Cryonics 2.0

Implicit Transhumanism, Anti-Aging, and the 'Rise of Rationalism'

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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 or sign up for 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 was until very recently a very fringe phenomenon (Romain 2010), only lately the topic of ethnographic manuscripts (Bernstein 2019; Farman 2020; Torsnes 2023). But it has been mainstreamed not only by advances in AI, but by the study of aging, as well as 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' (Farman 2019), my 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 that members of the Human Futures research team have given to this new context for cryonics (cf. Eriksen 2021, 2023), 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's[1] bodily remains in the hopes of reviving them later, using future medical and technological advances.[2] Though relatively little known as a real-world practice, cryonics has been carried out and developed for almost 60 years. Both those who practice it and those who sign up to be preserved are called 'cryonicists'.

The first part of the cryonics process is called 'cryopreservation'. The details of cryopreservation have changed over time, but the usual techniques involve a process of flushing out bodily fluids, replacing them as much as possible with increasingly concentrated medical antifreeze solutions, and lowering the body's temperature gradually, before storing it at ultralow temperatures in large 'dewars' (see Figs. 1–2).

Cryonicists differ in their hopes for the second part of the process: reviving people in different biological and non-biological forms. Their different hopes extrapolate from current trends in technological and scientific research into different possible futures. The range of hoped-for possibilities runs 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).

Signups for cryonics seem to have exploded in the past five years, during which time three new cryonics providers have emerged. Until five years ago, cryonics had only grown modestly, but signups have picked up on something nearly like an order of magnitude, according to interviews with cryonics providers. Though perhaps fewer than 500 human cryopreservations have taken place, there are now almost 5,000 contracts for future

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cryopreservation currently active. And the three new cryonics providers that emerged have recently 'onshored' human cryopreservation to Europe, Asia, and Australia (whereas previously only two US providers and one Russian provider offered cryopreservation and storage: Alcor, the Cryonics Institute, and KrioRus, respectively).

There have also been changes in who cryonicists are, how they see themselves, and their view of cryonics and its future – a change that the Human Futures research team has called 'Cryonics 2.0' (cf. Eriksen 2021, 2023).[3] My research points to two major influences on these changes: the 'mainstreaming' of interests in anti-aging research, and the 'Rise of Rationalism' and its associated movements (Effective Altruism and Longtermism), through which many newer cryonicists join the community (Torsnes 2023).

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

For most of its history, cryonics has been 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 – a claim this paper substantiates in new ways.

Fig. 2 Dewars at Alcor outside Phoenix, USA, with Alcor's Mike Perry in the background. Photo: William Dawley, August 2022.

In particular, Farman (esp. 2019) has argued that transhumanism's *digital* ideas about a future of 'convergence' have gone mainstream – ideas about the eventual merging of the digital and the biological (through nanoscale biotech and other means), enabling intelligent and (trans)human life outside the body, 'beyond the carbon barrier'. Giesen (2018: 197–198) has argued that beliefs in biological-digital 'convergence' has grown well prior to the recent explosion of AI capabilities, especially in elite business and policymaking circles. He 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 (WEF) and the Young Global Leaders forum (which has included a number of current and former heads of state) (YGL 2024). The WEF and YGL were both founded by Klaus Schwab, who popularized the transhumanist concept of the 'convergence [of] the digital, physical and biological' in his 2016 book *The Fourth*

Industrial Revolution, depicting it as another 'industrial revolution': the latest step in a series of technological leaps of progress (60).

However, my research focuses on a *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; compare Turner 2007; Vincent 2008). My analysis interprets anti-aging research using earlier anthropological research into how biomedical technologies are changing assumptions about the relationship between the body, selfhood, and the human condition (Lock 2002; Lock & Nguyen 2018), similar to what has occurred due to 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). The concepts of the body and human selfhood destabilized by these new biomedical technologies were themselves, in turn, partly the result of earlier biomedical discourses, such as immunology (Löwy 1991).

This paper aims to bridge these two sets of findings about how technologies change how the 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, arguments by the medical anthropologists above (and supported by my research) that *biological* technologies may be driving some of these changes (Lock & Nguyen 2018: 3–7).

Among many cryonicists, members of the Human Futures research team 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 (Torsnes 2023).

