

Cryonics 2.0

From Immortalism to Indefinite Lifespan¹

WILLIAM DAWLEY, ANNELIN ERIKSEN & SIGRID TORSNES

Abstract How has cryonics been affected by futuristic developments in AI and anti-aging medicine? Cryonics is the practice of perfusing human bodies with antifreeze solutions (cryoprotectants) and storing them at ultralow temperatures in the hopes of future revival. Cryonicists (those who practice cryonics) hope for revival by a variety of biological and digital methods, ranging from rewarming, healing, and rejuvenating the body, to adding digital and biological enhancements, to recreating the person or consciousness in digital form. Cryonics – once a very fringe phenomenon, only recently the topic of ethnographic manuscripts – have been mainstreamed by advances in the study of aging and AI and other cultural developments. Along with this mainstreaming and the growth in the number of cryonicists, there have been changes in how cryonicists learn about cryonics, how they self-identify, and how they present cryonics to others. Despite AI’s role in mainstreaming transhumanist ideas, such as consciousness outside the biological body, “beyond the carbon barrier” as ABOU FARMAN writes, our ethnographic and survey data show that cryonics is popularizing along two alternative routes: through a surging interest in *anti-aging* research and treatment, and through “the Rise of *Rationalism*” and Rationalist-adjacent movements like Effective Altruism and Longtermism. Cryonics 2.0 is the name we give to this new context for cryonics, wherein many cryonicists shed the explicit language of immortalism and transhumanism in favour of longevity and Rationalist discourses.

Keywords transhumanism and rationalism – medical anthropology – anti-aging – hybrid ethnography – artificial intelligence (AI)

Cryonics is the practice of preserving people’s² bodily remains in the hopes of reviving them later, using future medical and technological advances. Those who practice it are called cryonicists. The first part of the process is called cryopreservation.³ Its details have evolved, but the techniques largely share a process of flushing bodily fluids, replacing them as much as possible with increasingly concentrated medical antifreeze solutions, and lowering their temperatures gradually before storing them at ultralow temperatures in large “dewars” (see fig. 1 & 2).

Cryonicists differ in their hopes for the second part of the process: reviving people in different biological and non-biological forms, based on extrapolating from current trends in technological and scientific research. These hoped-for possibilities range from “simple” biological healing and rejuvenation, to brain and body transplantations and different degrees of bodily and/or nanotechnological improvements, all the way to the recreation of the person in digital form (or even in multiple forms).

Cryonics has been practiced and developed for almost 60 years. For much of this time, its growth has been slow, with less than 500 human bodies currently cryopreserved, and less than 5,000 contracts for future cryopreservation currently active.

Yet cryonics is growing both in terms of the rates of those signing and in terms of the number of cryonics providers across the globe. Until recently, the rate of signups was relatively constant, according to the cryonics providers we interviewed, and only three providers (two US and one Russian) offered cryopreservation and storage (Alcor, the Cryonics Institute, and KrioRus, respectively). But in the past 5 years, the rate of signups has jumped by almost an order of magnitude – a move matched by the emergence of three new cryonics providers being founded in Europe and Asia (which we discuss below).

Alongside this growth, we argue, there have been changes in who cryonicists are, how they see themselves, and their view of cryonics and its fu-



Fig. 1 Cryonics dewars for long-term storage at Cryonics Institute outside Detroit, USA (Jack Entremont, 2021).

ture. Our research points to two major influences on these changes: the “mainstreaming” of interests in anti-aging research, and many new becoming cryonicists through the “Rise of Rationalism” and its associated movements (Effective Altruism and Longtermism).

Cryonics began as a key element of *transhumanism*: a movement to enhance the human condition and overcome its existing limitations through science and technology. One of transhumanism’s long-term aims has been to make death avoidable, in some scenarios by freeing the human mind from the biological body altogether. FARMAN (2020) has convincingly argued that transhumanism’s core concerns and assumptions about personal identity, life extension, and technoscience have become more mainstream.

FARMAN (2019) has elsewhere argued that transhumanism’s *digital* ideas about a future of “convergence” have become quite mainstream – ideas about the merging of the digital and the biological, usually through nanoscale biotech, enabling intelligent and (trans)human life outside the body, or “beyond the carbon barrier”. GIESEN (2018: 197–198) has also argued that ideas about a digital “convergence” with the biological had become mainstream in elite business and policymaking circles well prior to the recent explosion of AI capabilities. His article sketches “the infrastructure behind [transhumanism’s] ideological dissemination’, which includes the European Council, the GAFAM firms (Google, Apple, Facebook, Amazon, Microsoft), and institutions like

the World Economic Forum and the *Young Global Leaders* forum (which has included a number of current and former heads of state) (YGL 2024). The founder of these latter two institutions, Klaus Schwab, popularized the transhumanist concept of the “convergence [of] the digital, physical and biological’ in his book *The Fourth Industrial Revolution*, depicting it as another “industrial revolution”, the latest step in a series of technological leaps of progress (2016: 60).

However, there is another, biological route by which transhumanist interests have become mainstream: the growth of interest in anti-aging research, emerging prepared by an increasingly common view of aging as avoidable (GUSTAFSSON 2021: 55–57; POWELL 2024; cf. TURNER 2007; VINCENT 2008). Having each observed this in our fieldwork and other research, we frame anti-aging research using earlier anthropological research into how changing assumptions about the relationship between the body, selfhood, and the human condition are shaped by biomedical technologies (LOCK 2002; LOCK & NGUYEN 2018), in-

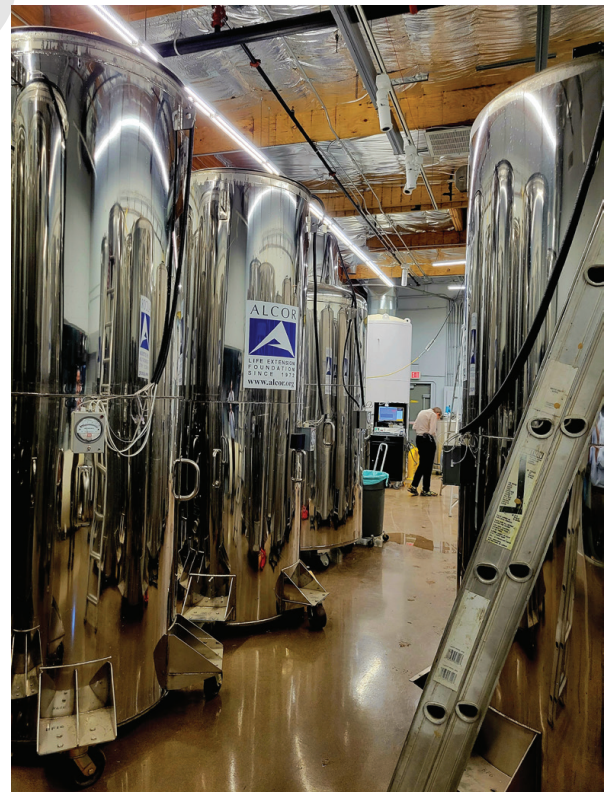


Fig. 2 Dewars at Alcor outside Phoenix, USA, with Alcor’s Mike Perry in the background (William Dawley, August 2022).

cluding organ transplantation (cf. OLIVER 2013), plastic surgery (TAUSSIG 2012; EDMONDS & SANABRIA 2014), and experimental uses of stem cells and hormones (some for anti-aging) (WHYTE & GIBBON 2009; Song 2010). Such research often, in turn, reveals that newly destabilized concepts of the body and human selfhood were themselves partly the result of earlier biomedical discourses, such as immunology (LOWY 1991).

Our research into cryonics has the potential to bridge these two sets of findings about how technologies change how relationship between the body, the human, and selfhood is constructed: first, those by FARMAN and others that *digital* technologies are driving this reimagination; and second, those supported by our recent ethnographic research (and comparable to previous medical anthropological arguments like those above) that biological technologies may be driving some of these changes (cf. LOCK & NGUYEN 2018: 3–7).

Among many cryonicists, we noted a growing *dis-identification* with explicit transhumanism and its cultural baggage. Instead, we found closer associations, on the one hand, with anti-aging research, and on the other hand with the “Rise of Rationalism” (alongside Rationalist-adjacent movements like Effective Altruism and Longtermism), which have been cited by many younger cryonicists as their first exposure to cryonics.

We name this trend and its broader context “Cryonics 2.0”: a new phase of cryonics associated increasingly with anti-aging (or “life extension”) and Rationalist-adjacent movements. We encountered this shift in our fieldwork, in survey data produced by cryonicists themselves, in interviews with cryonicists themselves, and in statements by leading cryonicists.

Earlier anthropological work has suggested the importance of anti-aging research in transforming ideas about human identity (TURNER 2007; VINCENT 2008), without linking this to transhumanist ideas. More recently, Jeremy COHEN (2021) has drawn attention to the close contemporary connection between cryonics and other “radical longevity” movements like anti-aging. Here, though, we draw attention to how cryonicists’ more modest language (like the “chosen lifespan”) may seem less radical, and thus be less alienating, than earlier

transhumanist language studied closely by COHEN, FARMAN, and BERNSTEIN (such as “immortalism”).

This tone of modesty coincides with the second shift (the “Rise of Rationalism”) that defines Cryonics 2.0. Cryonicists increasingly learn about “real-world cryonics” through self-described “Rationalist” websites and communities (including the more recent Effective Altruist and Longtermist movements), and this “Rationalist” tone is reshaping how cryonicists talk and think about cryonics. This second shift is not fully elaborated in the literature but is highly relevant to broader trends that are “mainstreaming” technoscientific rationality and transhumanist goals. Such Rationalist-adjacent communities seem to have captured the speculative energies of earlier transhumanism *and* to have grown the moral vision of many cryonicists.

This paper’s overall argument is roughly chronological. For the reader’s sake, we use the roughly sequential (but controversial⁴) acronym TESCREAL, to recall the relevant movements: Transhumanism, Extropianism, Singularity, Cosmism, Rationalism, Effective Altruism, and Longtermism. This chronology in some ways helps describe in detail the shift from the immortalism (and explicit transhumanism) of Cryonics 1.0 to the Rationalist-oriented quality of Cryonics 2.0. Just after the methods section below, and just before the conclusion, there are two sections which correspond to and describe the two halves of TESCREAL: Transhumanism, Extropianism, Singularitarianism, and Cosmism (TESC-) and Rationalism, Effective Altruism, and Longtermism (-REAL). Sandwiched between these TESC- and -REAL sections are three sections that exemplify this shift: one from the anti-aging conferences we attended, where anti-aging medicine has prepared the grounds for a more subtle, “implicit transhumanism”; another from our ethnography of how cryonics providers (including new organisations in Europe and Asia) represent themselves; and a third from survey data that provided an opportunity to “interface” closely with the survey’s designer and glean new understandings of how cryonicists self-identify and how younger cryonicists discovered “real-world” cryonics (cf. WALTORP 2018).

