.”

3. Encouraging professional review

“It would be a good idea to talk to a doctor or psychologist who can help you better manage your illness and find ways to cope with your emotions.”

4. Emphasize that problems can arise

“Although diabetes is a serious disease, modern medicine and the support of loved ones can help you live a full life.”

5. Offer specific support

“If you want, I can help find a specialist or just listen to you. You don’t have to go through this alone.”

If the situation is critical, it is very important to urgently contact specialized psychological assistance services or helplines in your regions. Remember that professional support is the best way out in such situations.

Before making a generalization, let’s pay attention to the proposals of students and postgraduates of the medical university with whom we conducted classes. Frankly speaking, one fact struck us. When talking about empathy from young people, we

could hear many good words about mutual understanding, respect, compassion, mercy. But when solving a specific problem, we felt harsh and sometimes cynical proposals. For illustration, we will use a comparative table.

Table 3. Suicide prevention tips

Artificial intelligence suggestions	Proposals from students and postgraduates
1. I understand that you are going through a very difficult time right now and that you feel helpless. But you are not alone, and there are people who want and can help you get through this.	1. Christianity considers suicide a great sin. It is unacceptable.
2. You are important to your wife and to many other people. Your life has meaning, even if it seems like all is lost right now.	2. Listen, sexuality is far from the most important thing in life. Your wife probably loves you for other qualities. Don't do this. Suicide is not a way out of the situation.
3. It would be a good idea to talk to a doctor or psychologist who can help you better control your illness and find ways to cope with your emotions.	3. Understand a simple thing. Modern medicine has made great achievements. The situation can be stabilized. Perhaps in the near future these issues will be successfully resolved. Wait.
4. Although diabetes is a serious disease, modern medicine and the support of loved ones can help you live a full life.	4. What kind of panic is this? Stop it. You're a man. Pull yourself together. Show willpower, overcome difficulties on your own, don't give up.
5. If you want, I can help you find a specialist or just listen to you. You don't have to go through this alone.	5. Let's talk. Maybe I can help you find good specialists. I suggest meeting at a time that's convenient for you.

We leave it to the readers to draw their own conclusions. In our opinion, these proposals lack warmth, an understanding of the pain involved, and the true tragedy of the situation. Since we (A. Vykhreshch) were a participant in this difficult situation, we would like to offer our own perspective. Notice the limited time available and the need for an immediate response. Intuitively, we asked the interlocutor only two questions: "Do you have children?" Upon hearing an affirmative answer, we asked, without unnecessary moralizing: "Think about how they will live on." After a pause, the man said: "Thank you. I will think about what you said." Life has once again shown that it is often more complicated than theoretical concepts. This single fact makes us reflect on the methodology for training social workers. It is clear that there must be a unity between understanding theoretical principles, patterns of communication, solving specific situations (case method), and practical activities – from volunteering to systematic professional practice. In the model of a successful professional, we have identified three main vectors in a pie chart, a kind of Cartesian

coordinate system: information, creativity, and practice (Vykhreshch, 2013). These areas are complemented by three more factors: psychological culture, time, energy. The use of artificial intelligence allows us to organize a kind of competition, a “brainstorming” of a student or graduate group and artificial intelligence in solving specific tasks of a social nature. It is no coincidence that we considered the problem of artificial intelligence in the context of working with students and graduate students. This should be a single system with a gradual transition to a higher level. Moreover. We recorded the same problems among both students and graduate students. For example, after choosing a research topic, it was necessary to prepare an appeal to experts. We record difficulties with written communication, starting from the forms of appeal and ending with the essence of our request. The logic of questions is often violated. After all, an expert should share his knowledge and experience, and not answer exam-level questions. We (A. Vykhreshch) conducted a kind of testing of the capabilities of artificial intelligence (Vykhreshch, 2024; Vykhreshch, 2025). It turned out that artificial intelligence (like students and graduate students after all) does not quite successfully solve creative tasks, does not respond to a sense of humor (or rather, it is a very peculiar reaction), but at the same time can express sound advice on solving complex issues. Further monographic-level research is necessary.

CONCLUSION

Artificial intelligence demonstrates numerous advantages as well as significant risks at the societal level. Evaluating its applications reveals its exceptional speed, capacity to process large volumes of information, ability to integrate sources from various countries, and its relatively effective performance in reviewing works and selecting relevant recommendations. Moreover, it can provide certain elements of communication for individuals experiencing social isolation. However, among the associated risks, it is important to underscore the potential for manipulating public consciousness, breaches of academic integrity, and the substitution of genuine human interaction with virtual environments.

DISCUSSION

In our opinion, further systematic study of the problem is necessary. At present, excessive enthusiasm for new technological possibilities, or excessive fear, prevails. In social work, artificial intelligence (better to say computer intelligence) can serve as a tool for increasing the efficiency of the educational process, professional activity. In this area, a person remains irreplaceable. Further discussion requires the characterization of the system of basic concepts, the search for patterns of social interaction, and the development of creative abilities of social workers.

PROSPECTS FOR FURTHER RESEARCH

Globalization, unexpected military confrontations, an incredible amount of information, and the dynamics of change require a series of studies by experts from different countries to identify general trends, offer a reasoned prognostic assessment of events to help people survive in the modern world. The rational use of

innovative information technologies, including artificial intelligence, will contribute to improving the quality of professional activities of social workers, their personal development, and self-realization. We note a significant number of theoretical works of a generalizing level. It is time for a gradual transition to specific research, an example of which is the study of the possibilities of artificial intelligence in the social assistance system. Each country has examples of unique experience, but it is scattered and inaccessible. It would be worth noting that specialized periodicals summarize information on the practical use of artificial intelligence with people of different age groups. This is especially important for those countries where the formation of social protection for people in the context of European traditions is taking place. Combined with targeted state policy and theoretical generalizations, assistance to people could be organized at a qualitatively higher level.

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