We have named 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 explicitly linking anti-aging 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, I draw attention to how cryonicists' more modest language (like the 'chosen lifespan': Torsnes 2023) 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 (Torsnes 2023: 34–36). 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 is structured more or less chronologically, using the (controversial[4]) acronym TESCREAL to name the movements that correspond with the shift from Cryonics 1.0 to Cryonics 2.0 – Transhumanism, Extropianism, Singularity, Cosmism, Rationalism, Effective Altruism, and Longtermism. Each half of the acronym pertains to these newer and older versions of cryonics, from the explicit transhumanism of Cryonics 1.0 (TESC-) to the Rationalist-oriented quality of Cryonics 2.0 (-REAL). Sandwiched between these

Fig. 3 & 4 Presentation of the private dewar for Bredo Mørstel in Estes Park, Colorado, USA. Photo: William Dawley, August 2023.

sections on TESC- and -REAL, respectively, are three sections that show evidence of this shift: one section on the anti-aging conferences I attended, where anti-aging medicine has prepared the grounds for a more subtle, 'implicit transhumanism'; another section on our team's ethnographic research on how cryonics providers (including new organisations in Europe and Asia) represent themselves (Torsnes 2023); 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 (Waltorp 2018). But first, the section below reflects on the value of hybrid ethnography and collaborative analysis in the study of cryonicists and other futurists.

Methods: Hybrid ethnography and collaboration with interlocutors

My depiction of Cryonics 2.0 relies on a style of hybrid (online-offline) ethnography that articulates closely with recent trends in ethnography, as well as interviews conducted in a semi-structured life-history format to evoke retrospective accounts of our interlocutors' path to cryonics (and to anti-aging practices as well).

In practice, both online and in-person ethnography were necessary to become familiar with cryonicists and their social worlds, given the preponderance of online meetings over offline ones among most longevity enthusiasts and other futurists. In-person, I attended the 'radical longevity' summit RAADfest in 2022 with Fartein Nilsen and Annelin Eriksen and, in the following two years, I attended both RAADfest and the more 'mainstream' anti-aging research annual conference A4M (the American Academy of Anti-Aging Medicine). I also attended many smaller events, including the Teens and Twenties (T2) event for

young cryonicists in 2023 (a year of returning 'alumni'), Alcor's 2023 annual board meeting and conference (coinciding with the transfer of a privately cryopreserved body of a Norwegian man to Alcor's care) (see Figs. 3–4, 7–8), and the first Global Cryonics Summit (GCS) in July 2024 (where I presented the findings discussed here) (see Figs. 11–12) (Dawley 2024). Yet most of these events were often at least partly broadcast and attended virtually, such as the livestreamed portion of the opening conference of the European Biostasis Foundation (EBF) in Rafz, Switzerland, that I was able to attend (where Tomorrow's cryonicists are in long-term storage). I was also able to spend some time visiting newer and more established cryonics headquarters and facilities (but for a uniquely extensive example of ethnographic research with these organisations, see Torsnes 2023). I also attended some more informal in-person meet-ups, including periodic cryonicist dinner events held in southern California, which have emerged (and reemerged) after the Covid-19 lockdowns. However, even these were organised first online.

'Online,' in fact, is the primary space where cryonicists gather. In-person/hybrid events like those above still remained fewer in number and as a proportion of interactions between cryonicists than their online meetings. Online meetings ranged from being regular, periodic, and special-purpose. Often these online settings allowed me to recruit participants for life-history interviews. And ultimately, the rapport built in combining offline and online interactions made it possible to collaborate and 'interface' with my interlocutors 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).

Figures 5 and 6 below show anonymized examples of these spaces (with the likenesses and names of non-public figures edited out). Many were regular videochat meetings (like the cryonics meeting hosted monthly by Rudi Hoffman (Figure 5), 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 I attended on cryonics, transhumanist, and Rationalist themes. Other cryonics spaces function more like social media. The most continuous and international of

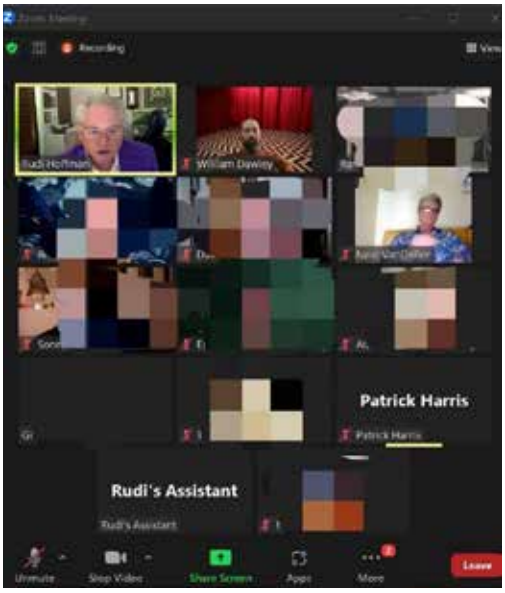

Fig. 5 Monthly cryonics meetup hosted by Rudi Hoffman. Screenshot: William Dawley, January 2024.