Methods: Hybrid ethnography and collaboration with interlocutors

Our depiction of Cryonics 2.0 relies on hybrid (online-offline) ethnography, which we describe here and articulate with existing trends in ethnography. In practice, we used both online and in-person ethnography to become familiar with cryonicists and other longevity enthusiasts. We attended numerous anti-aging and cryonics conferences, both in-person and online, both formal and informal. We also attended numerous regular and periodic online meeting spaces. Finally, we spent time at newer and more established cryonics facilities. From the contacts we made in these spaces, we conducted numerous interviews, often using a life-history, semi-structured format to evoke retrospective accounts of our interlocutors' path to cryonics (and to anti-aging practices as well). Ultimately, we were also able to collaborate and "interface" over some data they generated about the makeup of their own movement, carrying out an analysis that was clarifying to us and to them (WALTORP 2018).



Fig. 3 Presentation of the private dewar for Bredo Mørstel in Estes Park, Colorado, USA (William Dawley, August 2023).



Fig. 4 Presentation of the private dewar for Bredo Mørstel in Estes Park, Colorado, USA (William Dawley, August 2023).

In-person cryonics events are relatively rare as a proportion of interactions between cryonicists. In addition to the anti-aging and radical longevity events described in the paper's fourth section (A4M and RAADfest), DAWLEY attended many of the central longevity and cryonics events, including the Teens and Twenties (T2) event for young cryonicists in 2023 (a year of returning T2 "alumni"), the 2023 annual conference of Alcor (which coincided with a Alcor's assumption of care for the privately cryopreserved body of a Norwegian man) (see photos below), and the first Global Cryonics Summit (GCS) in July 2024 (where he presented the findings discussed here) (DAWLEY 2024). Torsnes was able to attend both the opening conference of the European Biostasis Foundation (EBF) in Rafz, Switzerland (which stores Tomorrow's cryonicists), and a cryopreservation training held in the UK, as well as a half year's intensive fieldwork at the Tomorrow office and work events in Berlin providing a glimpse into the new European developments cryonics, (covered in some detail in the section on the new cryonics providers

of the Cryonics 2.0). Some more informal in-person meet-ups, including periodic dinner events like those attended by DAWLEY in southern California, which have emerged (and reemerged) after the Covid-19 lockdowns. However, even these were organised first online.

“Online,” in fact, the primary space where cryonicists gather. The photos below show anonymized examples of these spaces (with the likenesses and names of non-public figures edited out). Many of these virtual spaces are regular videochat meetings (like the cryonics meeting hosted monthly by Rudi Hoffman, pictured below, or the Church of Perpetual Life monthly meetup, or weekly meetups like the Other Side Cryonics Hangout). Other videochat meetings are special-purpose and often stretch over a series of meetings, like two book clubs that DAWLEY attended on cryonics, transhumanist, and Rationalist themes. Other cryonics spaces function more like social media. The most continuous and international of these, at present, seems to be the “Cryosphere” (pictured below): the international cryonics Discord server⁵ that hosts dozens of subthreads dedicated to different topics, regions, cryonics providers, and languages (see fig. 6). The Reddit server “r/cryonics” has more recently been revived under the same “mods” (moderators) as the Cryosphere. Both servers aid in planning and announcing recurring and special-purpose meetings, both online and off. And thanks to many cryonicists’ “extremely online” lifestyle, even forums like the comments section of cryonics-related Youtube channels (like the Cryonics Underground podcast, the U.S. Transhumanist Party, and Tomorrow) are fairly interactive (see fig. 5)

In a way, “online forums are ‘the cryonics community’, for lack of a better term”, as one cryonicist jokingly put it in an online book club that DAWLEY participated in. The joke highlights both the disaggregated quality of the cryonics community and its “extremely online”. It also pointed, in this case, to recurrent efforts to ‘deepen’ the cryonics community both through additional online, small-group settings as well as ‘in meatspace’ (i.e., offline). The organisers of the first annual Global Cryonics Seminar (GCS) called the conference an effort to “deepen the cryonics community” by providing a single, overarching, annual cryonics meeting, and the T2 (Teens and Twenties) event

mentioned above was coordinated in 2024 to meet alongside it (rather than alongside the “radical longevity” conference RAADfest, as has been done previously).

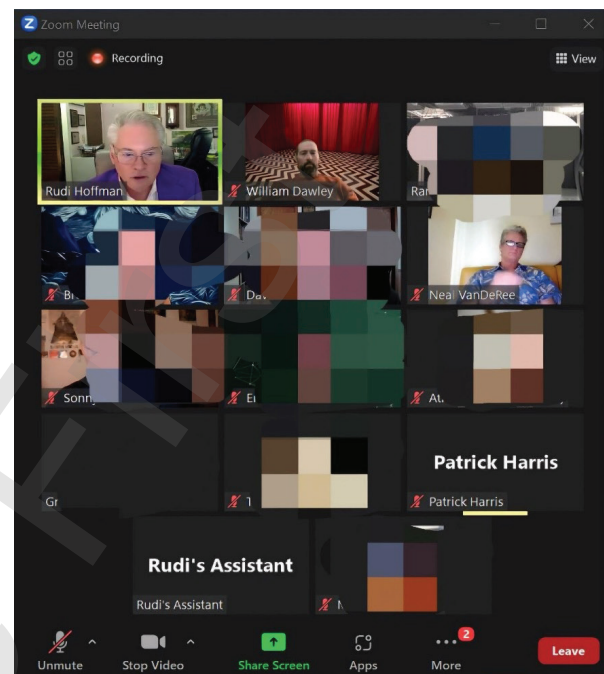


Fig. 5 Monthly cryonics meetup hosted by Rudi Hoffman (William Dawley, January 2024).

Some anthropologists have persuasively argued that hybrid methods are increasingly necessary for comprehensive ethnographies of contemporary life (PINK, HORST, HJORTH, POSTILL, LEWIS & TACCHI 2016; PRZYBYLSKI 2016). Our use of online ethnography and survey data seemed especially necessary, given the disaggregated and largely online nature of cryonicists (and of many futurist communities). While we have prior experience with more traditional, in-person ethnography, working closely with churches and support groups where people adopt new identities and ideas about social change (e.g., DAWLEY 2018; ERIKSEN 2016), these communities of cryonicists and other “radical longevity” enthusiasts were different, offering much fewer regular, face-to-face interactions. In fact, their growth is partly due to their online presence and positive regard for virtual spaces (much like the Rationalist-oriented movements we discuss below). Even the few annual, in-person meetings are simply inconvenient and cost-prohibitive for many: RAAD-

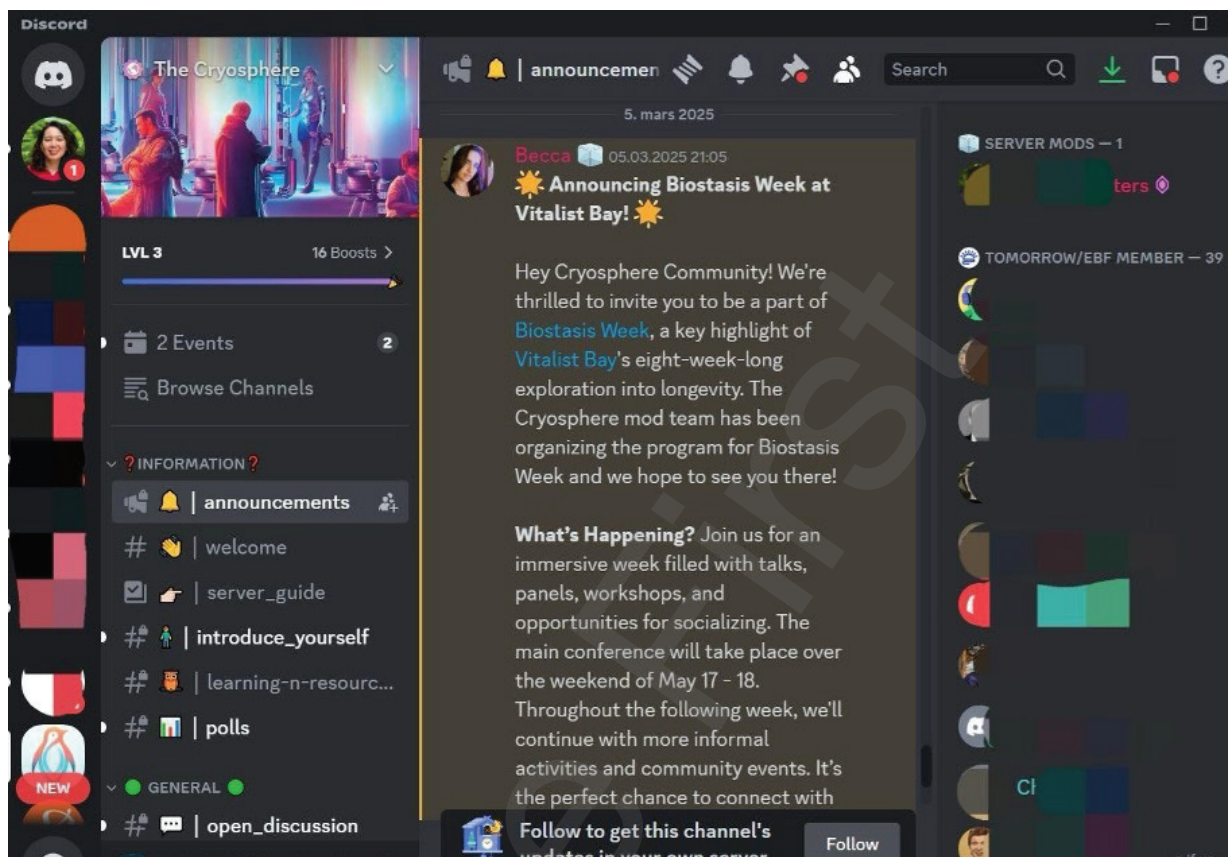


Fig. 6 “The Cryosphere” Discord Server announcements page (William Dawley, March 2025).

fest 2024 cost around \$1,000 USD in admission and hotel costs, not including airfare, and it was held outside summer months in September. Such events thus constitute only a sliver of the cryonics community. Hybrid ethnography allowed us to attend and participate in the great majority of these communities’ social activity (which takes place online), to contextualize the meanings and representativeness of in-person events, and to meet interviewees for life-history interviews on several continents. By following along with the same, day-to-day social networks many of our interlocutors did – before and after meeting many of them at in-person events – it was possible to build rapport with them through different channels, providing the “multi-access” advantages of hybrid ethnography promoted by anthropologists like RUO-FAN LIU (2022). LIU has also argued that hybrid ethnography improves upon “single-realm ethnography” by offering the ethnographer “multi-positionality” within the community. The result, we hope, is a much clearer and more accurate representation of the radical

longevity community as a whole – as well as a corrective to our earlier misperceptions about the complex relationship between cryonics, implicit transhumanism, and “the Rise of Rationalism”, which we discuss toward the paper’s end.