Fig. 6 'The Cryosphere' Discord Server announcements page. Screenshot: William Dawley, March 2025.

these, at present, seems to be the 'Cryosphere': the international cryonics Discord server[5] that hosts dozens of subthreads dedicated to different topics, regions, cryonics providers, and languages (Figure 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.

In a way, 'online forums *are* "the cryonics community", for lack of a better term', as one cryonicist jokingly put it in one of the online book clubs I participated in. The remark highlights both the disaggregated quality of the cryonics community and its 'extremely online' quality. 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 the GCS (rather than alongside the 'radical longevity' conference RAADfest, as has been done previously).

Some anthropologists have persuasively argued that hybrid methods are increasingly necessary for many ethnographies of contemporary human lives (Pink, Horst, Hjorth, Postill, Lewis & Tacchi 2016; Przybylski 2016). My 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 I 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 (Dawley 2018), 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 I discuss below). Even the few annual, in-person meetings are simply inconvenient and cost-prohibitive for many: before airfare, RAADfest 2024 cost around $1,000 USD in admission and hotel costs, and it was held outside summer months in the second week of September.

These costs mean such events constitute only a sliver of the cryonics community. Hybrid ethnography allowed me to attend and participate a much broader swath of the cryonics community and its social activity, to contextualize the meanings and representativeness of the in-person events I attended, and to meet interviewees for life-history interviews on several continents. By following along with the same, day-to-day social networks many of my interlocutors did – before and after meeting many of them at in-person events – it was possible to build rapport with them through different channels – the '*multi-access*' advantages of hybrid ethnography promoted by anthropologists like Ruo-Fan Liu (2022). This research also seemed to confirm Liu's argument that hybrid ethnography improves upon 'single-realm ethnography' by offering the ethnographer '*multi-positionality*' within different parts of the community and its events; in my case, the different positions I occupied and forms of participation I used differed in small book clubs or meetings compared to large online chat platforms, offering different perspectives in different ethnographic 'realms'. Attending to these different settings and kinds of participation should ultimately provide a clearer, more accurate representation of the radical longevity community as a whole – including a corrective to my earlier misperceptions about the relationship between cryonics, implicit transhumanism, and 'the Rise of Rationalism', discussed toward the paper's end.

A final advantage of hybrid ethnography is how it can facilitate longstanding ideas about collaboratively produced ethnography (Estalella & Sánchez Criado 2018), with collaboration 'all the way up and down, and alongside, the course of research' (Marcus 2018: xii). The rapport that

resulted from participation in different meetings and settings, particularly from describing my research as an attempt to build a more human and less sensationalistic picture of the community, encouraged a collaborative spirit of analysis, a 'fieldwork as mutually produced *interface* instigated by… curiosity' and the possibility of inhabiting different 'moral worlds' (Waltorp 2018: 126). One high point of this involved an 'interfacing' with leading transhumanists and cryonicists over (non-identifying) survey data gathered by Humanity+ (formerly the World Transhumanist Association) and the 2022 Cryonics Survey, which shaped key parts of my analysis. The Cryonics survey, conducted by Cryonics Underground host Max Marty (2023a–b), is especially salient to this paper, connecting the two halves of Cryonics 2.0 by offering weight to the idea of a dis-identification with explicit transhumanism as well as earlier, more anecdotal observations about the 'Rise of Rationalism'. Marty's willingness to interface closely with me and analyse non-identifying data with me 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 would credit Rationalist-adjacent online communities for having introduced them to 'real-world' cryonics. Probably because this collaboration used data already under discussion in cryonics circles, I 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 I offer here.

Before turning to that ethnography, I offer an overview of the changing relationship between cryonics and transhumanism.

'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, Bernstein 2019). This is characteristic of the phase called the Human Futures research has taken to calling Cryonics 1.0 (cf. Eriksen 2021, 2023, Torsnes 2023). Yet many contemporary cryonicists our team 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 what annual cryonics and anti-aging meetings show about the 'repositioning' of 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) and the first cryopreservation of a human body (James Bedford, in 1967) (Keep 2023).[6] 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 humankind into an augmented, immortal state (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 the survey data and my interviewed seemed to reveal many cryonicists discovering 'real-world' cryonics through Rationalist-adjacent websites like WaitButWhy and LessWrong – often long before they joined a 'CSO' (Cryonics

Service Organisation) or met other cryonicists – so too did the first organised group of transhumanists meet one another online via the 'Extropian' listserv (McClellan 1995; Regis 1994).

One way to distinguish Cryonics 1.0 from Cryonics 2.0 is to distinguish between an early, explicit transhumanism and a recently implicit transhumanism. 'Explicit transhumanism' is an explicit ideology that embraces science and technology as the path to create, not merely new cultural and social forms, but a new 'posthuman' condition, departing from what many assert or take for granted about the human species and condition (Bialecki 2022; Huberman 2021; Farman 2020; Pilsch 2017; Bernstein 2019). 'Implicit transhumanism' is a term that seems to have been suggested almost incidentally by Gennady Stolyarov, the Chair of the US Transhumanist Party (TVES 2020, 15:33); it describes how transhumanist goals, like life extension and human enhancement, have gradually become mainstream thanks to developments in fields like AI and anti-aging. It describes the context for Cryonics 2.0, wherein transhumanism has become relatively more 'mainstreamed' and the transhumanist label itself is frequently shed.

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.' From here, it 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 materials and advanced capacities, to replacing the body entirely.[7] And the *far-future* includes space exploration and colonisation, partly made possible by posthuman forms of life and the 'substrate-independence' of the mind (its transferability to other bodies and mediums).

'Extropianism' captured the sense 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, some three years prior to the Transhumanist Declaration. Like that later declaration, the Extropian Declaration heralded 'a technological transformation … accelerated by genetic engineering, … intelligence intensifiers [,] swifter computers[,] enormous and interconnected databases[,] artificial intelligence, [and] artificial life' (More 1995)

These final aspects of Extropianism have often been conceptualised by transhumanists as a 'Singularity' (the S of TESCREAL): a point in time when self-upgrading AI programs merge into a 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 TESCREAL) preceded transhumanism, Extropianism, and Singularitarianism to some extent. It emerged 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 organisation (CSO).

Most notable here is how the movements of TESC- have imagined immortality and space colonisation together since the Cosmism emerged

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

days. Though Cryonics 2.0 less often articulates cryonics explicitly with space-colonizing, post-human far-futures, this vision remains present in more subtle and implicit ways. For instance, see figure 7 of 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, see below) (FLI 2023).

Those involved in cryonics and anti-aging have leaned instead on hopes that AI might continue to resolve biological research problems, and for good reason. At both the RAADfest and A4M anti-aging conferences, presenters praised AI's 'solution of the protein folding problem' – once considered a nearly-impossible feat (SPARKES 2023) (see fig. 8).

As Figure 9 suggests, even mass media outlets prone to sensationalism and suspicion have depicted AI more favorably when it is used for medical advances. Below, in Figure 9, is another example, here 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):

This shift corresponds with the extent to which 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

Fig. 8 Headline from New Scientist article describing DeepMind AI's decoding of protein folding biology as a 'breakthrough that will speed drug development and revolutionise basic science'. Screenshot: William Dawley, March 2025.

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

work and immortality *per se*, insisting that he merely wanted to do away with age-related morbidities.

To examine this turn toward anti-aging, I turn to different findings from my hybrid ethnography in the following three sections: first, the anti-aging conferences I attended, and the ways in which anti-aging medicine has prepared the grounds for a more subtle, 'implicit transhumanism'; second, the way the growth of new cryonics providers revealed some of these conceptual shifts to Cryonics 2.0 just mentioned; and third, survey data I collaboratively analysed with the survey's designer, in an example of the "interfacing" described in the methods section after the introduction.

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

Two anti-aging conferences – the consumer-facing RAADfest (the Revolution Against Aging and Death festival) and the practitioner- and researcher-facing A4M (American Academy of Anti-Aging Medicine) – reveal how, alongside the growth of anti-aging, anxieties about its nearness to transhumanist hopes make many participants uneasy about hints of explicit or digital forms of transhumanism. While RAADfest occasionally featured some explicit transhumanism, the questions of digital transhumanism and immortalism were more sensitive topics – and A4M avoided them even where they might have cropped up.

After attending RAADfest digitally in 2021, Annelin Eriksen had remarked to members of the Human Futures project how many presentations encouraged activities not remotely identifiable as transhumanist, including guiding the audience members through bone density exercises, addressing sleep quality and vitamin deficiencies, and suggesting blood tests to assess aging-related 'biomarkers'. I attended RAADfest in 2022 with other members of the Human Futures team, and during 2023 and 2024 I also attended both RAADfest and A4M. These anti-aging conferences, fuelled by the mainstream success of researchers on aging like George Church and of anti-aging books like Peter Attia's 2023 bestseller *Outlive*, featured a widespread sensitivity about being associated with more explicit or digital forms of transhumanism, while in other ways making space for more implicit or more biological aspects of transhumanist hopes. And both A4M and RAADfest also featured presentations about more experimental cell and gene therapies for age-reversal, available only at 'offshore clinics' (in countries where they are legal).