Finally, online ethnography has a unique ability to embody longstanding ideas about collaboratively produced ethnography (ESTALELLA & SÁNCHEZ CRIADO 2018), “all the way up and down, and alongside, the course of research” (MARCUS 2018: xii). Our multiple positions and access points as simple several more “users” in these online spaces allowed a collaborative spirit to develop, of “fieldwork as mutually produced *interface* produced by... curiosity” and the possibility of inhabiting different “moral worlds” (WALTORP 2018: 126). The rapport that developed from these different in-person and online interaction eventually allowed DAWLEY “interface” with leading transhumanists and cryonicists over (non-identifying) survey data gathered by Humanity+ (formerly the World Transhumanist Association) and the 2022 Cryonics Survey. The latter survey, con-

ducted by Cryonics Underground host MAX MARTY (2023a–b), is especially salient to connecting the two halves of Cryonics 2.0, offering weight to the idea of a dis-identification with explicit transhumanism and our anecdotal observations about the “Rise of Rationalism”. MARTY’s willingness to interface closely with DAWLEY in interpreting and recoding some of that data helped shape the final Cryonics 2.0 hypothesis: it revealed a surprising relationship between age and the rejection of labels like “transhumanist” and “Rationalist”; and it showed how youth (and formal education) could help predict which cryonicists credited Rationalist-adjacent online communities for having introduced them to “real-world” cryonics. Probably because this collaboration used data already under discussion in cryonics circles, DAWLEY was subsequently invited to present these findings in cryonics and transhuman spaces, including the first GCS in Miami, as well as to address the audience of the U.S. Transhumanist Party Virtual Enlightenment Salon (DAWLEY 2024; 2025). The feedback from these venues has helped further refine the analysis we offer here.

But before turning to that ethnography, we offer an overview of cryonics and transhumanism that led us to our present research questions.

“Mainstreaming” transhumanism: From Cryonics 1.0 to “implicit transhumanism”

Cryonicists were once firmly situated within the transhumanist movement, which portrayed Cryonics as the primary and main technology for reaching a future where human limitations like mortality could be overcome (FARMAN 2020, cf. BERNSTEIN 2019). This is characteristic of the phase we are calling Cryonics 1.0. Yet many contemporary cryonicists we encountered revealed the more modest approach typical of Cryonics 2.0, omitting talk of immortalism and transhumanism and instead portraying cryonics alongside anti-aging and other newly-mainstream efforts to achieve biological rejuvenation and superlongevity. This section traces the early association of cryonics with transhumanism and related movements (Cryonics 1.0) before moving onto research at annual cryonics and anti-aging meetings that show the repositioning that we are calling Cryonics 2.0.

Cryopreservation and transhumanism emerged together at similar moments in the mid-twentieth century. Less than twenty years elapsed between the first cryopreservation of biological material (bovine semen, in 1949)⁶ and the first cryopreservation of a human body (James Bedford, in 1967) (cf. KEEP 2023). During this brief window, the terms “transhumanism” and “immortalism” were both coined: the first in Julian Huxley’s 1951 speech “Transhumanism” (BYK 2021), published in 1957; the second in two 1962 books on cryonics that featured “immortality” in their titles (by ROBERT ETTINGER & EVAN COOPER). All three of these works proposed conquering death and many other human limitations, thereby raising men into an augmented, immortal state (cf. FARMAN 2020).

The subsequent spread of both cryonics and transhumanism owed much to the internet – a fact which has remained true of Cryonics 2.0. Much as our interviews and contemporary survey data reveal that cryonicists frequently discovered that cryonics is “real” through Rationalist-adjacent websites like WaitButWhy and LessWrong – often long before they join a “CSO” (Cryonics Service Organization) or meet other cryonicists – so too did the first organised group of transhumanists meet one another via the “Extropian” listserv (see MCCLELLAN 1995; REGIS 1994).

One way to distinguish Cryonics 1.0 from Cryonics 2.0 is to distinguish between explicit transhumanism and implicit transhumanism: transhumanism which has become relatively more “mainstreamed” and often does not use the transhumanist label. Explicit transhumanism is an explicit ideology that has embraced science and technology as the path to create, not merely new cultural and social forms, but a new “posthuman” condition, departing from what we presently take the human species and condition to be (see BIALECKI 2022; HUBERMAN 2021; FARMAN 2020; PILSCH 2017; BERNSTEIN 2019). “Implicit transhumanism” – a term that seems to have been suggested almost incidentally by Gennady Stolyarov, the Chair of the US Transhumanist Party (TVES 2020: 15m33) – describes how transhumanist goals, like life-extension and human enhancement, become mainstream thanks to developments in fields like AI and anti-aging.

Explicit transhumanism, after growing online, first became institutionalised in the World Transhumanist Association (now Humanity+), which was founded in 1998 by philosophers Nick Bostrom and David Pearce, then further organised by bio-ethicist James Hughes (HUGHES 2019; 2021, SENNESH & HUGHES 2023). Numerous scientific figures signed WTA's Transhumanist Declaration (HUMANITY+ 2023). The eight-point statement begins, "Humanity stands to be profoundly affected by science and technology in the future," then presents transhumanism's expansive sense of future possibilities, especially *posthuman* and *far-future* ones: "We envision the possibility of broadening human potential by overcoming aging, cognitive shortcomings, involuntary suffering, and our confinement to planet Earth," as well as our responsibility to the sentience and suffering of all "future artificial intellects, modified life forms, or other intelligences to which technological and scientific advance may give rise". The posthuman condition ranges from genetic modifications that can obviate aging and mortality, to "upgrading" our biological "wetware" with more durable mate-

rials and advanced capacities, to replacing the body entirely.⁷ And the *far-future* includes space exploration and colonization, partly made possible by posthuman forms of life and the "substrate-independence" of the mind (its transferability to other bodies and mediums).

"Extropianism" captured this early vision of posthuman life expanding outwards in time and space. It spread first through the writings of Max MORE, who founded the journal *Extropy* in 1988, started the Extropian listserv in 1991, and penned the Declaration of Extropian Principles in 1995, three years prior to the Transhumanist Declaration. Like that later declaration, the Extropian one heralded

a technological transformation... accelerated by genetic engineering, ... intelligence intensifiers [,] swifter computers[,] enormous and interconnected databases[,] artificial intelligence, [and] artificial life (MOORE 1995).

These final aspects of Extropianism have often been conceptualized by transhumanists as a "Singularity" (the S of TESCREAL): a point in time when self-upgrading AI programs merge into a



Fig. 7 Stickers handed out at the annual Alcor Board Meeting (William Dawley, August 2024).

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DeepMind's protein-folding AI cracks biology's biggest problem

Artificial intelligence firm DeepMind has transformed biology by predicting the structure of nearly all proteins known to science in just 18 months, a breakthrough that will speed drug development and revolutionise basic science

By Matthew Sparkes

28 July 2022

Fig. 8 Headline from Daily Mail article on AI-assisted analysis of drug compounds for diseases (William Dawley, March 2025).

single, nearly omnipotent intelligence. The singularity was popularised in the 2005 bestseller, *The Singularity is Near*, written by cryonicist and key transhumanist figure RAY KURZWEIL, who was subsequently hired as Google's chief engineer. Much like a black hole's singularity, many Singularitarians posited that nothing beyond this point is knowable.

Cosmism (the C of TESCCREAL) preceded transhumanism, Extropianism, and Singularitarianism to some extent. It emerges from philosopher and theologian Nikolai Fedorov's late 19th-century hopes to unite humanity in humanity's "Common Cause" (*obshcheye delo*): to scientifically resurrect the dead, overcome mortality, and explore the cosmos in an enhanced corporeal (and moral) state (BERNSTEIN 2019). Tellingly, Russia was, until recently, the only other country than the US to house a cryonics service organization (CSO).

Most notable here is how, for Cosmism (as with transhumanism, Extropianism, and Singularitarianism), immortality and space colonization are imagined together. Though Cryonics 2.0 less often articulates cryonics explicitly with space-colonizing, posthuman far-futures, this vision remains present in more subtle and implicit ways. For instance, see the images below, from stickers distributed at the 2023 Board Meeting of Alcor (one of two US cryonics providers). Other in-group discourses also preserve the connection: cryonicists have long tossed around the term "cryonaut" for themselves, emphasizing the futuristic and exploratory nature of cryonics. "Cryonauts" were also the name chosen in 2022 for the NFTs (non-fungible tokens) that

were issued (or "minted") by LONGEVITYDAO (2022), a group using cryptocurrency and other blockchain mechanisms to fund cryonics research.

Cryonics 2.0 has been shaped by a different set of scientific developments, such as advances in AI and anti-aging medicine. While transhumanists have long awaited AI acceleration as precursor to the Singularity, recent, rapid AI development only achieved broad, public awareness in 2023, thanks to public-facing, generative AI programs like ChatGPT and audiovisual programs. These programs excited both hopes and fears in the public – and in AI researchers themselves. Early on, in March 2023, major AI companies and developers signed a public letter for a 6-month pause on AI development (with a few longtime transhumanists going further, as we discuss below) (FLI 2023). Those involved in cryonics and anti-aging hoped that AI might continue to resolve biological research problems, with some at both the RAADfest and A4M anti-aging conferences (see below) praising AI's "solution of the protein folding problem" – once considered a nearly-impossible feat (SPARKES 2023) (see fig. 8).

Even mass media outlets prone to sensationalism and suspicion have depicted AI more favorably when it is used in medical advances. Below is an example from the *Daily Mail*, whose headline shows AI "combating" known aging-related diseases like Alzheimer's by speeding up the discovery of possible treatments (e.g., MORRISON 2023) (see fig. 9).

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.com

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AI discovers drugs to combat age-related health issues like Alzheimer's: Software combed through 4,300 chemical compounds and zeroed in on three that could target faulty cells

- An AI algorithm combed through thousands of chemicals to spot 21 candidates
- The three compounds identified target senescent or faulty and damaged cells
- **READ MORE:** [AI is better at spotting cancerous nodules than existing methods](#)

By CASSIDY MORRISON SENIOR HEALTH REPORTER FOR DAILYMAIL.COM
PUBLISHED: 18:12 EDT, 14 June 2023 | UPDATED: 18:12 EDT, 14 June 2023

Fig. 9 Headline from *Daily Mail* article on AI-assisted analysis of drug compounds for diseases (William Dawley, March 2025).

Anti-aging leaders have also veered increasingly away from “immortalist” discourses, as others have described (e.g., BERNSTEIN 2019: 177). In one example from a recent interview (FERRANDO 2002), Aubrey de Grey, the longtime researcher of reversing age-related cell damage (himself a cryonicist) eschewed any connection between his work and immortality per se, insisting that he merely wanted to do away with age-related morbidities.