RAADfest's organizers persisted in at least some explicit transhumanism, influenced by members of the Coalition for Radical Life Extension, its hosts. RAADfest 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). Finally, 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.[8] And posthuman interests were absent entirely at A4M. Instead, the main focus of RAADfest and A4M was on accelerating research and medical applications: presenters blamed US regulations 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 telomer-

ase, implicated in the aging of chromosomes and their telomeres – the substance tested on Parrish) (Mohammadi & Davis 2016). Her 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. Though a longtime cryonicist, Fahy was celebrated on stage 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.

Indeed, even at RAADfest there was some apparent hostility to explicit transhumanism and post-biological futures. While Parrish and Fahy's achievements seemed to elicit awe in most audience members in 2023 and 2024, many attendees in 2022 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-implanted 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 (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. A4M 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, although the keynote speaker, Peter Diamandis, co-founded Kurzweil's 'Singularity University', his speech avoided any mention of Singularitarian or posthuman futures. Instead, he focused on AI's role in fuelling medical advances, ending aging, and producing a post-scarcity future (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 biological death, but not of biology itself.

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 for observing cryonicists' changing identifications and public discourse: first, in encounters with newer cryonics organisations; and second, in recent survey data from cryonicists (collaboratively analysed by Max Marty and myself, 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 I focus on the presentations and statements of their leaders online and at conferences, 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:

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

By contrast, Yin Feng houses its cryonics services within a larger organisation: the Yinfeng Life Science Research Institute (YLSRI). YLSRI focuses on cryopreservation very broadly, including human tissues and organs – and most commercially, the storage and preservation of reproductive cells for assisted reproductive medicine (see the slide below from GCS 2024):

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

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 his organisation 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).

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

Immortalism, as Sigrid Torsnes (2023: 61–67) has written, is 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, 'Ah, you know, we don't really like that word' – to which the others nodded in assent (Torsnes 2023: 62). As Torsnes argues, 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 I cover near the paper's end), so anything that might have

them labelled 'irrational' or 'a cult' (as several interlocutors mentioned) is avoided (Torsnes 2023: 82–83).

Fig. 13 YouTube video from Tomorrow Bio (2023a), 10 May. Note use of 'cryopreservation' in the main video title. Screenshot: 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). Screenshot: William Dawley, March 2025.

It was this shift that made sense of the frank way in which Emil Kendziorra, head and co-founder of Tomorrow and EBF, asserted during an interview, 'I am not a transhumanist'. As Tomorrow experiences rapid growth, with 800-plus contracts in 27 European countries and six cryopreservations performed by December 2025, Kendziorra has made an effort to present Tomorrow and EBF not only as bringing cryopreservation services and research to Europe (and recently to North America) (see map above) but also as *mainstreaming* cryonics by professionalizing it and by making it otherwise 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) (Torsnes 2023: 6). Figures 14–16 below show some examples of this terminology. These newer terms, together with the anti-aging/rejuvenation language some of the scenes below suggest, constitute a broad effort to portray their services as professionalised '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 professionalisation efforts also include making a licensed physician, Irishikesh Santhosh, head of the cryopreservation team responsible for surgical and SST (standby, stabilisation, and transport) services. It also involves experimentation and training with bodies donated to medical research to improve the outcomes of cryopreservation.

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 in Figures 14–16). 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 attune cryonics with scientific and medical frameworks, such as 'informed consent' about participating in experimental treatments. 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 (Torsnes 2023: 44, 56), which Figures 15 and 16 show, respectively:

CRYONICS Expert Answers Your Questions | Q&A with Dr. Emil Kendziorra | Tomorrow Biostasis

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

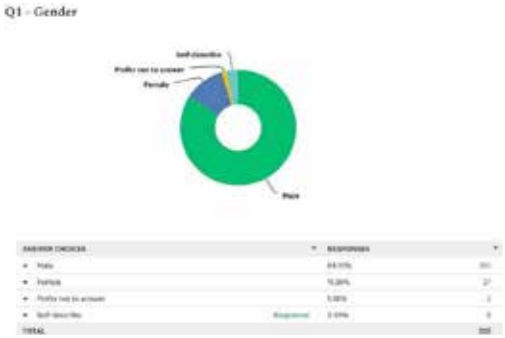

Fig. 16 Gender identities of respondents to the Cryonics Survey of 2022 (Marty 2023b). Graphic: William Dawley, March 2025.

The identities of Cryonics 2.0

This section's analysis derives from a close 'interfacing' with Max Marty in analyzing and re-coding survey data from the Cryonics Survey of 2022, which he designed in collaboration with two unnamed cryonicists (2023a–b). This interfacing itself happened both online and in-person and was probably at least partially made possible by the hybrid methods employed (see the Methods section).

The 2022 Cryonics 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 research team's ethnographic observations, other parts produced, through a collaborative analysis with cryonicists, significant revisions and reinterpretations of our research team's initial findings.