To examine this turn toward anti-aging, we turn in the following three sections to different findings from our hybrid ethnography: first, the anti-aging conferences we attended, and the ways in which anti-aging medicine has prepared the grounds for a more subtle, ‘implicit transhumanism’; second, our European ethnography (online and in-person), which revealed some of the conceptual shifts to Cryonics 2.0 just mentioned and third, survey data that Dawley further analysed alongside the survey’s designer, in an example of the “interfacing” described in our methods section after the introduction.

RAADfest and A4M: where implicit and explicit forms of transhumanism meet

While attending anti-aging conferences⁸ – such as the consumer-facing RAADfest (the Revolution Against Aging and Death festival) and the practitioner- and researcher-facing A4M (American Academy of Anti-Aging Medicine) – we observed how explicit and implicit forms of transhumanist hopes were expressed in different ways. While RAADfest occasionally featured some explicit transhumanism and immortalism, both events (but especially A4M) favoured more mainstream, anti-aging discourses and treatments, as well as implicit forms of transhumanism.

For instance, many 2021 RAADfest presentations encouraged activities not remotely identifiable as transhumanist, including leading audience members in bone density exercises, addressing sleep quality and vitamin deficiencies, and suggesting blood tests to assess aging-related “biomarkers”. These were also found at A4M and in recent, mainstream anti-aging books like Peter Attia’s 2023 bestseller *Outlive*. And both A4M and RAADfest also featured presentations about more



Fig. 10 James Arrowood, CEO of Alcor, at the 2024 Global Cryonics Summit (William Dawley, July 2024).

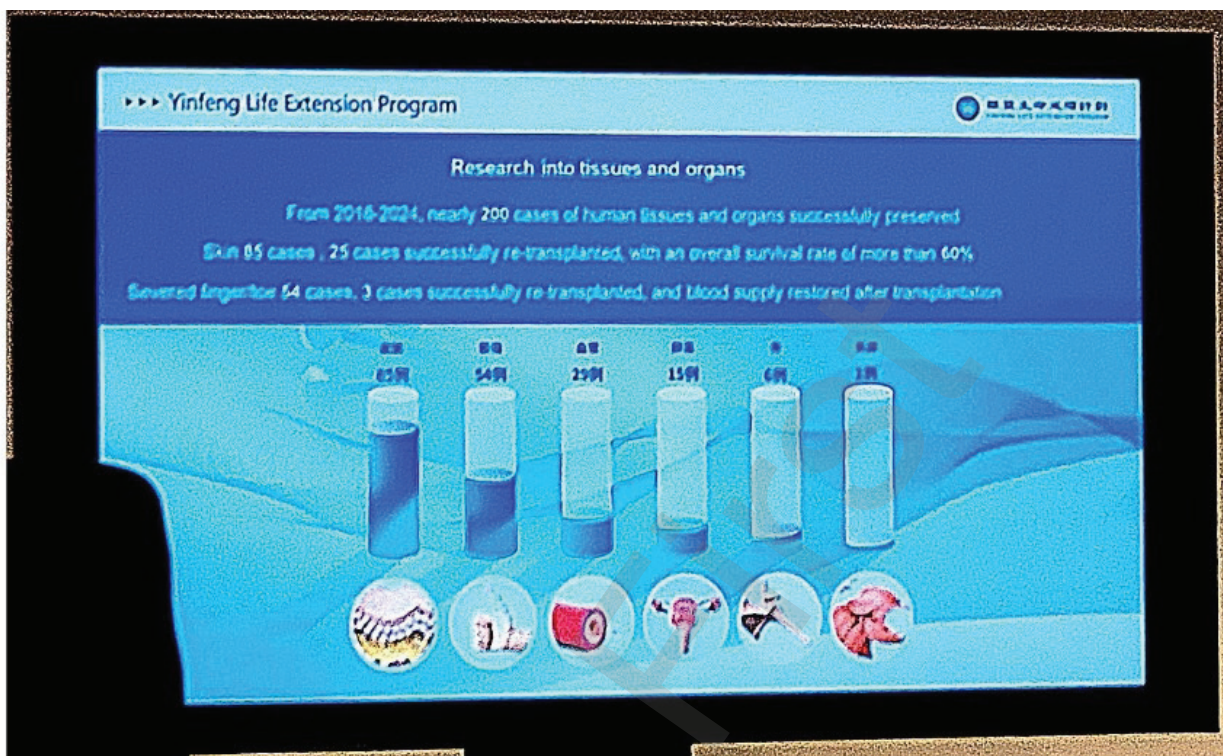


Fig. 11 Yin Feng presentation at the 2024 Global Cryonics Summit (William Dawley, July 2024).

experimental cell and gene therapies for age-reversal, available only at “offshore clinics” (in countries where they are legal).

But RAADfest’s organizers, the Coalition for Radical Life Extension, went further. They included presentations from anti-aging researchers like Liz Parrish and Bill Andrews, the former being a vice-presidential candidate for the 2020 US Transhumanist Party, and the latter a vocal cryonicist. The Coalition also includes Bill Faloon: a major, early, and persistent funder of cryonics and anti-aging research, and founder of his own immortalist “church” in Florida (the Church of Perpetual Life) (COPL), which he said he founded in part to bring together all radical longevity enthusiasts (FALOON 2023). The Coalition also includes the leaders of People Unlimited, another, longstanding immortalist community outside Phoenix, Arizona (COHEN 2019).

Despite these connections, interest in cryonics or in digital posthuman conditions was rare –not only at RAADfest but even in the immortalist communities above.⁹ And such interests were absent entirely at A4M. Instead, both RAADfest and A4M tended to focus on accelerating research and medical applications: presenters blamed US regula-

tions by the Food and Drug Administration for not speeding up human trials or expanding patient eligibility for the “Right to Try” (i.e., the right to participate in experimental treatments) to those not (yet) declared terminally ill.

At RAADfest 2023, Elizabeth Parrish (famous for undergoing early experimental gene therapies she helped develop) received the conference’s Bacon Prize, named for FRANCIS BACON’S (2000[1627]) early admonition that medicine and science be used for human betterment. The award was presented by Aubrey de Grey and Bill Andrews (whose research team discovered telomerase, implicated in the aging of chromosomes and their telomeres – the substance tested on Parrish) (MOHAMMADI & DAVIS 2016). That award ceremony made no mention of immortalism or transhumanism, even though all three onstage were linked to these movements. The same was true the following year at RAADfest 2024, when Parrish awarded the Bacon Prize to Greg Fahy: a longtime cryonicist who was celebrated as the former head of the Society for Cryobiology (the mainstream science) and as a researcher working on regenerating the thyroid and reducing one’s “epigenetic” age.

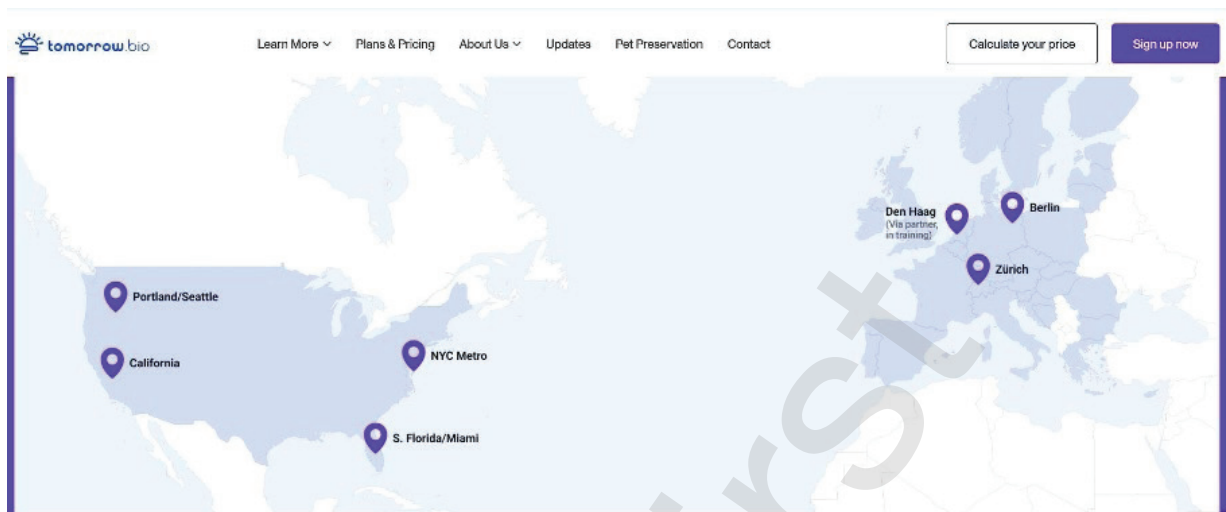


Fig. 12 From Tomorrow Bio's website section on Geographic coverage, showing from where cryopreservation medical standby teams can be sent (William Dawley, March 2025).

Indeed, some hostility to explicit transhumanism and postbiological futures appeared at RAADfest (cf. FARMAN 2019). While Parrish and Fahy's achievements seemed to elicit awe in most audience members in 2023 and 2024, in 2022 many attendees exited the ballroom as the keynote speech by Singularitarian Ray Kurzweil was introduced. Similar evacuations occurred when AI specialist Ben Goertzel took the stage and introduced the nursing robot "Grace" ("sister" to the more famous Sophia). And when Gennady Stolyarov, head of the US Transhumanist Party, asked whether the crowd wouldn't enjoy the brain-implemented computing presented by one presenter, Nuno Martins of UC Berkeley, or the possibility of uploading their minds and living forever in new bodies, some booed in disagreement (cf. DAWLEY 2022). Many anti-aging enthusiasts clearly sought to distance themselves from posthuman visions of "living beyond the carbon barrier" (GIESEN 2018; FARMAN 2019).

Such distancing was an even stronger dynamic at the 2023 A4M conference, which addresses itself more to practitioners, clinics, and health spas than does RAADfest. Accordingly, researchers presenting at A4M made even more modest claims and seemed to face higher scrutiny from audience members about how experimental (or scientific) their approaches were. When AI was mentioned at the 2023 A4M conference, it was usually as a tool to solve biological aging – not as a vehicle for posthuman life. For example, al-

though the keynote speaker, PETER DIAMANDIS, co-founded Kurzweil's "Singularity University", his speech avoided any mention of Singularitarian or posthuman futures. Instead, he focused instead on AI's role in fuelling medical advances, ending aging, and producing a post-scarcity future (cf. DIAMANDIS 2012). Rather than a far-future "Singularity", the key inflection point mentioned by Diamandis and other A4M and RAADfest presenters was "Longevity Escape Velocity" (LEV): a hypothesised stage when the annual, age-related damage to the body would be countered or even exceeded by decreases in "biological age" – thus "escaping" the necessity of biology death, but not of biology itself.



Fig. 13 YouTube video from TOMORROW BIO (2023a), 10 May. Note use of "cryopreservation" in the main video title (William Dawley, March 2025).

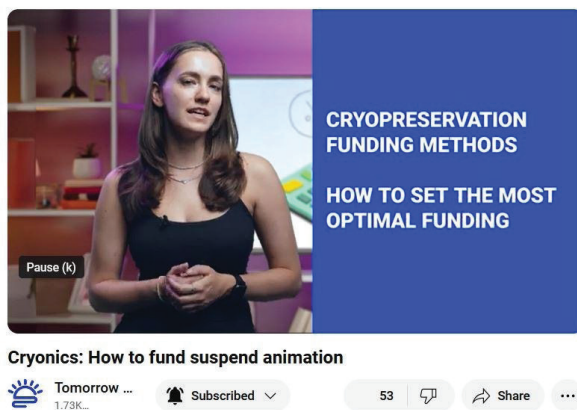


Fig. 14 YouTube video from TOMORROW BIO (2023b), September 22. Note use of “cryopreservation” in the video preservation (but “cryonics” in the title) (William Dawley, March 2025).

Anti-aging thus reflects the broader pattern for Cryonics 2.0: muting or omitting immortalist, posthuman, and post-biological visions of both explicit transhumanism and Cryonics 1.0 in order to speak to a broader audience. The paper’s following two sections trace two further spaces where we observed cryonicists’ changing identifications and public discourse: first, in our encounters with newer cryonics organizations like Tomorrow; and second, in cryonicists’ own survey data (collaboratively analysed by MAX MARTY and DAWLEY, with help from sociologist Carlos DelClos). Together, these spaces also suggested the second half of Cryonics 2.0: the influence of the more contemporary -REAL movements (Rationalism, Effective Altruism, and Longtermism).

The new CSOs of Cryonics 2.0: detecting conceptual shifts in Europe and elsewhere

As this paper’s introduction mentioned, three new CSOs have opened in the past five years: one in Western Europe (Tomorrow/EBF), one in Australia (Southern), and one in China (Yin Feng). Currently, they house less than 100 patients in total – most of them at Yin Feng. The self-representation of these new CSOs (and the changing representation of the earlier CSOs) reflects the Cryonics 2.0 era. Here we focus on interviews with and presentations by their leaders online and especially at conferences we attended, including EBF’s 2022 inaugural conference

and the presentation of Yin Feng at GCS 2024 in Miami.

Both Tomorrow/EBF and Southern Cryonics appear to follow the pattern of Alcor and Cryonics Institute: quiet labs with few full-time employees and tight security. This pattern is exemplified by the following presentation slide from GCS 2024, by Alcor’s current CEO: By contrast, Yin Feng houses its cryonics services in the much larger organization (the Yinfeng Life Science Research Institute (YLSRI), which focuses on cryopreservation broadly, including human tissues and organs – most commercially, the storage and preserving of reproductive cells for assisted reproductive medicine (see the slide below from GCS 2024, fig. 11).

The YLSRI is one of 25 divisions of the Yinfeng Biological Group (Yin Feng Bio 2023), which is itself one of three business sectors operated by Shandong Yinfeng, a firm with a current market cap of 2 billion renminbi (275 million USD). Yin Feng’s lead cryopreservation expert, Aaron Drake (formerly of Alcor), commented positively on this arrangement: “Alcor doesn’t partner with any medical facilities... [But at Yin Feng] we work with surgeons, anaesthesiologists and perfusionists [people who operate heart-lung machines]. It is a large, research-based project”, working closely with “organ transplants... and other medical procedures” (YAU 2020).

Yet this integration with more mainstream science and cryopreservation uses is exactly what Tomorrow, Alcor, and other CSOs have sought. For example, Alcor’s CEO expressed his desire to link



Fig. 15 YouTube video from TOMORROW BIO (2021), 9 July. Note the close link to rejuvenation and biological revival in the scene shown (William Dawley, March 2025).

his organization with organ preservation at the 2023 annual Alcor Board meeting:

In talking to members, I said, why did you sign up with Alcor? What are you doing here? And... they ultimately said, I want to contribute, and I want to be a part of the science, I want to be a part of this “Apollo moon landing” mission where we’re working to preserve organs, preserve the brain, and ultimately have that be useful for ourselves and for society (ALCOR 2023: 6).

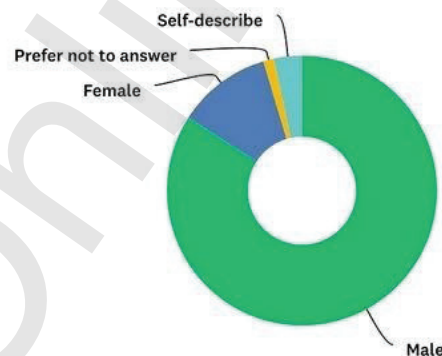
Immortalism, by contrast, was something many CSOs seemed eager to disidentify with, despite the titles of recent ethnographies of cryonics (Bernstein 2019; Farman 2020). When Torsnes mentioned the “I-word” to a group of cryonics researchers, she was met by shrugs, until one offered, “You know, we don’t really like that word” – to which the others nodded in assent (TORSNES 2023). The framing preferred by Tomorrow and other contemporary CSOs is that of the ‘chosen lifespan’. CSOs and many ordinary cryonicists in the Cryonics 2.0 era are focused on appearing serious and scientifically-minded (much like the

-REAL movements we cover later), so anything that might have them labelled “irrational” or “a cult” (as several of our interlocutors mentioned) is avoided.

Similarly, the head and co-founder of Tomorrow and EBF asserted frankly, ‘I am not a transhumanist,’ during our interview with him.¹⁰ As Tomorrow experiences rapid growth, with 300-plus contracts in 27 European countries and six cryopreservations performed by March 2025, Kendziorra has made pains to present Tomorrow and EBF, not only as bringing cryopreservation services and research to Europe (and recently to North America) (see map below) but as *mainstreaming* cryonics by professionalizing it and by making it compatible with mainstream science.

Tomorrow and EBF even skirt the word “cryonics” in most discussions, preferring the broader terms “cryopreservation” (which can also apply to organ and tissue preservation) and “biostasis” (any method of suspending life processes). The photos below show some examples of this terminology. These terms, together with the anti-aging/rejuve-

Q1 - Gender



ANSWER CHOICES	RESPONSES	
Male	84.10%	201
Female	11.30%	27
Prefer not to answer	1.26%	3
Self-describe	3.35%	8
TOTAL		239

Fig. 16 Gender identities of respondents to the Cryonics Survey of 2022 (MARTY 2023b) (William Dawley, March 2025).

Question 33 - "Simulated you" vs "you"

If your brain is destructively scanned and a simulated digital copy of that scan is run on a very sophisticated computer in the future - is that person "you" in the ways that you feel matter?

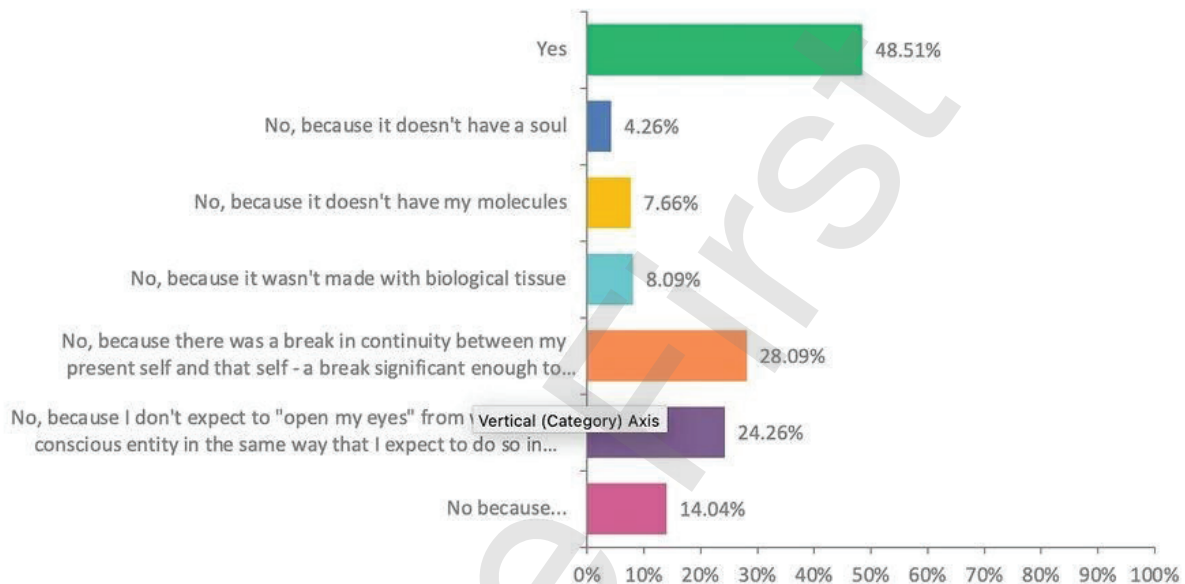


Fig. 17 Respondents answer a question about whether a copy of their brain would be them in the Cryonics Survey of 2022 (MARTY 2023b). Note the attention to different ideas about the self, interpreted through technology (William Dawley, March 2025).

Q19 - (Identity) I consider myself a

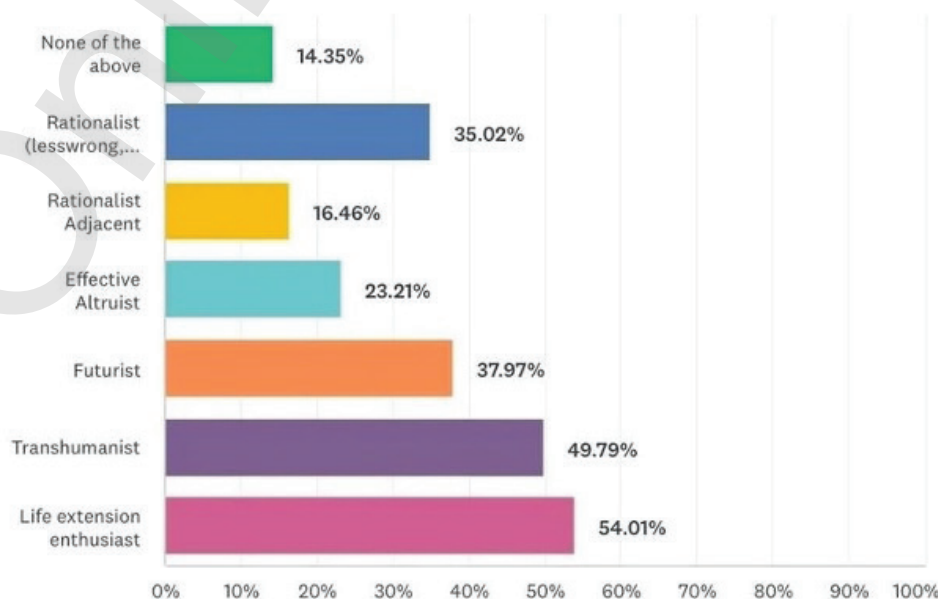


Fig. 18 Respondents answer a question about which identities they consider themselves in the Cryonics Survey of 2022 (MARTY 2023b) (William Dawley, March 2025).