Age and gender data largely matched what 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 (see Figure 17). Around 84% and 11% of total survey respondents identified as male and female, respectively:

The widespread sense that many cryonicists work in 'tech' and had extensive formal education was fleshed out by responses to 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 healthcare (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 were 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.

Similarly, comments about high levels of autism in the cryonics community was corroborated somewhat in the survey. While comparison is difficult, since base-rate estimates for autism spectrum disorder vary highly by method, most estimates remain well within the single digits (Chiarotti & Venerosi 2020; Maenner *et al.* 2021). Yet over 30% of respondents identified

themselves as somewhere on the autism spectrum (Marty 2023a).

The survey also addressed how varied cryonicists' views of biological and post-biological futures are. On one hand, whole-body cryopreservation signups outnumbered 3-to-1 signups for cryopreservation of the head or brain alone (73 to 27%), among those with completed or nearly-completed cryonics contracts (60% of the total). Only a slight majority of respondents thought consciousness could *in principle* exist in digital or non-biological form (between 55–60%, depending on interpretations of valid responses) (Marty 2023b). This suggests a greater (or perhaps persistent) faith in biological futures (versus post-biological ones) than otherwise might be assumed.

A question of whether the self *could* be successfully uploaded (see Figure 18) also divided respondents. Slightly less than half (48.5%) thought a brain that was 'destructively scanned' and then uploaded 'is "you" in the ways that you feel matter'. Yet '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':

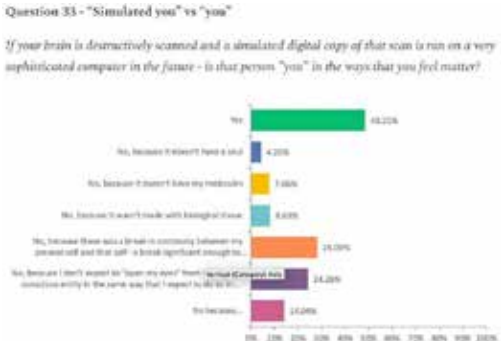

Fig. 17 Respondents answer a question about whether a copy of their brain would be them in the Cryonics Survey of 2022 (Marty 2023b). Note the attention to different ideas about the self, interpreted through technology. Graphic: William Dawley, March 2025.

But the most significant clarification produced by this collaborative 'interfacing' was the second major 'leg' of Cryonics 2.0: the 'Rise of Rationalism' and the growing relationship between cryonics and -REAL (Rationalism, Effective Altruism, and Longtermism). Respondents were given the option to affirm any number of relevant identities, including Transhumanist, Rationalist (or Rationalist-Adjacent), Futurists, and Life Extension Enthusiasts (although Longtermism was unfortunately not included):

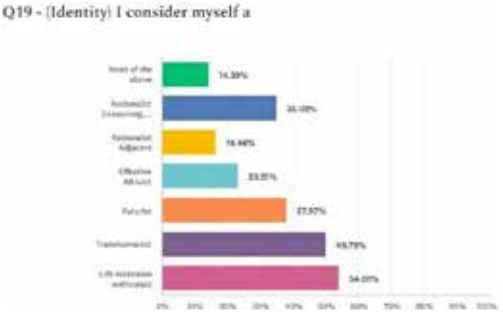

Fig. 18 Respondents answer a question about which identities they consider themselves in the Cryonics Survey of 2022 (Marty 2023b). Graphic: William Dawley, March 2025.

The responses, shown in Figure 19, resonate with the findings of my interviews and observations: they show an increasing identification of cryonicists as Rationalist or Rationalist-Adjacent (which reached 51% when combined) rather than as Transhumanist (just under 50%) (cf. Torsnes 2023: 34–36, 55). They also suggest an even closer association with anti-aging and 'life extension' (54%) than with futurism (38%), which was also surprising.

Still, the relationship between identity shifts and age was more complicated than expected. Yes, younger cryonicists were often increasingly likely to become cryonicists through Rationalist online culture. But older survey respondents (and not just cryonics leadership) had become *significantly less* likely to accept *any* of the identity labels offered, including transhumanism: as the correlations in Table 1 show, age is strongly negatively correlated with identifying as Rationalist and/or Rationalist-Adjacent (p=0.005), or as an

Correlations

		DontConsider	Rationalist	RatAdjacent	Rat+RatAdjacent	EffectiveAltruist	Futurist	Tranhumanist	LEenthusiast	Age (yrs)
DontConsider	Pearson Correlation	1,000	-,289**	-,176**	-,377**	-,217**	-,308**	-,389**	-,423**	,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**	1,000	-,124	,767**	,379**	,204**	,326**	,129*	-,164*
	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**	-,124	1,000	,466**	,139*	,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**	,767**	,466**	1,000	,399**	,169**	,294**	,085	-,185**
	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**	,379**	,139*	,399**	1,000	,197**	,322**	,121	-,187**
	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**	,204**	,014	,169**	,197**	1,000	,331**	,371**	-,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**	,326**	,048	,294**	,322**	,331**	1,000	,330**	-,301**
	Sig. (2-tailed)	,000	,000	,457	,000	,000	,000		,000	,000
	N	244	244	244	244	244	244	244	244	226
LEenthusiast	Pearson Correlation	-,423**	,129*	-,010	,085	,121	,371**	,330**	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*	-,100	-,185**	-,187**	-,014	-,301**	-,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 (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). Photo credit: William Dawley, March 2025

Effective Altruist (0.005) – but even more negatively correlated with Transhumanist identity (0.000).

Further analysis of respondents' Location data showed that the strongest correlation between Location and Transhumanist identity came from a recoding that showed respondents from a country *without* English as the main language. 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' as a cultural phenomenon also seemed to explain one of the most fascinating questions about *how* young cryonicists come to find out about cryonics. Survey respondents were asked to recall where they first learned about *real-world cryonics*. Rationalist and Rationalist-adjacent websites like LessWrong and WaitButWhy were the most recurrent answers (cf. Torsnes 2023: 34–36).

Only age and education were shown to explain whether respondents found real-world cryonics through Rationalist sites. Multiple regression analysis models found that, despite other correlations, only age and (to a lesser extent) having finished a bachelor's degree education appeared to be statistically significant explanations for whether these websites were the initial point-of-contact with real-world cryonics. Together, age and education could explain between 35 and 50% of the likelihood of learning about real-world cryonics through Rationalist-adjacent sites, according to one analysis (see Table 2).

The collaborative analysis that allowed for this closer look at the survey not only helped better explain the constant mention of Rationalist sites during interviews but also pointed to the much broader drift toward Rationalism – one which has until recently not been well elaborated in the existing literature on cryonics. The next section turns to these newer movements: Rationalism, Effective Altruism, and Longtermism – the '-REAL' of the TESCREAL acronym.

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 [illegible] because parameter estimates changed by less than .001.

Classification Table[a]

Observed			Predicted: Other	Predicted: [illegible]	Percentage Correct
Step 1	[illegible]	Other	53	10	84.1
		[illegible]	11	26	[illegible]
	Overall Percentage				[illegible]

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-squared) was between 35 and 50% of the total variation. Graphic: William Dawley, March 2025.

The 'Rise of Rationalism': Rationalism, Effective Altruism, and Longtermism in Cryonics 2.0

Before tracing the rough chronology of each of these movements (and their relationship with cryonics), it is worth describing each of them and their relationships to TESCREAL as a whole. The contemporary Rationalism movement (distinct from the seventeenth-century philosophy) emerged much like transhumanism and Extropianism: as a 'tech movement' or social movement that 'acts on' new technological developments as key to social change (Hepp & Schmitz 2023). Rationalism saw itself as a practical philosophy of shaping the future by 'training and applying' rational and scientific decision-making and by avoiding cognitive biases (OvercomingBias 2024; LessWrong 2019; Kahneman 2011).

In turn, Effective Altruism (EA) and Longtermism are the dominant strains of trying to apply these Rationalist 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 quality of life over time. The EA organisation '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 organisation, 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, 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 as the movement's forefather for his contemporary restatement of this ethical calculus when he argued, in the wake of the Bengali cyclone and the Bengali 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).

'Neartermist' EA thus applies Rationalism to altruism as it is usually understood (as concerned with present or near-term), But 'Longtermists' extend EA into the "long, long term" (Romain 2010). By expanding Singer's equal regard for suffering into the far-future, thus *ignoring temporal distance* as well as geographical or cultural distance, they grant equal weight to future lives.

These long-term calculations quickly depart from Neartermist concerns, invested in preventing an unimaginable proliferation of sentient life (in biological and digital form) over an expansive, Extropian-like future of millions, billions, or even trillions of years from being utterly snuffed out, either by extinction events or by 'unrecoverable dystopias' that might themselves harbour untold number of sufferers (Ord 2020: 138–158; MacAskill 2022: 68–131).