		DontConsider	Rationalist	RatAdjacent	Rat+RatAdjacent	EffectiveAltruist	Futurist	Tranhumanist	LEnthusiast	Age (yrs)
DontConsider	Pearson Correlation	1,000	-,289 _a	-,176 _a	-,377 _a	-,217 _a	-,308 _a	-,389 _a	-,423 _a	,098
	Sig. (2-tailed)		,000	,006	,000	,001	,000	,000	,000	,143
	N	244	244	244	244	244	244	244	244	226
Rationalist	Pearson Correlation	-,289 _a	1,000	-,124	,767 _a	,379 _a	,204 _a	,326 _a	,129 _a	-,164 _a
	Sig. (2-tailed)	,000		,052	,000	,000	,001	,000	,044	,014
	N	244	244	244	244	244	244	244	244	226
RatAdjacent	Pearson Correlation	-,176 _a	-,124	1,000	,466 _a	,139 _a	,014	,048	-,010	-,100
	Sig. (2-tailed)	,006	,052		,000	,029	,825	,457	,873	,132
	N	244	244	244	244	244	244	244	244	226
Rat+RatAdjacent	Pearson Correlation	-,377 _a	,767 _a	,466 _a	1,000	,399 _a	,169 _a	,294 _a	,085	-,185 _a
	Sig. (2-tailed)	,000	,000	,000		,000	,008	,000	,183	,005
	N	244	244	244	244	244	244	244	244	226
EffectiveAltruist	Pearson Correlation	-,217 _a	,379 _a	,139 _a	,399 _a	1,000	,197 _a	,322 _a	,121	-,187 _a
	Sig. (2-tailed)	,001	,000	,029	,000		,002	,000	,060	,005
	N	244	244	244	244	244	244	244	244	226
Futurist	Pearson Correlation	-,308 _a	,204 _a	,014	,169 _a	,197 _a	1,000	,331 _a	,371 _a	-,014
	Sig. (2-tailed)	,000	,001	,825	,008	,002		,000	,000	,830
	N	244	244	244	244	244	244	244	244	226
Tranhumanist	Pearson Correlation	-,389 _a	,326 _a	,048	,294 _a	,322 _a	,331 _a	1,000	,330 _a	-,301 _a
	Sig. (2-tailed)	,000	,000	,457	,000	,000	,000		,000	,000
	N	244	244	244	244	244	244	244	244	226
LEnthusiast	Pearson Correlation	-,423 _a	,129 _a	-,010	,085	,121	,371 _a	,330 _a	1,000	-,062
	Sig. (2-tailed)	,000	,044	,873	,183	,060	,000	,000		,353
	N	244	244	244	244	244	244	244	244	226
Age (yrs)	Pearson Correlation	,098	-,164 _a	-,100	-,185 _a	-,187 _a	-,014	-,301 _a	-,062	1,000
	Sig. (2-tailed)	,143	,014	,132	,005	,005	,830	,000	,353	
	N	226	226	226	226	226	226	226	226	226

a. Significant at .05 level

Table 1 Correlations between age and different identities (from Question 19 above) in the Cryonics Survey of 2022 (cf. Marty 2023b). Note in the last row (age) that the most significant negative correlation (the second number, where smaller indicates greater significance) is produced by combining Rationalist and Rationalist-adjacent responses (column 4). Note in the last row (age) that identification with transhumanism (the seventh column) is the most significant negative correlation of all (the second number, where smaller indicates greater significance) (William Dawley, March 2025).

nation language some of the scenes below suggest, constitute a broad effort to portray their services as “normal science”. “[Our] primary goal,” begins EBF’s mission statement, “is to advance research protecting humans from harm and degradation” through “state-of-the-art technology and medical practice” (EBF 2023). Tomorrow’s professionalization includes making a licensed surgeon, Irishkesh Santhosh, head of the cryopreservation team responsible for SST (standby, stabilization, and transport) services. It also involves experimentation and training with bodies donated to medical research. Tomorrow’s best-known mainstreaming efforts include shareable explanatory videos about cryopreservation and Kendziorra’s AMA (Ask me anything) livestreams, both of which foreground scientific findings and practicalities for customers (TOMORROW BIO 2023a; 2023b; 2021; 2022) (see screenshots of them above and below). These videos were regarded in the cryonics community as an ideal method of making cryopreservation seem more palatable and credible. Kendziorra went further, framing the videos as a way to put cryonics in tune with scientific and medical frameworks, such as “informed consent’ about participating in experimental treat-

ments. After providing this information, he said, “I think that it is right and morally correct to – if possible, if *medically* possible – give people the chance to live however long they want.” It was not merely that earlier European generations were *intellectually* unaware of cryonics, he said, but that, lacking familiarity with scientific advances, they were *culturally* unready for ideas like the “chosen lifespan”, left to make decisions based on religious and family traditions. Tomorrow’s rapid expansion, Kendziorra said, gave him confidence in Tomorrow’s approach to marketing and medical professionalism, which Fig. 14 and 15 show, respectively:

The changing face of cryonics: who they are, what they believe, how they identify, and the rationalist road to Cryonics

Hybrid ethnography allowed us to interact with cryonicists in ways that were close and ongoing enough that we were able to interface with them to produce our findings (see Methods). Here we examine the results of interfacing with MAX MARTY in analyzing and re-coding survey data from the Cryonics Survey of 2022, which he designed in col-

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	78,277 ^a	,353	,491

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than ,001.

Classification Table^a

Observed		Predicted		Percentage Correct
		1stRationalist-LWnWbWetc Other	R+RA+LW+WB W	
Step 1	1stRationalist-LWnWbWetc	53	10	84,1
	R+RA+LW+WBW	11	20	64,5
Overall Percentage				77,7

a. The cut value is ,500

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a Male	,513	,850	,365	1	,546	1,671
Age (yrs)	-,135	,032	17,414	1	<,001	,874
FinishCollege	1,967	,693	8,062	1	,005	7,147
NativeEnglishCountry	-,387	,581	,443	1	,506	,679
Constant	2,829	1,159	5,958	1	,015	16,936

a. Variable(s) entered on step 1: Male, Age (yrs), FinishCollege, NativeEnglishCountry.

Table 2 Results of a multiple-regression analysis showing the predictive power of four different variables in determining whether respondents learned about real-world cryonics through Rationalist and Rationalist-adjacent websites: gender, age, finishing a bachelor's (the most predictive recoding of education), and location in a country with English as a main language (the most predictive recoding of a respondent's location). Note in the third table that only age and education were statistically significant predictors of learning about real-world cryonics through these websites (rows 2 and 3). Note in the first table that this model's predictive power in determining whether respondents learned about real-world cryonics through these sites (R-square) was between 35 and 50% of the total variation (William Dawley, March 2025).

laboration with two unnamed cryonicists (2023a–b). The survey received almost 250 responses, 60% of whom had purchased cryonics contracts, 25% of whom intended to, and 10% were undecided but “cryo-curious.” Although some of the survey data merely clarified our ethnographic research, other parts of it produced, through collaborative analysis, significant revisions and reinterpretations of our initial findings.

Age and gender data largely matched what our interviews with leaders at Alcor and Tomorrow suggested, such as an average sign-up age somewhere in the mid-30s. Kendziorra suggested most

Tomorrow sign-ups were in their mid-30s – an age suitable, he thought, for many of them both to afford the required life insurance payments and to reflect on a future of aging. Although MARTY's (2023a) survey did not ask directly about the age when cryonicists sign up with a CSO, the data suggests a similar figure: the respondents' average age was 43 – and the average signup was ten years prior.

Likewise, cryonicists' well-known gender imbalances were made legible by the 2022 survey. Around 84% and 11% of total survey respondents identified as male and female, respectively (see fig. 16).

Our sense that cryonicists worked predominantly in “tech” and were well-educated was also fleshed out by Questions 36 and 37 of the 2022 survey (MARTY 2023a). Almost 4-in-10 survey respondents identified as working in the tech-sector (37.5%). Another 4-in-10 reported working in either research and academia (26.5%) or health-care (12.5%). And nearly 40% had master’s or doctorate degrees, compared to 15% of total US residents over age 25 (US Census Data 2019).

Educational data showed *almost half* of respondents might be trained as “engineers”, if computer science (31%) and engineering degrees (14.5%) were combined – given how many IT jobs are classified as “software engineers”. Even more might be classified as STEM graduates, given how many reported math (15%) engineering (14.5%), biology (9%) and economics (6%) as their highest-earned degrees. All this data gave interpretive context to a comment made by Tim Gibson to cryopreservation trainees in the UK that, “We are the engineers, not the scientists.”

Similarly, the survey corroborated our observations about how frequently cryonicists commented on the high levels of autism in their community. While base-rate estimates for autism spectrum disorder vary highly by method, they usually remain well within the single dig-

its. Yet over 30% of respondents identified themselves as somewhere on the autism spectrum (MARTY 2023a; cf. CHIAROTTI & VENEROSI 2020; MAENNER *et al* 2021).

The survey also addressed the complicated state of cryonicists’ views of biological and postbiological futures. On one hand, of those with completed or nearly-completed cryonics contracts (60% of the total), further recoding revealed that whole-body cryopreservation signups outnumbered 3-to-1 signups for cryopreservation of the head or brain alone (73 to 27%). Yet, on the other hand, a slight majority of respondents thought consciousness could *in principle* exist in digital or non-biological form (55–60%, depending on interpretations of valid responses) (Marty 2023b).

A question of whether the self could be successfully uploaded (see below) divided respondents: nearly half (48.5%) thought a brain that was “destructively scanned” and then uploaded “is ‘you’ in the ways that you feel matter”. “No” responses were split as to why the upload was not ‘you’. Some 28% of respondents suspected there would be “a break significant enough” in the “continuity between my present self and that self”, while 24% would not “expect to open my eyes from within that conscious entity in the same way that I expect to do so in this body tomorrow morning” (Fig. 17).

Scenario	Duration (centuries)	Carrying capacity (lives per century)	Number of future lives
Earth (mammalian reference class)	10^4	10^{10}	10^{14}
Earth (digital life)	10^4	10^{14}	10^{18}
Solar System	10^8	10^{19}	10^{27}
Solar System (digital life)	10^7	10^{23}	10^{30}
Milky Way	10^{11}	10^{25}	10^{36}
Milky Way (digital life)	10^{11}	10^{34}	10^{45}

Table 3 Future “carrying capacity” scenarios typical of longtermist calculations. From *The case for strong Longtermism* (GREAVES & MACASKILL 2021).