Table 3 and Figure 20 below illustrate why Longtermists consider these expansive far-futures far weightier than concerns about the next 100 years shared not only by Neartermists but also by many global policymaking bodies. Table 3, from *The case for strong Longtermism* by Hillary Greaves & William MacAskill (2021: 8), starts by calculating the Earth's carrying capacity for mammalian life, then shows how this carrying capacity would explode if sentience expanded into digital lifeforms, and finally extrapolates both possibilities into a future where life expands 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 10,000,000,000,000,000,000,000,000,000,000,000,000,000 times greater than the earth's present carrying capacity (10^{10}) for sentient lives throughout an entire century:

Scenario	Duration (centuries)	Carrying capacity (lives per century)	Number of future lives
Earth (mammalian reference class)	10^3	10^{10}	10^{13}
Earth (digital life)	10^3	10^{16}	10^{19}
Solar System	10^5	10^{10}	10^{15}
Solar System (digital life)	10^5	10^{16}	10^{21}
Milky Way	10^{11}	10^{10}	10^{21}
Milky Way (digital life)	10^{11}	10^{16}	10^{27}

Table 3 Future "carrying capacity" scenarios typical of longtermist calculations. From The case for strong Longtermism (Greaves & MacAskill 2021).

Figure 20 shows how the 'weaker' cases for Longtermism still use at least a *million*-year time frame. Even this weaker Longtermism, restricted to earthly, human lives, shapes a very different moral calculus than that used by Neartermists as well as other altruist and most policymakers (Dawley *in progress*), dwarfing all present and past lives by many orders of magnitude:

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

The practical result is that Longtermist goals and organisations look quite different from those of Neartermist EA, as well as those of most altruists and policymakers. Longtermists funnel resources not toward efforts to avoid climate change risks but toward what they argue are more pressing kinds of existential risk ('x-risk'), including civilisational collapse as well as expansive futures of mass suffering for humans and other sentient beings, resulting especially from 'misaligned AI'.

The biography of one cryonicist, Eliezer Yudkowsky, spans roughly the entirety of the TESCREAL movements and illustrates for the reader the 'Rise of Rationalism' found in Cryonics 2.0. As a young person, Yudkowsky participated in the earliest Extropian and transhumanist

communities (e.g., EXTROPIANS 1996). Then, 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 a collection of essays, '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's biography shows a similar shift. In 2000, he had founded the Singularity Institute for Artificial Intelligence (SIAI) to accelerate the development of 'superintelligent, Friendly AI'. But by 2005, he had renamed it the Machine Intelligence Research Institute and refocused on avoiding AI-related x-risk.

Recently, 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.[9]

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). Aside from the two EA institutions noted above, started by EA's founder MACASKILL, there are others committed to more Longtermist visions. These 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 chair).

Rationalism seems be the largest umbrella and the most diffuse movement. I met participants in numerous Rationalist 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) (TORSNES 2023: 34–36). 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 I 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' that shares those cultural values, including preferring efficiency over other values (such as equality), which becomes

truer as they attend more and more elite-identified institutions.[10]

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 emphasizes avoiding the 'Greatest Evil': x-risk. Perhaps, as Anders Sandberg suggested in an interview, 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, 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, my research suggests a shift among cryonicists that the Human Futures research team calls 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' medicine 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 the growing influence of 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 much 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 popularisation of transhumanism's goals, such as life extension, are instead partly due to the growing popularity of anti-aging medicine and biomedical advances (also 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 (Torsnes 55–56). Certainly, the hope persists for preserving the human mind after death, and independent of its biological substrate, as shown by the Longtermist calculations above about 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 the case for cryonics as 'normal' (Yudkowsky 2010), compared to earlier, explicit transhumanism.

Notes

1 Also, over 100 animal bodies have also been preserved, which are not discussed here.
2 A newer form of brain preservation, aldehyde stabilisation, is not included here. It is aimed more at preserving the brain's 'connectome', usually for re-creation rather than revival.
3 This paper is based on three years of hybrid fieldwork among numerous cryonics and anti-aging communities and events and a series of life-history, semi-structured interviews, as part of the Research Council of Norway-funded research team 'Human Futures: Technoscientific Immortality', as well as collaboration with Max Marty on the Cryonics Survey of 2022.
4 The TESCREAL acronym is contentious among my interlocutors (Sennesh & Hughes 2023, esp. n11), being coined by their detractors (Ahuja 2023 and Troy 2023). For this paper, TESCREAL merely provides a convenient chronology.
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– 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, told an interviewer, '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 Few COPL members seemed interested in cryonics when I visited their annual cryonics-themed event, the 'Remembrance of the Resurrectables' (i.e., of the cryopreserved); one organizer estimated that they constituted fewer than 40 of the 150-200 monthly online and in-person attendees. That same year, the leaders of People Unlimited denied any interest in or connection to cryonics, despite Alcor's being down the road – although in June 2024, Bernadeane, one of their founders, was cryopreserved.
9 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) (LessWrong 2025).
10 '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 *et al.* 2015: 1300).

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