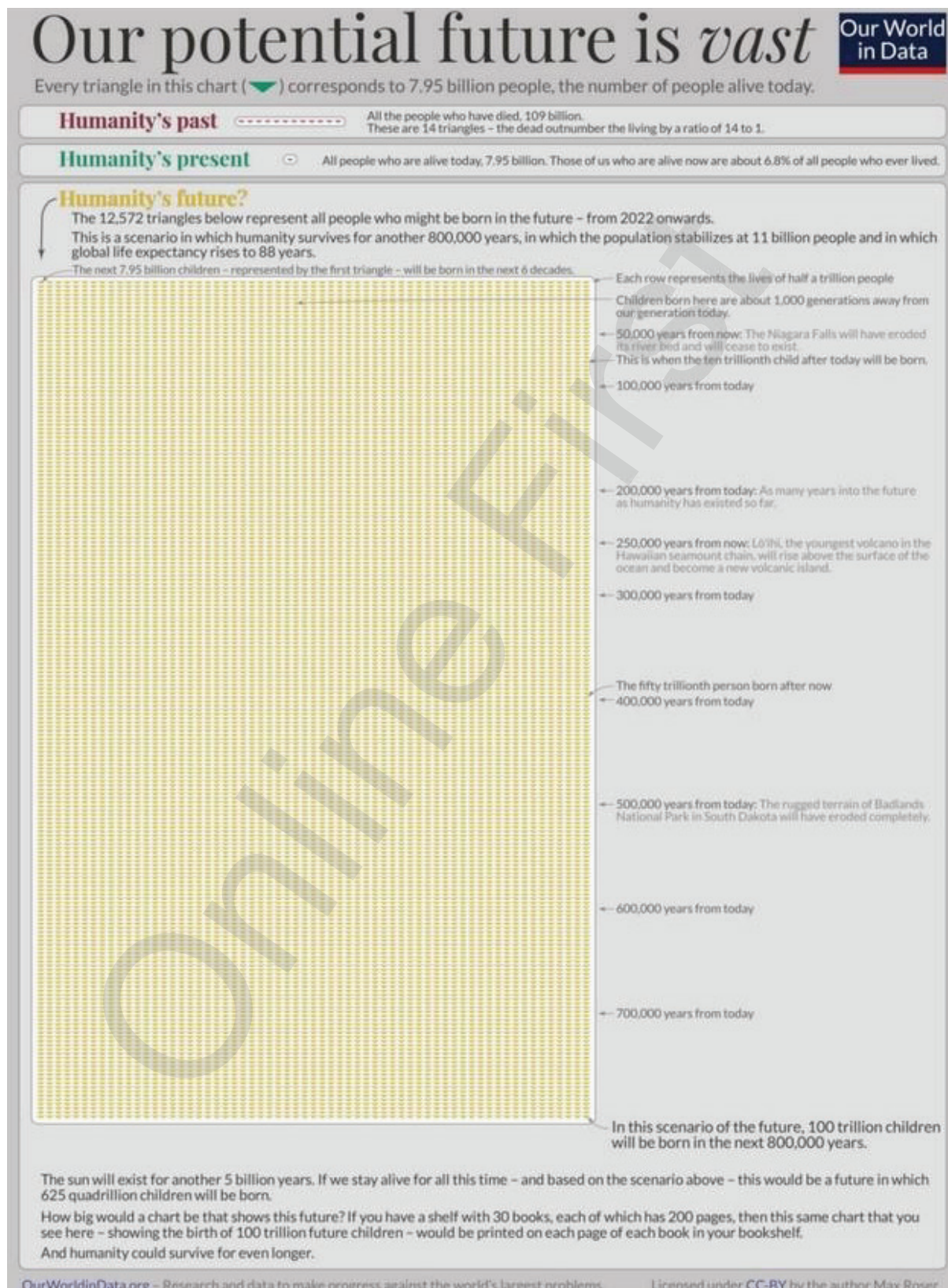


Fig. 19 A million-year Longtermist projection, restricted to Earthly, human lives (cf. MACASKILL 2022) Note the three sections, comparing human lives past (twelve red triangle), present (single green triangle), and future (12,572 yellow triangles). From ROSER 2022.

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But the most significant clarification produced by this collaborative “interfacing” was the second major leg of Cryonics 2.0: its growing relationship to -REAL (Rationalism, Effective Altruism, and Longtermism). Respondents could opt to affirm a number of relevant identities, including Transhumanist, Rationalist (or Rationalist-Adjacent), Futurists, and Life Extension Enthusiasts (although Longtermism was unfortunately not included) (see fig. 18).

These responses resonate with our interviews and observations: the increasing identification of cryonicists as Rationalist or Rationalist-Adjacent (51% combined) rather than as Transhumanist (just under 50%). In addition, it suggests a closer association with anti-aging and “life extension” (54%) than with futurism (38%) more broadly.

But the relationship with age was complicated. Younger cryonicists were often, we discovered, increasingly likely to become cryonicists through Rationalist online culture. Yet older survey respondents (not just cryonics leadership) had become significantly *less* likely to accept *any* of the identity labels offered: in the table of correlations (below), age is strongly negatively correlated with identifying as Rationalist and/or Rationalist-Adjacent ($p=0.005$), as an Effective Altruist (0.005) – or as a Transhumanist (0.000).

Further analysis suggested that, of six different recodings of respondents’ Location data, coming from a country without English as the main language showed the strongest positive correlation with Transhumanist identity. Taken together, these findings may suggest that Transhumanism (as a label) does not carry the same baggage among younger cryonicists and those outside the Anglophonic world.

“The Rise of Rationalism” also seemed to explain one of the most fascinating answers to how young cryonicists come to find out about cryonics. The survey asked respondents to recall where they first learned about *real-world cryonics*. Rationalist and Rationalist-adjacent websites like LessWrong and WaitButWhy were the most recurrent answers – and these were (on further analysis) found to correlate especially with younger ages and (to a lesser extent) with formal education (especially when coded as whether the respondent had finished their bachelor’s degree).

Further multiple regression analysis (see below) showed that only age and having finished a bachelor’s degree education were statistically significant – and together could explain between 35 and 50% of the likelihood of learning about real-world cryonics through Rationalist-adjacent sites (Table 2).

The collaborative analysis not only helped explain the constant mention of Rationalist sites during our interviews but also pointed to the much broader drift toward Rationalism – one which has not been well elaborated in the existing literature on cryonics. We now turn to these newer movements: Rationalism, Effective Altruism, and Longtermism – the “-REAL” of the TESC-REAL acronym.

The “Rise of Rationalism”: Rationalism, effective altruism, and longtermism in Cryonics 2.0

Before we trace the rough chronology of each of these movements and their relationship with cryonics, it is worth describing each of them and how they are related to each other and to TESC-REAL as a whole. Rationalism (the contemporary movement, not the seventeenth-century philosophy) emerged, much like transhumanism and Extropianism, as a “tech movement” (HEPP & SCHMITZ 2023). It saw itself as a practical philosophy of “training and applying” rational and scientific decision making and avoiding cognitive biases (OVERCOMINGBIAS 2024; LESSWRONG 2019; KAHNEMANN 2011).

In turn, Effective Altruism (EA) and Longtermism are the dominant strains of trying to apply these principles to broader social, technological, and ecological issues. Effective Altruism (EA) is, in the words of its founder, “the project of using evidence and reason to figure out how to benefit others as much as possible and taking action on that basis” (MACASKILL 2017: 2). EA individuals and institutions often try to measure and establish standardized metrics of the per-dollar benefit done by particular actions, in order to override the cognitive biases and distorted perceptions that may entice altruists’ time and money to less effective causes. One such healthcare-derived metric, “QALYs” (quality-adjusted life-years), is sometimes used to compare different interventions on patient

lives' quality over time. The EA organization "Giving What We Can" offers QALY-per-dollar assessments of different charitable foundations, encouraging members to start by giving 10% to the highest-ranked charities. Another EA organization, 80,000 Hours, helps Effective Altruists choose and change careers that will maximise the good they do. (It is named by multiplying the standard, 40 hours per workweek by 50 weeks annually over 40 years).

In some ways, “Neartermist” EA is simply a Rationalist flavour of a perennial moral universalism which argues that ethical responsibilities should transcend geographic and relational boundaries or distances. MACASKILL (2017: i) and others often credit philosopher Peter Singer’s as the movement’s forefather for his contemporary restatement of this ethical calculus when he argued, after the Bengali cyclone and civil war, “It makes no moral difference whether the person I can help is a neighbour’s child ten yards away from me or a Bengali whose name I shall never know, ten thousand miles away” (SINGER 1972: 231–232).

“Longtermists” are in some ways one of two flavours of EA. While “Neartermists” concern themselves largely with present or near-term suffering (applying Rationalist approaches to altruism as it is usually understood), “Longtermists” extend Effective Altruism into the “long, long term” (ROMAIN 2010). By expanding Singer’s equal regard for suffering into the far-future, *ignoring temporal distance* as well, they grant equal weight to future lives. These long-term calculations quickly depart from Neartermist concerns, considering a vast range of futures, from the near-term extermination of all sentient life or “unrecoverable dystopias” lasting millennia (ORD 2020: 138–158; MACASKILL 2022: 68–131), to an expansive, Extropian-like future of millions, billions, or trillions of years, with an unimaginable proliferation of sentient life (in biological and digital form).

Two diagrams below illustrate why, for Longtermists, these expansive far-futures outweigh Neartermist concerns about the next 100 years. The first, from *The case for strong Longtermism* by HILLARY GREAVES & WILLIAM MACASKILL (2021: 8), first calculates the Earth's carrying capacity for mammalian life, then calculates how this carrying capacity would explode if sentience expands into digital lifeforms, and finally calculates both

possibilities if life expanded throughout our solar system or throughout the galaxy. allowing for 10 *trillion* years before extinction (10^{11} centuries). In the most expansive of these scenarios, the authors estimate a total of 10^{47} sentient lives – some 10,000,000,000,000,000,000,000,000,000,000,000 times greater than the earth's present carrying capacity (10^{10}) for sentient lives per century (Table 3).

The next figure (19) shows how less “strong cases” for Longtermism still use at least a million-year time frame. Even restricted to earthly, human lives, it still shapes a very different moral calculus than Neartermism by dwarfing all present and past lives by many orders of magnitude:

The practical result is that Longtermists and their organizations look quite different from both standard altruism and Neartermist EA. Longtermists funnel resources mostly toward efforts to avoid special kinds of existential risk (“x-risk”), civilizational collapse, or expansive futures of mass suffering for humans and other sentient beings, especially “misaligned AI”,

The biography of one cryonicist, ELIEZER YUDKOWSKY, spans roughly the entirety of the TESC-REAL movements and illustrates for the reader the “Rise of Rationalism” found in Cryonics 2.0. YUDKOWSKY participated in early Extropian and transhumanist communities (e.g., EXTROPIANS 1996). With fellow cryonicist Robin Hanson, he helped found the earliest Rationalist site, OvercomingBias (still the name of Hanson’s Substack). In 2009, Yudkowsky founded LessWrong. Between these years, he wrote “The Sequences,” which drew on philosophy, cognitive science, decision theory, computing, and x-risk.

Reflecting on his origins in transhumanism, Yudkowsky noted that, within the growing Rationalist movement, transhumanism now seemed strangely optimistic:

Every now and then... someone [in the Rationalist community] encounters some of my transhumanist-side beliefs — as opposed to my ideas [about] human rationality — strange, exotic-sounding ideas like superintelligence and Friendly AI. And [this person] rejects them (2008).

Though he considers this rejection unfair, Yudkowsky would himself, likewise, shift his energies from developing “superintelligent, Friendly AI” towards

efforts to prevent “misaligned AI” from emerging as an x-risk. While in 2000, he had founded the Singularity Institute for Artificial Intelligence (SIAI) to accelerate AI development, by 2005 he had renamed it the Machine Intelligence Research Institute, focused on avoiding AI-related x-risk.

In 2023, YUDKOWSKY refused to sign on to an open letter by AI researchers, calling for a 6-month moratorium on further AI development (FLI 2023), considering it too modest. He published an op-ed in *Time* magazine instead, arguing that the letter “understat[ed] the seriousness of the situation” and “ask[ed] too little to solve it” (YUDKOWSKY 2023). The op-ed suggested military measures might be needed to prevent “large GPU clusters” capable of hosting a hostile superintelligence – an existential risk to all humanity.

Among cryonicists, YUDKOWSKY was the first to trace the rise of Rationalist culture in cryonics, especially in his 2010 LessWrong essay, “Normal Cryonics”. Attending an annual Teens and Twenties cryonics event, he observed that younger cryonicists seemed increasingly rational and “normal”. Though five years before he had portrayed cryonics as a righteous “challenge to death” (2005), he now perceived a broader shift of younger cryonicists shifting from seeing cryonics as “a desperate battle against Death” towards viewing it as “the obvious thing to do” – a rational response to technoscientific advancements. Younger cryonicists increasingly seemed to him like the sober thinkers Rationalists aspire to be.¹¹

There have been important differences in how Rationalism, EA, and Longtermism have developed institutionally. Of the Rationalist universe, EA and Longtermism seemed to have developed more elaborate, elite-level institutions (perhaps in part because of their broader goals). We have noted two EA institutions, started by EA’s founder MACASKILL, while others, more committed to Longtermist visions, include not only MIRI, and the erstwhile Future of Humanity Institute (2024) at Oxford University, but also the Future of Life Institute (with AI expert Max Tegmark as current president).

Rationalism seems to be the largest umbrella and the most diffuse movement. One of the authors, DAWLEY, met participants in numerous households and meetups during fieldwork among cryonicists and futurists, many of which got their

start in online conversations on newer Rationalist forums – most notably Astral Codex Ten (ACX) and WaitButWhy (WBW). WBW was the single most common answer given by survey respondents as to where they were first introduced to “real-world cryonics”, usually referring to the WBW essay, “Why Cryonics Makes Sense” (URBAN 2016). The first book club DAWLEY attended ended up covering the book by the WBW author (2023).

Perhaps it should be unsurprising that many young cryonicists seem to discover real-world cryonics through Rationalism and these adjacent movements. Culturally, Rationalism runs parallel to the contemporary mainstreaming of scientific discourse and techno-solutionism: a vision of human “advancement” through reason, science, and technological efficiency that seems like a “domesticated,” implicit transhumanism, as argued by PILSCH (2017). And sociologically, like cryonics, Rationalism, EA, and Longtermism all find disproportionate favour among tech industry workers and the broader, so-called “professional-managerial class” who share those cultural values, including preferring efficiency over other values (such as equality), especially as they attend more and more elite-identified institutions.¹²

Thus, less “domesticated” far-futures certainly persist among cryonicists and other futurists, but their emphasis has changed in parallel with the changes constituting Cryonics 2.0. While Longtermism’s future visions are as expansive as Extropianism, Singularitarianism, and Cosmism (TESC-), there is a significant reversal in emphasis. The early, TESC- era (of Cryonics 1.0) spent much of its speculative energy arguing for a particular “Greatest Good”: a future of limitless life and fantastic human augmentation. But the younger, -REAL generation associated with Rationalism, Effective Altruism, and Longtermism emphasize avoiding the “Greatest Evil”: x-risk. Perhaps, as Anders Sandberg suggested in an interview with our team, they have concluded that it is simply easier to agree on the worst outcomes than to agree on the most desirable ones. But like their predecessors – and like many cryonicists – they perceive our current moment as an inflection point in a potentially immense history, where small directional pivots can yield very different trajectories, very different futures.

Conclusions

To summarize, our research suggests a shift among cryonicists that we call Cryonics 2.0, which is under-elaborated and unnamed in the extant literature on cryonics. Cryonics 2.0 consists of two parts: first, a “mainstreaming” of cryonics that leans toward the growing popularity of “anti-aging” and away from explicit “immortalism” and transhumanism; and second, the “Rise of Rationalism” among many cryonicists, especially younger cryonicists, some of whom first discovered real-world cryonics through Rationalism and Rationalist-Adjacent movements like Effective Altruism and Longtermism. Cryonics 2.0 represents a still-emergent adaptation to this changed cultural context, reflecting cryonicists’ goals of growing their community.

For the anthropology of medicine, Cryonics 2.0 occupies a unique place. It bridges arguments by medical anthropologists like Lock and others that the *biological* sciences and changes in biomedicine are reconstituting ideas about the body, the human, and the self with discussions by FARMAN (2019) and others, who see this reconstitution as modelled on *digital* technologies. Cryonics 2.0 reveals how the mainstreaming and transforming of transhumanism happens through both channels, but it raises the centrality of anti-aging in particular, as well as from growing movements like Rationalism.

While some of these movements (like Longtermism) focus on the far-future and radically different futures, others frame these new logics about the body and the human as SCHWAB (2016) has in his notion of “Fourth Industrial Revolution”: as a continuation of earlier cycles of technological progress. Although many cryonicists remain enthusiastic about AI and “convergence”, they also perceive that the popularization of transhumanism’s goals, such as life extension, are partly due to the popularity of anti-aging medicine and biomedical advances instead (cf. BERNSTEIN 2019). Many recognize that hopes for extending life *in the body* are less alienating and more easily received as rational and credible – not only to cryobiologists but also to potential cryonicists and to the public. Certainly, the hope persists for preserving the human mind after death, and independent of its biological substrate, as shown by the Longtermist calcu-

lations above the danger posed by x-risk to all sentient life: animal, human, and posthuman. But, as FARMAN (2020) has noted, avoiding stigma is central to being taken seriously and to growing cryonics, so discussions about post-biological life now make some cryonicists uneasy or are reserved for “internal” discussions.

Similarly, the “Rise of Rationalism” has played an important role in this mainstreaming effort, despite its absence from many accounts of cryonics. The popularity of these movements allows cryonicists to reframe transhumanist hopes as Rational – as reflecting a rational, altruistic, and responsibly long-term orientation, rather than an overly accelerationist one. That is, the -REAL movements help make case for cryonics as “normal” (YUDKOWSKY 2010), compared to earlier, explicit transhumanism.

Notes

- 1 This paper is based on fieldwork by the Research Council of Norway-funded research team “Techno-scientific Immortality”, most substantially Dawley’s three years of hybrid fieldwork among numerous cryonics and anti-aging communities and events (and the bulk of the life-history, semi-structured interviews described below), as well as collaboration with Max Marty and others on their survey analysis. Torsnes conducted fieldwork at Tomorrow Biostasis in Berlin and at UK Cryonics in the UK, and Annelin Eriksen (the project’s PI) carried out shorter visits to cryonics and anti-aging events in Europe and the US.
- 2 Some of these organizations have also cryopreserved over 100 animal bodies, which are not discussed here.
- 3 Aldehyde stabilization, not included here, represents another form of brain preservation aimed at preserving the brain’s “connectome”, usually for re-creation rather than revival.
- 4 The TESCREAL acronym is debated by some of our interlocutors (SENNESH & HUGHES 2023, esp. n11), being coined by their detractors (see AHUJA 2023 and TROY 2023). For this paper, TESCREAL merely provides a convenient chronology. English translation did not pinpoint a specific root.
- 5 Discord is a chat server, comparable to a Slack or Teams channel, first associated with gamers.
- 6 Cryobiology and cryonics are distinct. Cryobiology is the study and practice the use of low temperatures to slow biological processes and preserve biological material, allowing for organ transplants and the preservation of human and animal reproductive cells, for both human fertility medicine and industrial agriculture. For 35 years, the Society of Cryobiology banned its members’ involvement in cryonics (from 1982 to 2017). Cryonicists sometimes praise the work of cryonicist Greg Fahy (the Society’s 2022–2023 president), whose

contributions to cryobiology were thought to have undermined the ban.

7 Linda Chamberlain, a cryonics pioneer and Alcor's co-founder, said in a recent interview, "I hope I won't have a biological body but [instead] a body made out of nano-bots... a nano-bot swarm or nano-bot cloud. It will be much more durable. I can be as beautiful as I want to be. I won't be old anymore" (CNET 2020:16:14).

8 DAWLEY, ERIKSEN, and FARTEIN NILSEN attended RAADFest together in 2022 (see DAWLEY 2022). ERIKSEN first attended RAADFest online in 2021, and Dawley attended both RAADFest and A4M in 2023 and 2024.

9 When DAWLEY visited COPL's 2022 annual cryonics-themed event, the "Remembrance of the Resurrectables" (i.e., of the cryopreserved), few COPL members seemed interested. One of COPL's main organizers estimated that fewer than 40 of the 150-200 monthly attendees (whether online or in-person) were interested in cryonics; most were focused on anti-aging medicine and lifestyles. And although Bernadeane, founder of People Unlimited, was cryopreserved in June 2024, the leaders of People Unlimited denied any interest or connection in cryonics, despite Alcor being just a few miles down the road.

10 DAWLEY & TORSNES conducted this interview.

11 Cryonics provokes frequent and vigorous discussions on Rationalist forums: LessWrong features "Cryonics" in 130 posts, slightly more than "Counterfactuals" (112) and less than the MIRI AI lab where YUDKOWSKY works (142). See LESSWRONG 2025.

12 "Regardless of party", US elites are "significantly more focused on efficiency vis-a-vis equality than is the U.S. public – a bias that increases with each increment of eliteness", measured by university prestige (FISMAN, JAKIELA, KARIV & MARKOVITS 2015: 1300).

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